



Samling Reforestation (Bintulu) Sdn Bhd

A member of Samling Group of Companies

PUBLIC SUMMARY

Forest Plantation Management Plan

for the

MTCS Area within PAONG LPF/0021

For the period

1st January 2023 to 31st December 2032

Revision Date: 26th January 2026

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Yap Fui Fook

Chief Operating Officer

1. Related Documents and Systems

There are numerous related documents. These are listed in the Document Register held in the PAONG office.

2. The Company

Paong Licensed Planted Forest (PAONG) is an industrial tree plantation (ITP) operating under a Sarawak government licence (LPF/0021) issued to Samling Reforestation (Bintulu) Sdn Bhd (SRB) – a subsidiary of Syarikat Samling Timber Sdn Bhd (SST). The licence was issued on 16 August 2000. It is valid for 60 years and expires 15 August 2060.

Samling is head-quartered in Miri City, in the north of Sarawak, Malaysia.

The use of Samling here and throughout this FPMP refers to the timber and wood products division of the Samling Group.

Samling aims to produce an economically sustainable supply of logs from the PAONG ITP which, when combined with logs from their other ITP areas will support its downstream wood processing activities – plywood, sawn timber, fibreboard, door skins, furniture and furniture components and wood pellets.

Samling is an equal opportunity employer that operates an active safety and health management system.

Additionally, Samling also recognises the value of, and the importance of, its environmental and social responsibilities.

3. Malaysian Timber Certification Scheme (MTCS)

3.1 Our Commitment

Samling is committed to develop and conform to the principle of sustainability on all forested land and potentially forested land held under PAONG LPF/0021 and, in so doing, to comply with the Malaysian Criteria & Indicators for Sustainable Forest Management (MC&I SFM) of the Malaysian Timber Certification Scheme (MTCS) - the MTCS ST 1002:2021 operated by the Malaysian Timber Certification Council (MTCC). It is intended that the ethos of MTCS compliance should be embedded in PAONG's management culture for the whole LPF and not just the area proposed for certification under the MTCS, which, in any event, covers 95.0% of the LPF.

Certification of forest plantation management - and therefore of the plantation logs produced for in-house processing – is very important to the future of Samling. It creates potential marketing and economic advantages for its wood-based products and, more importantly, it will help ensure that management of its resources is carried out under MTCS principles thereby helping to ensure sustainability.

3.2 Certification Requirements

The MTCS requires:

- a) Practicing the guidelines and requirements set out by the nine principles of the MTCS that are the framework of the MC&I SFM.
- b) Developing a sound policy base derived from the nine principles and ensuring they are communicated and followed in the workplace.
- c) Developing open lines of communication involving employees and stakeholders in the development of economically sustainable forest plantation management practices.

- d) Using best practice guidelines in its management regimes. This includes the implementation and continued use of sound, proven and economically viable forest plantation management and environmental, financial and social practices that protect the sustainability of the resources.

3.3 Area Eligible for Certification under MTCS

Section 5.2 and Table 5.1 give details for the determination of the area eligible.

3.4 Certification Status

PAONG was successfully audited for compliance with the MTCS by SIRM QAS International Sdn Bhd in June 2023 with SIRIM's Certificate for Forest Management (Forest Plantation) No. FMC-FP 00120 being issued on 8 March 2024 with expiry on 7 March 2029.

4. Forest Plantation Management

4.1 Statutory Framework

In the main the most recent legislation that effects ITP and environmental management is contained within the Forest (Planted Forests) Rules, 1997 and the Natural Resources and Environment Ordinance, 1993 (Cap. 84).

The outcomes should always adhere to the principle of sustainable ITP management and are controlled in companies such as Samling by the use of these documents as resource consents. These two pieces of legislation therefore act as a method of controlling adverse management effects.

Other are numerous other Acts and Regulations that form the basis of forest plantation management practices at PAONG. These are all listed in the document register held in the PAONG office.

SST's legal department will advise PAONG management of relevant changes in existing legislation and of new legislation as appropriate.

PAONG management keeps "hard" copies of legislation key to its business and management practices on site in the PAONG office and at the Miri HQ. In some cases the legislation is held in PDF format where hard copies are not available. However, amendments to legislation are relatively frequent and there is access to up-to-date acts of parliament through the internet. (Full copies of these acts of parliament may be found at www.agc.gov.my and www.federalgazette.agc.gov.my.)

4.2 Forest Plantation Management Objectives

The forest management objective is the economic production of logs for supply to Samling downstream. This supply is primarily for solid use, i.e., peeler logs and saw logs. However, in achieving this primary objective there are several important supplementary objectives. These are listed below, not in any order of priority:

- maintain the ecological productivity of the ITP – thereby assisting to maintain the value of the forest services;
- ensure a sustainable level of log production at the group level;
- conduct forestry operations in a manner that does not impact negatively on the wellbeing of those people living within and nearby the LPF;
- safeguard the environment of the LPF - thereby assisting to maintain the value of the forest services;

- ensure that natural forest areas are protected from human interference in the Conservation Area SMZs; and
- maximise harvesting recovery.

4.3 Forest Plantation Management Strategy

SRB uses the MTCS principles and criteria to formulate the management strategy in order for PAONG to achieve the objectives set out above.

As the history of the LPF described in Chapter 5 indicates and as is noted in the EIA, the area has a long history of repeated harvesting. The ITP is established in clearly defined areas of this degraded residual forest.

Special Management Zones (SMZ) have been, and continue to be, identified (see Section 4.4). The SMZs invariably contain residual forest which, as it is protected within the SMZ, has a protective function and contributes to conservation values, the enhancement of biodiversity and to carbon sequestration. The area under SMZs represents 39% of the total MTCS area (Table 5.2).

SRB also recognises the importance and significance of international agreements in its management. It will give governing authorities as much cooperation as possible to enforce the regulations of such agreements.

4.4 Special Management Zones (SMZs) in PAONG LPF's MTCS Area

4.4.1 Zone types occurring in PAONG LPF's MTCS Area

SMZs are generally, but not necessarily, those areas of harvested and now degraded residual MDF which do not form a part of the ITP planted area for reasons other than being designated as SA (shifting agriculture) or under land claim. R&D areas, although under special management, are within the ITP management area. Within Sarawak there are a number of possible zone types but only those listed in Table 4.1 below have been identified as occurring within PAONG's MTCS area to date.

Table 4.1: Special Management Zones (SMZs) occurring within PAONG LPF's MTCS Area

Zone Types
Riparian buffer: mandatory; to EIA prescribed widths determined by the water course width
Swampy: (mineral soil)
Rocky and skeletal soils
Steep areas: $\geq 35^\circ$ rare mandatory; upper slopes (i.e. outside riparian buffers)
Gulley: steep riverside areas outside the mandatory buffer zone
Conservation: voluntarily designated as such; otherwise it might have been planted

A zone type may be mandatory, e.g. a riparian buffer zone must be established along permanent water courses – see Table 4.2 – and steep areas in excess of 35° must not be cleared for planting. Elective zone types are those where, for example, at the manager's discretion a wildlife corridor has been demarcated on otherwise plantable land. This would be classed as a conservation area. In reality all the above SMZs are effectively conservation areas and are totally protected from

encroachment. And there are 'Hobson's choice' zone types where the physical characteristics of the site preclude the option of planting, e.g. marshland and skeletal soils.

Table 4.2: Recommended Widths for River Buffer Zone

Width of Permanent Water Course (m)	Width of River Buffer Zone on each side of the river (m)
>40	50
20 - 40	40
10 - 20	20
5 - 10	10
<5	5

Source: Segan EIA Report by Ecosol Consultancy Sdn Bhd.

The types are not mutually exclusive: e.g., a riparian buffer may contain marshland and steep areas. By virtue of being demarcated on the ground, GPS-ed and mapped and then protected from most human activity, SMZs, of whatever type, play a significant role in the conservation of the PAONG LPF's bio-diversity.

4.4.2 Management of SMZs

The guiding management principles are common to all SMZs that are currently identified in PAONG LPF regardless of whether or not they fall within the MTCS area.

The zones are first identified and then demarcated on the ground. Although they must still be demarcated, the boundaries of steep areas, skeletal soils and marshland are more or less self-defining whilst the boundaries of riparian buffers must be carefully located to ensure compliance. Once clearly demarcated on the ground all SMZs are protected and, apart from the removal of any planted merchantable exotic trees and access by local people for traditional purposes (and such use is negligible). There should be no invasive human activity within them. However, incursion can and does take place but most in cases management does not have the authority to take any action other than to make an official report to the relevant government agency.

Where mangium (or any other exotic ITP species) was originally planted in the RBZ the intention is to remove it when harvesting the adjacent block. Harvesting will be undertaken with minimum damage leaving the residual vegetation to recover and to continue to develop over the ensuing years. The removal of the exotics can be considered as assisting the natural process of recovery and reversion. The use of machinery, other than chain saws, in an RBZ is prohibited.

Following demarcation and the removal of any merchantable exotic trees, no further invasive action in these SMZs is allowed. This protection will allow the SMZs to develop in structure and bio-diversity.

Table 5.2 in the following chapter shows the distribution of SMZ types. The major SMZ type is that of the Conservation Areas (formerly, and sometimes still, called green belts) which in total covers 6,666 ha; this is just over 39% of the Protected Area.

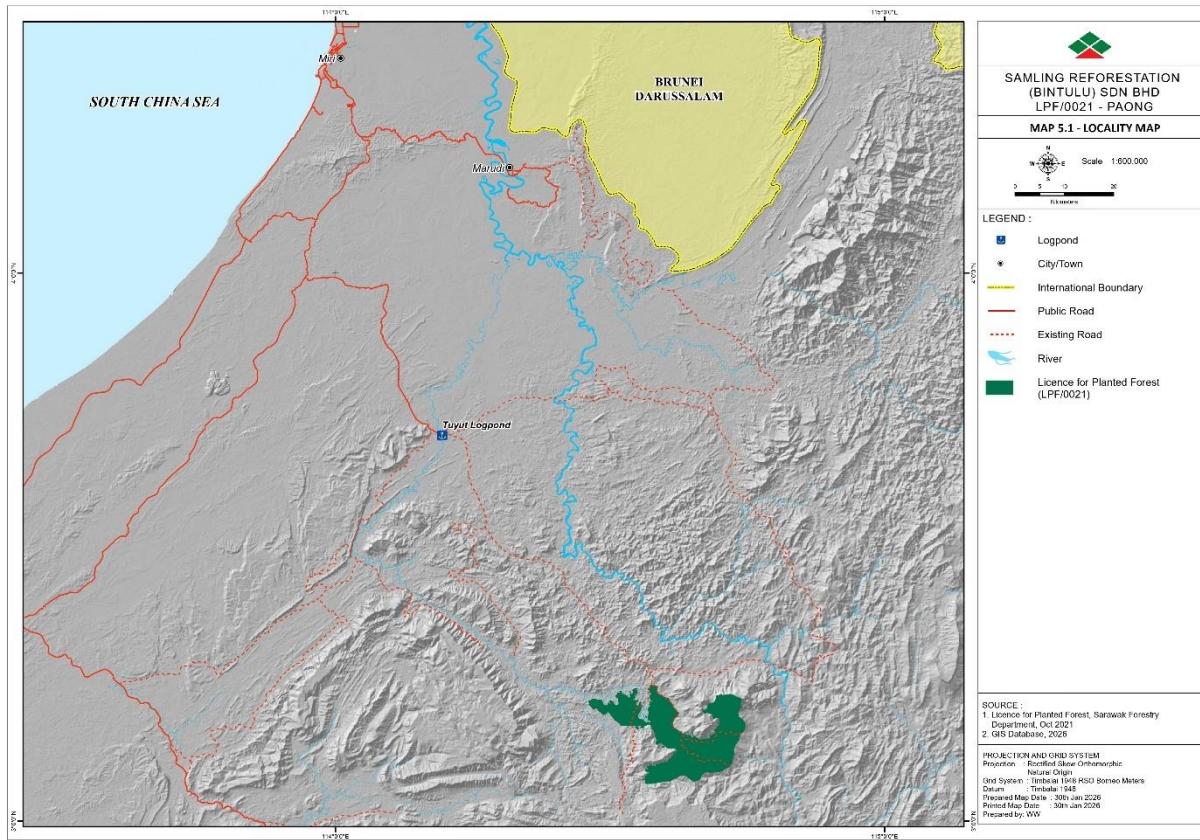
5. Resource Description

5.1 History and Land Status

5.1.1 Introduction

This history more or less refers only to the area now known as Paong LPF, the location of which is shown in **Map 5.1**. shows the present boundaries of the LPF.

Map 5.1: Locality Map



5.1.2 Forest Timber Licences

The licensing history is not well known. At some time in the late 1970s, a forest timber licence (FTL) was issued covering most of what was known as FAO Unit 8 together with some adjoining State land. Initially this area was licensed to STIDC as T/0233 which was then re-issued to Samling Plywood (Lawas) Sdn Bhd as T/0404 for a period of 20 years expiring in 2013. On expiry, T/0404 was renewed for a further 20 years to May 2033 ((WPO.628.319.29(VI))-75 dated 3rd January 2013). A large part of T/0404 was designated as LPF/0021 (Map 5.1) to become ITP on completion of harvesting of the natural forest.

5.1.3 Past Harvesting

The terms and conditions attached to the original FTL are not known. The first revision of the Tinjar-Paong Management Plan, dated 1st April 1982, gave DBH cutting limits as the usual 45cm/60cm – non-dipterocarp/dipterocarp. It also stated that all merchantable trees of obligatory species of 45+cm on State land must be harvested. The cutting cycle is stated as 25 years for the FAO Unit 8 area.

Up to 100 m³/ha of merchantable logs might have been harvested in the first cycle. This would inevitably result in a significant degree of damage to the remaining trees and saplings with the actual degree being more or less proportional to the volume removed. Thus, the structure of the post-harvest forest would rarely if ever approximate that of the undisturbed 'natural forest' or the 'native ecosystem' or to use more common term, the 'primary forest'. If an area has been subject to more than one cycle of harvesting, then its structure and diversity would have been further compromised.

On an area designated for conversion to LPF the FTL holder, after completion of harvesting, surrenders the completed coupe to the LPF holder. The LPF holder then applies to SFC under the Permit to Enter Coupe (PEC) system, first for Operations 1 to 4 cover the demarcation of coupe and block boundaries, road alignment etc., all of which would have been done under the FTL's operation. Following inspection by SFC, Operation 5 is then applied for. This allows the LPF holder to clear areas in preparation for planting at which time any residual merchantable trees would be extracted (an operation known as 'salvage'). If the area has been subject to more than one cutting cycle then the residual merchantable volume will be very low or even non-existent. (In the LPF licence, page 6, it states that "...*The existing Mixed Dipterocarp Forest had been logged at least twice and had lost its original form and structure...*")

5.1.4 Conversion of primary forest

As has been noted in the preceding sections, the natural forest within the LPF has been subjected to harvesting since the mid-1970s. Consequently, no undisturbed primary forest was known to remain within areas identified as suitable for ITP at the time the LPF licence was issued in August 2000. Under the LPF licence conditions, the substantial areas of Terrain Class IV (TCIV $\geq 35^{\circ}$) are excluded from the plantable area. Much of TCIV would have been subject to at least one and possibly two cycles of helicopter logging. This means that almost all, if not all, the conservation areas are residual MDF, having been harvested at least twice either by helicopter or ground based equipment.

This means that no primary forest has been converted to ITP within the LPF area. Furthermore, no primary forest remains for conversion.

5.2 Determination of the Area Eligible for Certification under MTCS

5.2.1 PAONG LPF's eligibility

ITP on land converted after 31st December 2010 is not eligible for forest management certification. PAONG LPF is fortunate in that clearing of residual forest and planting started relatively early with the first areas planted in 2003 - three years after Segar LPF (LPF/0014), which is Samling's oldest.

Table 5.1 shows that 17,119.5 ha were endorsed by the FDS for conversion to ITP prior to the MTCS cut-off date of 31 December 2010. This is the *gross plantable* area and includes areas which, on detailed survey, were found to be not suitable for planting - because too steep, wet, gullied, etc. It also includes areas that, whilst plantable, are currently claimed by natives. This means that the actual planted area of 8,437 ha is considerably less than might be indicated by the GIS PEC area. Table 5.1 also shows the distribution of the 24,834 ha of the total MTCS area, i.e. including ITP areas, non-forest land and protected forest areas, across each of the eight coupes that comprise the LPF. The gross area of what is technically plantable but currently under investigation is also shown under ITP Production Area.

Whilst there are areas of shifting agriculture (SA) within the boundaries of the LPF, the conditions of the licence specifically exclude them from consideration for planting unless an agreement with the natives to do so has been made with Operations. There is no SA within the MTCS area. The simple area breakdown of PAONG LPF as given by FDS is:

	(ha)
Area under MTCS	24,834
Shifting agriculture	1,285
Road buffer	11
LPF area	26,124

Unfortunately, FDS has not supplied a shape file and so the LPF boundary must be digitised from the map supplied by FDS. This results in Samling's GIS measurement of the LPF area being 26,130 ha - a 6 ha discrepancy.

Fortunately, there is agreement on the MTCS area, for which a detailed area statement is shown in Table 5.2.

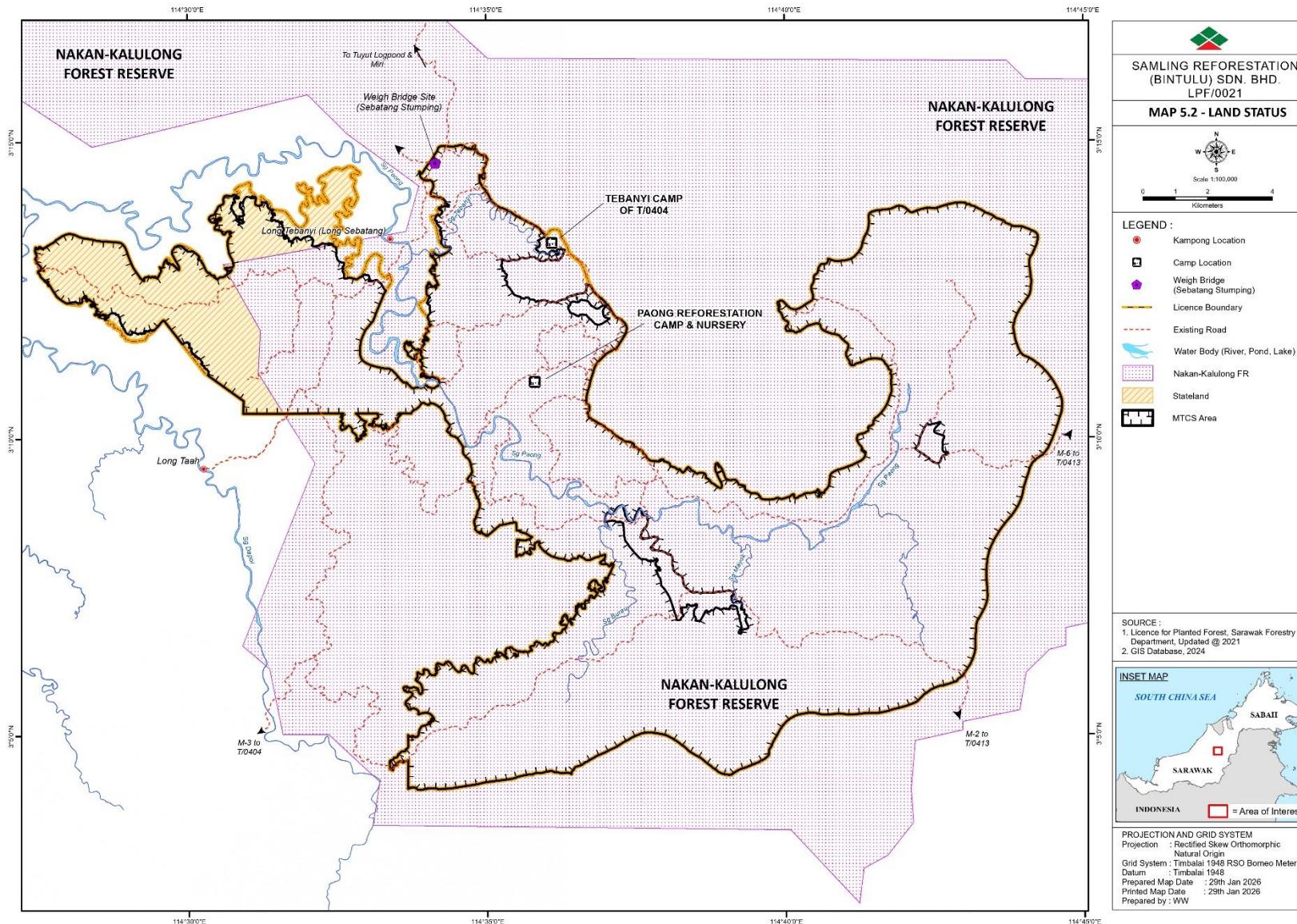
5.2.2 Determination of the area eligible for MTCS

The eligible area was determined through the application of the FDS's operational control system known as Permit to Enter Coupe (PEC). Table 5.1 lists the coupes and blocks and the dates the blocks were endorsed by FDS for Operation 5. The original PEC area was revised on a coupe by coupe basis consequent of FDS revising the LPF boundaries. This boundary revision resulted in some LPF blocks falling outside the revised LPF boundary and into Samling's Sekiwa FMU, the adjacent forest timber licence T/0404. All of these blocks were unplanted. The location of the MTCS area is shown on **Map 5.3**.

5.3 Geology and Soils

For the geology and soils reference should be made to the EIA which gives a very concise overview of the geology of the LPF. It also gives a quite detailed, useful summary of the soils although these are only been documented at reconnaissance level.

Map 5.2: Land Status



Map 5.3: MTCS Area within Paong LPF/0021

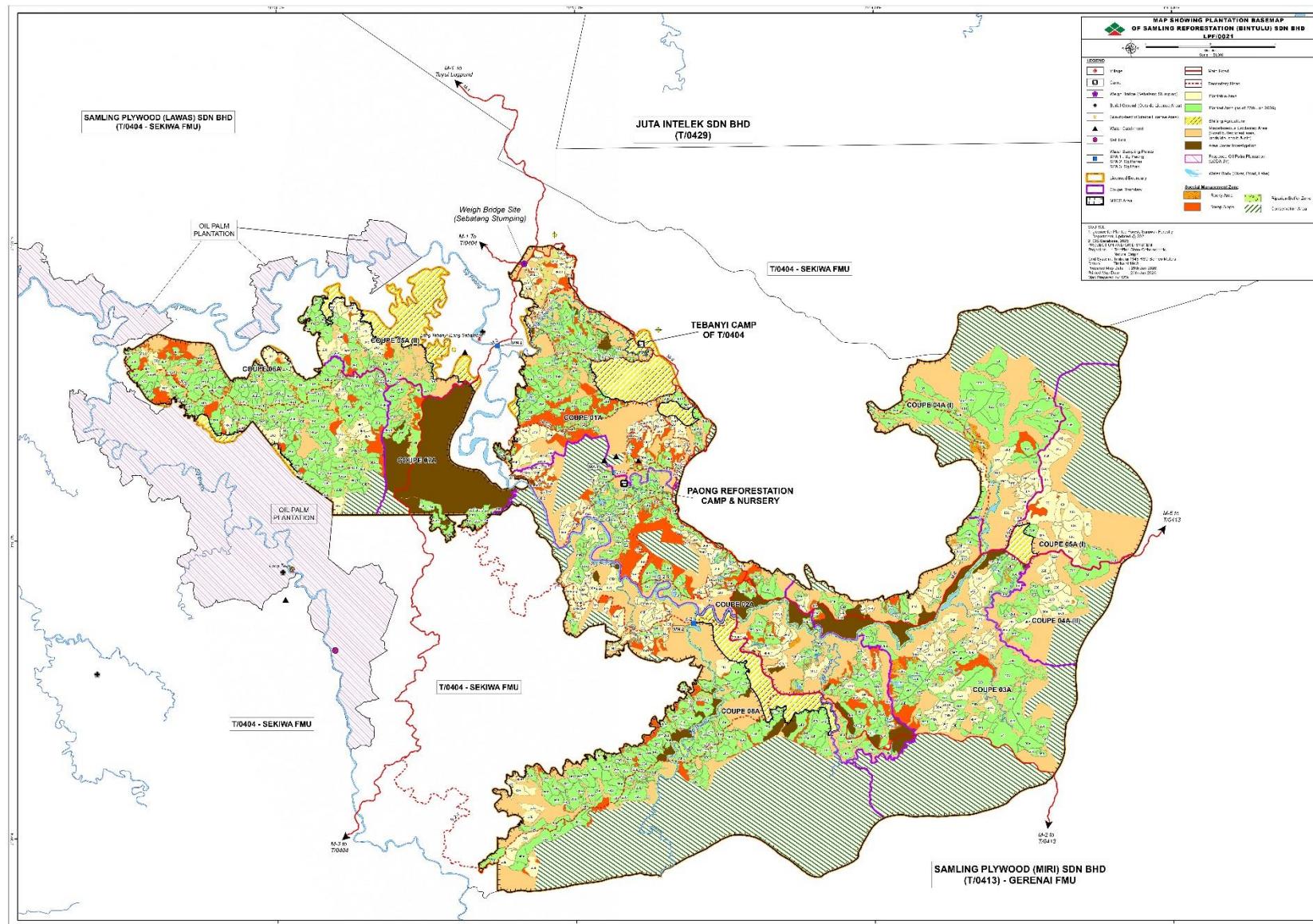


Table 5.2: SEGAN (LPF/0014) – Area Statement Paong MTCS Area at 31st December 2025 (hectares).

Land Type	Gross Area ha %	Non-Productive ⁴ Area										ITP Productive Area					
		Non-Forested Areas					Protected Forested Area					Total	1) Planted ²	2) Plantable ³	3) TUP	4) Area Under Investigation ⁷	Total
		SA	Water	Road line	Others ¹	Total Non-Forested Area	Conservation ⁵	Buffer Zone	Gully	Steep	Total Protected Area						
Mineral	24,834	0	277	339	4,456	5,072	6,666	684	1,262	1,175	9,787	14,859	6,641	27	1,980	1,327	9,975
Total	24,834	0	277	339	4,456	5,072	6,666	684	1,262	1,175	9,787	14,859	6,641	27	1,980	1,327	9,975
% Distribution - Certification Area	0%	1%	1%	18%	20%	27%	3%	5%	5%	39%	60%	27%	0%	8%	5%	40%	
% Distribution - Non-productive ⁵ & Productive Area	0%	2%	2%	30%	34%	45%	5%	8%	8%	66%	100%	67%	0%	20%	13%	100%	

Sources: LPF Licence, Block Master

Block Update As of: 05/01/2026

Layer used: C:\Mapping\Temp\2026\01_January\MTCS\L21\21_block_update_20251231_mtcs.shp

1) Rocky, swampy & sandy areas, proposed nursery, misc unplanted area & others

2) See Note in Chapter 5, regarding the minor discrepancy between this figure & that shown in Table 5.4

3) Approved under PEC Opt5 on or before 31st December 2010; assessed as plantable but still not recorded as planted at map record date

4) Non-productive as in not producing industrial timber

5) International Buffer Zone, kerangas forest, green belt & water catchments

6) This is lower than the approved PEC gross operable area because the latter is gross & includes unplantable areas

7) These area areas which require investigation in order to determine if they can be planted

5.4 Land Use and Status

The Licence for Planted Forest (LPF/0021) became effective on 8th December 1998 for a period of 60 years. It is located in the Telang Usan District of the Miri Division. (See Map 5.1). The area designated for MTCS lies entirely within LPF/0021 (See Map 5.3). The whole LPF is on mineral soils. An area statement for land use in the MTCS area is given in Table 5.2. In Table 5.3 the relationships between the MTCS area, the Nakan-Kalulong F.R. and State land that comprise the PAONG LPF are shown. It is notable that the MTCS area constitutes 95% of the total LPF area and that 91.8% of it is within the forest reserve as shown in Map 5.2.

Table 5.3: PAONG LPF – relationship with Nakan-Kalulong F.R. and State land

Location	ha	%	Note
Paong LPF area	26,130	100.0%	
of which	23,702	90.7%	is inside Nakan-Kalulong FR
Balance of	2,428	9.3%	is State land
Paong MTCS area	24,834	100.0%	
of which	22,804	91.8%	is inside Nakan-Kalulong FR
Balance of	2,030	8.2%	is State land
Paong LPF area	26,130	100.0%	
Paong MTCS area	24,834	95.0%	
LPF area outside MTCS	1,296	5.0%	

Source: Samling GIS; Paong FMP Tabs 5.1 etc

Reference to the gazette notification for the Nakan-Kalulong Forest Reserve (**Appendix 4**) shows that no rights or privileges within the forest reserve were admitted to any specific individual nor to any community.

5.5 Industrial Tree Plantation (ITP) Resource in the MTCS

5.5.1 Resource utilisation

Harvesting started in September 2021. Much of the area is over mature as can be seen in Fig. 5.1.

5.5.2 Species distribution

Table 5.4 shows the major species and year of planting (YOP) for the MTCS ITP resource at 31st December 2025 as extracted from the Block Master at that date.

There are two important points to note regarding Table 5.4.:

- *E. pellita* represents 31.9% of the planted area; and
- Most of the mangium is a failed crop and will yield little of no commercial volume.

N.B. The areas in Table 5.4 are those which passed post-plant QC. Table 5.4 also includes a few small areas which were planted but are considered to have failed following establishment and which might be re-planted before rotation age.

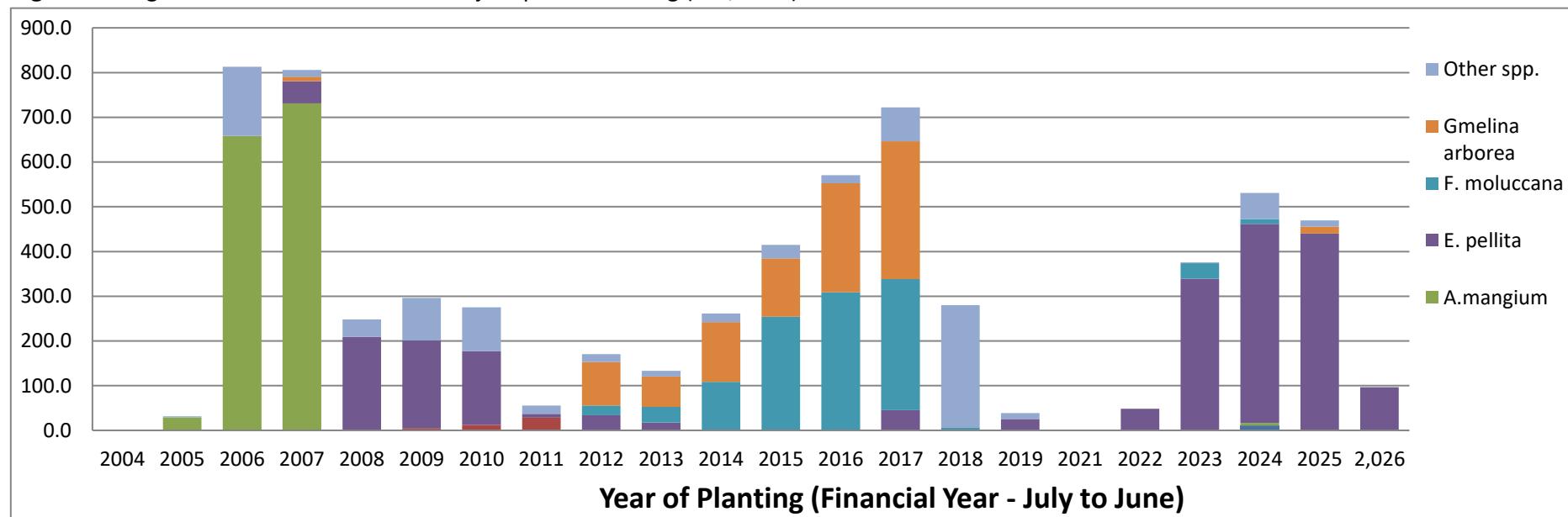
The age class distribution of the resource in the MTCS area for six named species, and all other species combined, is shown in Figure 5.1.

The age class distribution is highly skewed. With a weighted average rotation age of around 10 years the annual area harvested on a 'normalised forest basis' would be about 850 ha. The harvesting plan takes in to account the desirability of attaining a more normal forest structure, together with the fact that almost all the mangium blocks have failed and will yield little or no harvestable volume, when determining the annual cut in terms of area and volume.

Table 5.4: Species and Year of Planting for Paong MTCS Area at 31st December 2025

Species	Year of Planting (YOP)																					Grand Total	%	
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2021	2022	2023	2024	2025	2,026		
<i>A. crassicarpa</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.6	-	-	10.6	0.2	
<i>A. hybrid</i>	-	-	-	-	-	4.9	12.3	28.4	-	-	-	-	-	-	-	-	-	-	-	-	-	45.6	0.7	
<i>A.mangium</i>	-	29.3	658.4	731.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.0	-	-	1,425.0	21.5	
<i>E. pellita</i>	0.5	-	-	49.6	209.0	196.0	165.1	8.6	33.8	17.5	-	-	-	45.2	-	25.5	-	48.3	338.9	445.0	439.7	96.4	2,119.1	31.9
<i>F. moluccana</i>	-	-	-	-	-	-	-	21.8	34.8	108.2	253.8	308.9	292.9	5.4	-	1.4	-	35.1	11.0	-	-	1,073.1	16.2	
<i>Gmelina arborea</i>	-	-	-	9.8	-	-	-	-	97.3	68.1	133.8	131.1	243.6	308.4	-	-	-	-	-	-	16.1	-	1,008.1	15.2
Other spp.	-	1.9	155.0	15.3	39.1	95.3	97.5	18.7	17.8	12.8	19.5	30.0	18.3	75.7	274.7	13.1	-	-	1.8	58.1	13.6	0.8	959.1	14.4
Grand Total	0.5	31.3	813.3	806.0	248.1	296.2	274.9	55.6	170.6	133.1	261.5	414.9	570.8	722.1	280.1	38.6	1.4	48.3	375.8	530.7	469.5	97.2	6,640.6	100

Source: MTCS Area Block Update at 31st December 2025.

Figure 5.1: Age Class Distribution for the Major Species – Paong (LPF/0021) at 31st December 2025.

5.5.3 Sustainability of production

When considering sustainability of production, it should be kept in mind that Samling's downstream is also supported by log production from Samling's other ITPs. In order to ensure a more or less regular log flow to the mills it is, therefore, Samling's *total log flow* that must be sustainable and not necessarily that of any individual LPF. (See also Ch.10). Furthermore, as noted in the previous paragraph, the area that might be harvested on an annual basis is far too small for economic annual production.

5.5.4 Risks faced by the resource

Disease

A *Ceratocystis* sp. has been present in PAONG LPF for some time and has resulted in the death of a number of *A. mangium*. Management must always be aware of the possibility that the incidence of damage and death will reach the epidemic proportions already experienced in Sumatra and, to a lesser extent, in Sabah and of the impact that this will have on the AAC – and on future species selection. However, in PAONG *A. mangium* had in great part already failed before the arrival of the *Ceratocystis* sp. and, as reference to Fig. 5.1 shows, it is not been planted, other than for an R&D trial, since 2007.

Fire

All forest plantations are at serious risk to fire at some stage in their development. It is the responsibility of management to reduce the risk where possible and be prepared to deal with any incidence of fire that might be within its area of responsibility and to assist in dealing with fire in nearby neighbouring areas.

Flood

There are no parts of the MTCS area that are subject to serious, prolonged flooding.

Wind blow

Experience on the peat at Segan has shown that wind damage can be severe. Mangium and its hybrid might be more prone: a stark example of this was observed with two adjacent blocks, one of pellita and the other of mangium: the latter was flattened but the former remained standing. Elsewhere pellita is seen to suffer but, perhaps surprisingly, not from uprooting but from both stem break and the stems bending – something from which they did not recover. However, if the water table is too high then blow may occur.

However, on the mineral soils of PAONG LPF, wind damage, whilst it might be severe very locally, has not yet been wide spread. When wind blow does occur, it gives the impression that the trees have been struck by a strong wind on a very a narrow front – a line squall. But, of course, the damage is accumulative over the rotation period and could have a significant effect on yield.

5.6 Forest Carbon Stocks and High Carbon Stock Areas (HCS)

The previous edition of the MTCC's MC&I (MC&I Forest Plantation.v2) did not stipulate any requirements regarding forest carbon stock. The revised version, the MC&I SFM, which came into force 1st January 2021, does mention forest carbon stocks under Indicator 6.1.2 in terms consideration of the impacts [of the LPF's activities] on forest carbon stocks. The 9,787 ha (39.0%) of the MTCS area that is under natural forest and protected as SMZs, is a significant forest carbon stock that increases as the heavily disturbed MDF continues to recover, grow and to sequester carbon dioxide in the process.

High carbon stock is mentioned under Indicator 6.12 with specific reference made to *afforestation of non-forest lands*.

6. Environmental Considerations

6.1. Environmental Limitations

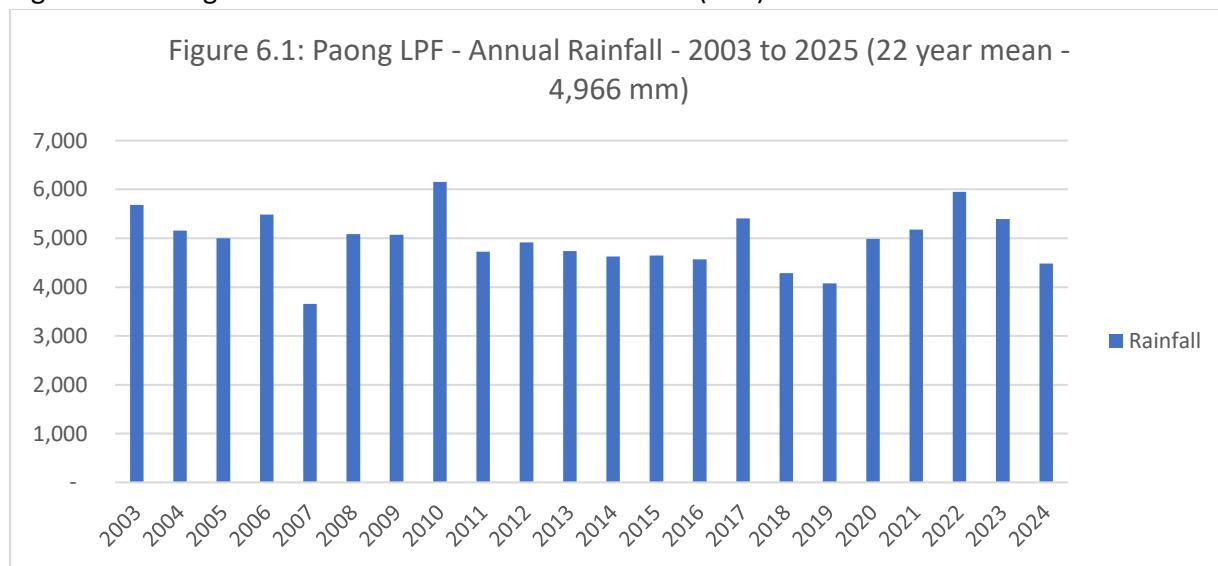
6.1.1 Introduction

There are few environmental limitations for ITP in the LPF area. Similarly, for the MTCS area where the main limitation is the broken terrain with short, steep slopes on relatively fragile soils leading to a potential for increased erosion. A further limitation is that the combination of high rainfall and broken terrain gives rise to an intricate network of small streams. There are thus numerous water courses that must be buffered with protective strips of residual natural forest or unplanted land of widths determined by the prescription set out in the EIA and shown in Table 4.2.

6.1.2 Rainfall

The average annual rainfall recorded over 20 years at PAONG nursery is 4,966mm. It has ranged from 3,658mm (2007) to 6,157mm (2010) and has averaged 19 rain days a month and 232 rain days a year. Any given month in the year might be either the driest or the wettest in that year. The driest month is August 2007 with 102mm and the wettest is October 2005 with 824mm. This relatively high annual rainfall with frequent rain days and no truly distinct seasons¹ impacts heavily on the efficient use of both labour and equipment and thus on operational costs.

Figure 6.1 Paong LPF: Annual Rainfall - 2003 To 2024 (mm)



Source: Rainfall LPFs

Table 6.1: Paong LPF Average monthly rainfall and rain days 2003 to 2024

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave	Annual
mm	485	371	413	432	430	378	332	325	376	401	528	494	414	4,966
days	22	19	19	19	20	17	16	16	17	19	23	23	19	232

Source: Rainfall LPFs

¹ November, December & January contribute 30% to the total annual rainfall, whilst June, July & August contribute 20%.

6.1.3 Access

The high level and frequency of the rainfall and steep terrain makes access to some areas difficult, and even impossible at times, especially during the wetter season (November to January inclusive) when ungravelled roads can quickly become slippery and temporarily unusable. Because of this it is not realistic to plan for reliable harvesting and transporting on a year-round basis. To ensure a regular log supply a buffer stock will have to be built up at an all-weather depot, or at the mill, or both, before the onset of the wetter season.

6.1.4 Harvesting

Harvesting will be predominantly by shovel yarder with shovel extraction close to the roads. This combination makes for reasonably efficient extraction in the broken terrain whilst minimising the environmental impact, especially soil disturbance that can lead both to compaction and to increased erosion. Ground skidding may be used in the few areas where the access and topography restrict the efficient use of a shovel yarding/shovel extraction combination but must be kept to the absolute minimum to avoid serious site damage and compromising the productivity of the next rotation.

6.2. The Environmental Management Plan² (EMP)

The EMP (DOC(PLAN)02) is a stand-alone document to which reference should be made for details. Elements of the EMP are referred to in various sections of this FPMP. Some of the essential points regarding environmental impact mitigation measures are restated below in Section 6.3.

6.3. Environmental Impact Mitigation

6.3.1. Soil erosion

Mechanised operations in areas of steep slopes and high rainfall inevitably give rise to increased soil erosion. This is kept to a minimum firstly by using the most appropriate harvesting systems. Secondly, where new roads must be constructed, by ensuring good road alignment and by construction that conforms to the FDS standards – which is necessary in order to obtain a PHC (Permit to Harvest Coupe). Thirdly, by ensuring that any extensions of spur roads and clearing of new landings to facilitate extraction and loading are kept to the minimum necessary for efficient operation.

Section 10.2 describes the shovel yarder system that is the main extraction method. The use of this system minimises soil erosion and compaction by reducing the need to enter the harvest block with ground-based machinery. Where the terrain allows, operation efficiency requires the use of shovel extraction (excavators with grapples) to extract from roadside strips.

6.3.2. Water quality

Maintenance of water quality is in part achieved by minimising soil erosion (6.3.1) and by keeping fertiliser leaching and herbicide run off to the minimum. Fertiliser use is exceptionally low - less than 70kg/ha. The herbicide load is also low with 4 to 5 litres/ha applied each round. The active ingredient of the main herbicide used is glyphosate which is generally considered to be toxicologically and environmentally more benign than most of the other herbicides currently available.

² EMP for the Replanting of Coupes 01A -08A of Paong Forest Plantation. Ecosol Consultancy Sdn Bhd September 2021 (NREB/6 -3/2H/52)

To date PAONG LPF has not used insecticides in the field. However, experience with *Gmelina* in other ITPs indicates that there might be a need for very restricted use of a termiticide. However, it would only be used in response to attack and, as *Gmelina* is not currently planted, this is unlikely to be an issue.

Sewage disposal in the camp is by means of cess pits and in the plantation by long drop latrines. All used oil from in-field oil changes is brought back to the workshop for controlled recycling or for disposal as scheduled waste.

Water quality is monitored by means of water sampling whereby samples are taken quarterly from sampling points identified by the EIA. These samples are analysed by an external laboratory with the results submitted to NREB and presented within the external consultant's quarterly Environmental Monitoring Report (EMR). Reference to these reports will confirm that, to date, the results have always been within NREB acceptable parameters or in other ways compliant with the standards set in the EIA. (The most recent results appear in Samling's website.)

6.3.3. River buffer zones (also known as riparian buffer zones) – RBZ

Riparian buffer zones are established in accordance with the EIA recommendation (See the EMP and Table 4.2). The objective is to establish a well-defined strip of land - a buffer - that will help to protect the river bank and the river bank eco-system at least for the currency of the LPF. This will reduce soil erosion and thereby reduce the amount of sediment moving into the water courses. Establishing and then protecting riparian buffer zones also maintains, and over the longer term enhances, the biodiversity of the area. There is currently 1,930 ha of RBZ within the MTCS area. It is expected that the RBZ area will increase following demarcation prior to the harvesting of the first rotation and re-demarcation prior to planting: this has been the experience in other LPFs.

6.3.4. Zero burning

There will be a 'zero burn policy' for the preparation of second rotation sites for re-planting after harvesting. This practice has the benefit of reducing air pollution; conserving the organic carbon content of the top soil and improving the overall nutrient status and condition of the soil. (Where the first crop was *Acacia*, burning for second rotation site preparation usually results in very dense natural regeneration of acacia seedlings. This gives rise to very heavy competition for the planted seedlings.)

'Zero burn' also removes the ever-present danger of a controlled burn getting out of hand. However, there are negative factors arising from a 'zero burn' policy: even on the second rotation, planting is more difficult than would be the case on a clean burnt area, especially where a very thick fern layer has built up. Furthermore, in dry periods the presence of large amounts of flammable debris presents a serious fire hazard that remains for some time after planting.

6.3.5. Integrated pest management (Use of chemicals)

Apart from the insecticides and fungicides used, unavoidably, in the nursery only herbicides and fertiliser are used in the plantation. As stated in 6.3.2, both are used at low, or very low, rates of application. To review its use of chemicals in ITP, and in an attempt to further reduce such usage, Samling recently commissioned an Integrated Pest Management Framework; this is in the process of being finalised (March 2022).

6.4. Environmental Safeguards

6.4.1 Environmental Quality Monitoring

Previously, Environmental Monitoring Report (EMR), which was submitted quarterly to NREB reports on the environmental status of a project. With the full implementation of the NRE (Audit) Rules 2008, EMR will be migrated to Environmental Compliance Audit, Chapter 5: Environmental Status. Table below showing the result of water quality analysis as of October 2025.

Table 6.2: Water sample analysis result as of October 2025.

Parameters	Unit	Compliance Limits*	1st IECA			2nd IECA		
			SPA1	SPA2	SPA3	SPA1	SPA2	SPA3
			27/Mar/2025			24/Nov/2025		
pH Value*	-	6 – 9	7.0	6.6	6.9	6.8	6.8	7.2
Dissolved Oxygen*	mg/L	5 – 7	5.6	5.5	5.5	4.2	3.5	3.8
Temperature*	°C	-	21.9	20.4	20.7	27.4	27.5	27.4
Turbidity*	NTU	50	38.1	37.5	37.4	10.0	7.7	1.3
Biochemical Oxygen Demand	mg/L	3	2	2	9	2	3	3
Chemical Oxygen Demand	mg/L	25	8	12	47	50	58	52
Total Suspended Solid	mg/L	50	4	5	20	14	5	3
Total Dissolved Solid	mg/L	-	13.4	15.4	26.6	24.3	22.7	26.3
Ammoniacal Nitrogen	mg/L	0.3	0.14	0.17	0.74	N.D(<0.2)	N.D(<0.2)	N.D(<0.2)
Nitrate Nitrogen	mg/L	7	-	-	-	0.060	0.048	N.D(<0.04)
Phosphate	mg/L	0.2	-	-	-	0.064	0.031	0.049
Oil & Grease	mg/L	40	N.D(<1)	N.D(<1)	N.D(<1)	N.D(<1)	N.D(<1)	N.D(<1)
Total Coliform Count	MPN/100mL	5000	70	170	2800	16000	1400	2800
Faecal Coliform Count	MPN/100mL	400	23	79	240	2200	700	1100

6.4.1. Use of chemicals

As stated in 6.3.5 chemicals are used in both in the nursery and in the blocks (but only herbicides) at very low rates of application.

PAONG acknowledges that under current best practice, applications of herbicides are necessary to ensure an acceptable survival rate as well as prevent increment loss through the competitive effects of weeds. The ERP (Enterprise Resource Planning) system records the type and quantity of chemicals used in forest operations and the rate of application is recorded on a block by block basis with the results reported monthly in the Block Consumption Report.

However, PAONG will always actively seek management practices that reduce the amount of chemical entering the environment of its LPF. This is of benefit not only to the environment but also to SRB as chemicals are expensive to procure and apply. Reducing these activities would have a substantial financial as well as environmental benefit to PAONG.

Training also provides best practice guidelines and protocols for the proper use of chemicals in terms of human and environmental safety and economic application and for the safe disposal of the containers in which chemicals were supplied.

6.4.2. Water course quality

As mentioned in 6.3.2 under the LPF licence conditions PAONG was required to monitor water quality of the LPF's water courses. This is done four times a year with analysis undertaken by an independent laboratory and the results reported in the EMR.

6.4.3. Monitoring exotic plant introductions

PAONG's management is aware of the potential problems that might arise from the introduction of exotic species. However, no exotic species grown by SRB has been identified as an invasive plant pest by any Sarawak government agency. Furthermore, only two exotic genera (*Eucalyptus*, *Falcatoria* and *Gmelina*) are currently planted commercially (as opposed to trialled). Both are known to regenerate naturally, to a greater or lesser degree, under PAONG's conditions but this not is considered to be an adverse environmental impact.

To date, no exotic ITP species is known to have invaded areas outside either the LPF or the MTCS area. *A. mangium* – no longer planted in Paong – and *A. crassicarpa* are pioneering, short-lived light demanders and are only known to regenerate freely in open areas, e.g. burnt-over SA. In any hill paddy cropping cycle areas of SA, regeneration of *Acacia* might be considered as beneficial because it both protects and, as a nitrogen-fixer, improves the soil.

Even in the event that seed should germinate, then *E. pellita* seedlings will find it difficult to compete with the strong weed competition. *Gmelina*, whilst it does regenerate naturally in Sarawak, is not known anywhere to be invasive. *Falcata* (batai), although something of a pioneering light demander, has not been known to be invasive under Sarawak's conditions.

Unfortunately, other than those of the four genera listed above, not one of the almost 90 exotic species that have undergone trials by Samling to date has, as yet, proven successful enough to regenerate naturally and thus none poses any degree of environmental risk.

Monitoring is by observation during the course of regular security patrols and by *ad hoc* comment from management staff made in the course of their duty.

6.5 Fire Prevention and Control

The PAONG LPF has a detailed fire plan covering fire prevention and control. Sections 3 & 4 cover the description of the LPF, rainfall records and trends and vegetation and boundaries and neighbours. Sections 5 and 6 cover the prescription for firebreaks and the potential fire risk areas and the fire danger rating system. Sections 8 and 9 cover vehicles and equipment. Sections 12, 13 and 14 cover the management of the situation should a fire occur with 11 and 15 covering post fire activities.

6.6 Conservation of Bio-diversity

This has been briefly referred to in Section 4.4. Conservation of the bio-diversity as represented by the gene pools of PAONG LPF's flora and fauna and of the ecosystems in which they are found is very much dependent on the residual natural forest in the riparian buffer zones and the conservation areas which together represent more than 30% of the gross area of the MTCS area. There will be, as yet unidentified, contributions to bio-diversity from the *planted* forest areas. Indeed, even areas of SA in their various stages have a part to play in contributing to the overall bio-diversity of an area, although there is no SA within PAONG's MTCS area

As stated in the EIA report and mentioned in Chapter 5, harvesting in the residual natural forest has been very wide spread and at varying degrees of intensity for several decades. No natural forest type has been identified within PAONG LPF that is not also widely represented elsewhere within Sarawak. As already mentioned, the residual or remnant forest falls into several mapping units

which together are termed Special Management Zones (SMZ) - see Table 4.1 - all of which are protected to the extent that the LPF management the authority to do so.

Prior to harvesting starting in September 2021 the process of re-demarcating SMZ areas on the ground and their subsequent GPS tracking was carried out with far greater diligence than was the case in the early years of clearing and establishing the planted areas of the LPF. This in part due to the wide spread availability of GPS devices – some of the original blocks were established using chain and compass and in part in order to comply with the requirements of the MC&I. As harvesting proceeds through the MTCS area the re-survey of the coupes and blocks will no doubt result in a small increase in the total area of RBZs and possibly of other SMZ types.

As already stated in Section 4.2.2 the SMZs are protected areas. This protection should ensure that the current level of bio-diversity does not diminish; indeed, over time the diversity of the flora should increase with the arboreal component developing in terms of DBH and height (i.e. structure) with the species composition becoming, albeit very slowly, more diverse (see 6.6 Residual Forest). The PAONG plantation maps show that the SMZs are widely distributed throughout both the LPF and the MTCS area. Currently they represent about 39% of the MTCS area (Table 5.2). It is expected that this percentage will increase a little over time as the pre- and post-harvest GPS surveys better define the land categories.

6.7 Residual Natural Forest

6.7.1 Background

The history of the LPF referred to in Section 5.1 clearly shows that the original MDF was subjected to very heavy harvesting in the past. This means that the residual, or remnant, MDF forest is very much secondary in physical structure and in terms of genetic diversity its flora is probably somewhat changed. However, as no study was undertaken to establish baselines in the natural forest prior to harvesting, the original diversity levels of both the flora and of the fauna of the no longer extant primary forest type(s) remain unknown. It is now a question of protecting those areas of residual forest that have been designated as SMZs. Continued protection should, over many decades, allow the forest to recover in terms of structure: i.e. only time will allow the full expression of those species that are genetically pre-disposed to grow to a large size. Similarly, over time, genetic diversity should increase – slowly – as species that might have disappeared are recruited back into the SMZs by various means of seed dispersal.

6.8 Adjacent Lands

As can be seen from Map 5.3, the greater length of the MTCS boundary is common with two of Samling's FTLs: Sekiwa FMU (T/0404) - from which LPF/0021 was excised, and Gerenai FMU (T/0413). Sekiwa FMU is currently in the process of being certified under the MTCS and the Gerenai FMU was certified, also under MTCS, in 2020.

In the north-eastern 'wing' of the LPF, a short length of the LPF boundary is common with that of Juta Intelek Sdn Bhd (T/0429) – an unrelated company.

There is no neighbouring or nearby suburban or residential development which requires the consideration of either environmental and aesthetic values or additional safety considerations during forest operations.

7.Socio-Economic Context

7.1 Contribution by Current and Future Forest Operations

The net plantable and potentially plantable area of the MTCS area is just under 10,000ha. This is almost negligible when viewed against the State's previous planting target of one million hectares or even against the area currently planted state wide. However, small as this area might appear the PAONG resource is important to Samling and to the Miri region's economy. All the log production goes to Samling's own downstream operations: peeler logs to the Samling's plywood mills and saw logs to Samling Housing Products Sdn Bhd. Mangium chip logs will go to Samling's TreeOne Mega Pellet at Bintulu. Thus, the entire log production from Paong ITP will be processed locally, i.e., within the Miri-Bintulu Region.

Maintaining a sustainable flow of logs suitable for Samling's solid wood downstream requirements is a key overall management objective of SST. The PAONG MTCS area must both play its part in achieving this.

The determination of the annual cut is based on:

- areas of mangium in the MTCS area that need to be cleared for replanting; and
- the need to start the normalisation process for the LPF.

Based on a long term, sustainable cut objective, the AAC must be reviewed on an annual basis. The objective is to ensure a more or less sustainable harvest volume from the whole LPF whilst moving towards a normal age class distribution.

7.2 Employment and Services

PAONG employed 21 full time staff at supervisor level of whom 3 are from adjacent village to Paong FPMU. There are 41 workers of whom 27 are Indonesians and only 14 are Sarawakians. The competition for local workers from offshore oil and gas employment and the oil palm industry (both own planting and estates) is strong. However, of PAONG's Sarawakian work force almost 100% can be considered as 'local', e.g. from Lg Tebanyi @ Lg Sebatang and other long houses not too far away.

Establishment and maintenance work in PAONG are done using in-house workers. The greater part of the logistical support is supplied locally from Miri; e.g. engineering, spares and supplies.

PAONG is an equal opportunity employer: however, of the 34 Sarawakian employed only 6 are female. Rather being the result of any prejudice or bias, this imbalance reflects the not incorrect perception by locals of ITP work being in the 3 D category – dirty, dangerous and demanding (or difficult).

Table 7.1: Paong LPF - Social and economic monitoring – employment

	Year	2022		2023		2024		2025	
		n	%	n	%	n	%	n	%
Staff									
Sarawakian - Local	m	8	10.7	8	10.7	2	2	3	5
	f	3	4.0	3	4.0	1	1	0	0
	m+f	11	14.7	11	14.7	3	3	3	5
Sarawakian - Other	m	3	4.0	3	4.0	7	8	14	23
	f	0	0.0	0	0.0	2	2	3	5
	m+f	3	4.0	3	4.0	9	15	17	27
Other Malaysian	m	0	0.0	0	0.0	0	0	0	0

	f	0	0.0	0	0.0	0	0	0	0
	m+f	0	0.0	0	0.0	0	0	0	0
Foreign	m	0	0.0	0	0.0	0	0	1	2
	f	0	0.0	0	0.0	0	0	0	0
	m+f	0	0.0	0	0.0	0	0	1	2
	Staff - total Malaysian & Foreign		14	18.7	14	18.7	12	13	21
Worker									
Sarawakian - Local	m	9	12.0	9	12.0	6	8	6	10
	f	3	4.0	3	4.0	2	2	2	3
	m+f	12	16.0	12	16.0	8	9	8	13
Sarawakian - Other	m	0	0.0	0	0.0	11	12	5	8
	f	0	0.0	0	0.0	0	0	1	2
	m+f	0	0.0	0	0.0	11	12	6	10
Malaysian - Other	m	1	1.3	1	1.3	0	0	0	0
	f	0	0.0	0	0.0	0	0	0	0
	m+f	1	1.3	1	1.3	0	0	0	0
Foreign	m	48	64.0	48	64.0	60	66	27	44
	f	0	0.0	0	0.0	0	0	0	0
	m+f	48	64.0	48	64.0	60	66	27	44
Worker - total Malaysian & Foreign		61	81.3	61	81.3	79	87	41	66
All employees - Summary									
Male & female	m	69	92	69	92	86	95	56	90
	f	6	8	6	8	5	5	6	10
	m+f	75	100	75	100	91	100	62	100
Malaysian & Foreign	Local	23	30.7	23	30.7	11	12	11	18
	Other-Sar	3	4.0	3	4.0	20	22	23	37
	Other-Mal	1	1.3	1	1.3	0	0	0	0
	Foreign	48	64.0	48	64.0	60	66	28	45
	All	75	100	75	100	91	100	62	100

Source: Paong Payrolls 2025

7.3 The Value of Forest Services

An EIA of the whole LPF was undertaken in November 2000; Section 3.3.3 deals with the socio-economy of the region. Ten native settlements were identified then within a much larger LPF (100,000+ha) but none was within what is now the PAONG MTCS; the nearest is Lg Tebanyi @ Sebatang which is less than one kilometre for the MTCS area. For these communities that EIA survey recorded 224 doors with an estimated population of 1,209. But it was noted that "... whilst the number of door-units can be taken as more or less correct the population figures do not give a true picture of the actual number of people residing in the communities surveyed. ...a significant number of residents, especially the younger and more able-bodied people, have left the settlements and are now working elsewhere...". This is an extract from an EIA conducted almost 23 years ago. The SIA (2023) recorded only 61% of the individual houses (*sulaps*) as being occupied. In Lg Tebanyi @ Sebatang and Lg Ta'ah 87% and 40% of the doors, respectively, were occupied.

The core occupation of the area's resident communities is subsistence farming and is therefore not related to the residual forested areas of the MTCS – which constitutes more than 95% of the total LPF area and which is mainly (91.8%) within the Nakan-Kalulong F.R..

On Page C3-29 of the EIA (2000), the point regarding rural depopulation is re-emphasized: "... *most of the younger people of working age have left for the towns where better paying jobs can be found while the elderly and young children remain in the longhouse...*".

The following extract from Section 4.2.1 of the HCVA (2023) Assessment indicates a lack of demand for forest services: "...*use of Non-timber Forest product (NTFP) appears to be on decrease, although wildlife, wild vegetables and wild fruits are still gathered as their food supplement. Raw material, herbs and medicinal plants are rarely used nowadays because much of the knowledge has been lost and the increasing on modern medicine. ...For local communities, dependence on forests has generally decreased since embarking on eco-tourism.*" HCVA (2023) concludes in Section 5.0: "*The ethnic communities are likely to continue to rely on forests for many years for materials such as timber, rattans, palm leaves and foods from nearby forests including a part of the study are in the vicinities of their settlements. "...Any direct impact [on the HCV 5 Values] from Paong plantation would be minimal..."*".

There seems to be little significant need, and hence little current demand, for forest services in the form of products such as fish, wild meat, honey, boat and house building materials, rattan etc. from the LPF and therefore from the MTCS area.

In the EIA assessment undertaken 23 years ago it was noted that "... *a significant number of residents, especially the younger and more able-bodied people, have left the settlements and are now working elsewhere.*

Fishing: "...*fishing in the Batang Tinjar and its tributaries is not commercial in nature being carries out by the locals mainly to supplement their diets. Only excess catch, which is rare, is sold for extra cash..."*

Hunting: "...*activity has diminished greatly since the arrival of the loggers. The disturbed forests do not support a large population of wild game...Game meat, if any is mainly for the hunters' own consumption..."*

As an ever-increasing percentage of the population becomes wage earners and entrepreneurs, either locally - especially in Samling's ITP and nearby oil palm plantations - or more probably, after migrating to urban centres, any continuing demand for forest services from PAONG MTCS area in the form of products such as fish, wild meat, honey, boat and house building materials, jungle vegetables and fruit, rattan etc. will surely continue to fall.

7.4 Social Impact Assessment

7.4.1 Impacts from the ITP's operations

There are no local (native) communities within PAONG LPF. The Social Impact Assessment (SIA) undertaken in April 2023 recognised two communities adjacent to LPF/0021: Long Tebanyi @ Sebatang and Long Ta'ah. There are numerous individual houses along M2 road and the Spg. Pasir road. No rights were admitted to any individual or community in the gazette notification for the

Nakan-Kalulong F.R., consequently the houses, and their occupants, are encroachments and therefore illegal. FDS has been notified of these encroachments.

Table 7.2: List of Neighbouring Stakeholders

No	Village	Village Head	Ethnicity	Coordinate
Within LPF/0021				
No Village located within LPF/0021				
Adjacent to LPF/0021				
1	Long Tebanyi	Francis Lawai	Kenyah	3°13'19.26" N 114°33'38.37" E
2	Long Ta'ah	Philip Janggau	Sebob	3°9'28.40" N 114°30'25.89" E

Source: SIA Paong August 2023

Table 7.3: List of Indirectly affected communities

No	Settlement	Village Head	Proximity (km)	Status	Coordinate
1	Long Buken	Dawit Kachit	4.8	Settled Penan	114°25'13.000" E 3°11'58.300" N
2	Apau Nyaring	Micheal Nyadang Pusan	5.1	Settled Penan	114°30'56.500" E N3°3'52.900" N
3	Long Kerong	Jayak Lawa	8.5	Semi-nomadic Penan	114°29'41.300" E 3°4'36.500" N
4	Long Liaw	Bitang Sakai	9.5	Semi-nomadic	114°26'14.000" E 3°7'58.100" N
5	Long Apu	Peter Tingang	8.3	Settled Kenyah	114°48'40.928" E 3°8'29.383" N
6	Long Julian	Augustine Supen Taja	9.4	Settled Kenyah	114°48'30.857" E 3°6'23.100" N
7	Long Anap	Anthony Balare Sagan	12.2	Settled Kenyah	114°49'11.109" E 3°3'41.950" N
8	Long Jeeh	Apoi Ukang @ Fisher Apoi	27.2	Settled Kenyah	114°55'48.716" E 2°58'54.443" N

Source: SIA Paong August 2023

The 8 villages as shown in Table 7.3 were not affected to Paong FPMU Operation. Therefore, the community awareness engagement program and social impact monitoring are not required to carry out. Justification to excluded the above villages are as below:

- a) **No Operational Impact:** The Paong Forest Plantation Management Unit operations did not extend to or impact villages No. 1 to 8, ensuring that these villages remain unaffected by any activities within the Paong FPMU.
- b) **Hydrological Flow:** Apau Nyaring and Long Kerong located at Sg. Keluan and Sg. Menuap respectively. Whereby Long Liaw and Long Buken settlement were located nearby to Sg. Lobang and Sg. Nibong. For Long Apu, Long Julian, Long Anap and Long Jeeh were located at Sg. Julian and Batang Baram.
- c) **Distance Consideration:** All of the villages are located more than 3 kilometer away from the Paong FPMU license boundary. This substantial distance ensures no direct influence or interaction with the Paong FPMU's activities.
- d) **Administrative Boundaries:** Villages in Table 7.3 fall within the jurisdiction of the Sekiwa Forest Management Unit (FMU), which operates independently of the Paong FPMU. This distinction is crucial in recognizing the separate management and operational responsibilities of each FMU.
- e) **User Rights:** The villages residing in these villages do not hold user right within the Paong FPMU area. Their livelihood activities and resource use are confined within their own community territories and not within the Paong FPMU.

7.5 Stakeholder Engagement (Consultation)

7.5.1 Introduction

Stakeholder consultation, perhaps better termed '*engagement*', should:

- assist in the development of constructive, productive and more trusting relationships over the long term;
- result in a relationship with mutual benefits;
- help to identify trends and emerging challenges which are currently, or which may in the future, impact the management of the LPF in some way;
- establish transparent and accountable forest management operations; and
- provide a platform for proper conflict resolution.

7.5.2 Communities

Engagement, or consultation, is usually in the form meetings to ensure the FPMU's compliance with the various requirements of the MC&I SFM. E.g., awareness of the FPMU's operations that might affect the community and dissemination of the relevant results of social and wildlife monitoring.

Community engagement also takes place when:

- (a) a complaint arises and a *Borang Aduan* is completed and submitted to the FPMU manager for further action - which should include community engagement and discussion as an aid to resolution; or
- (b) a community wants to request some form of assistance that would trigger a CSR response. For this a *Borang Memohon Bantuan* should be completed and submitted to the FPMU manager or put in the box provided outside the office for this purpose;

The conflict resolution mechanism is available on Samling's website with QR code for ease of the public access to the complaint / request form using mobile phone. Figure 7.1 shows the screenshot of Samling's website with the conflict resolution mechanism.

The local communities are aware of *Borang Aduan* as LPF's mechanism for resolving disputes. This complaint Form has been shared to the local communities during community awareness and engagement program.

7.5.3 Government departments and agencies

Engagement and consultations with FDS, SFC and other government departments and agencies take place on an *ad hoc* basis - as and when required by either party.

7.5.4 Non-government organisations

Samling, through the AGM Refor, engages regularly with the STA's Plantation Committee.

Samling Refor, as a member, also engages fully with the Borneo Forestry Cooperative (BFC).

Other NGOs are engaged from time to time as they or Samling might require; e.g. WWF, Mighty Earth, Aidenvironment.

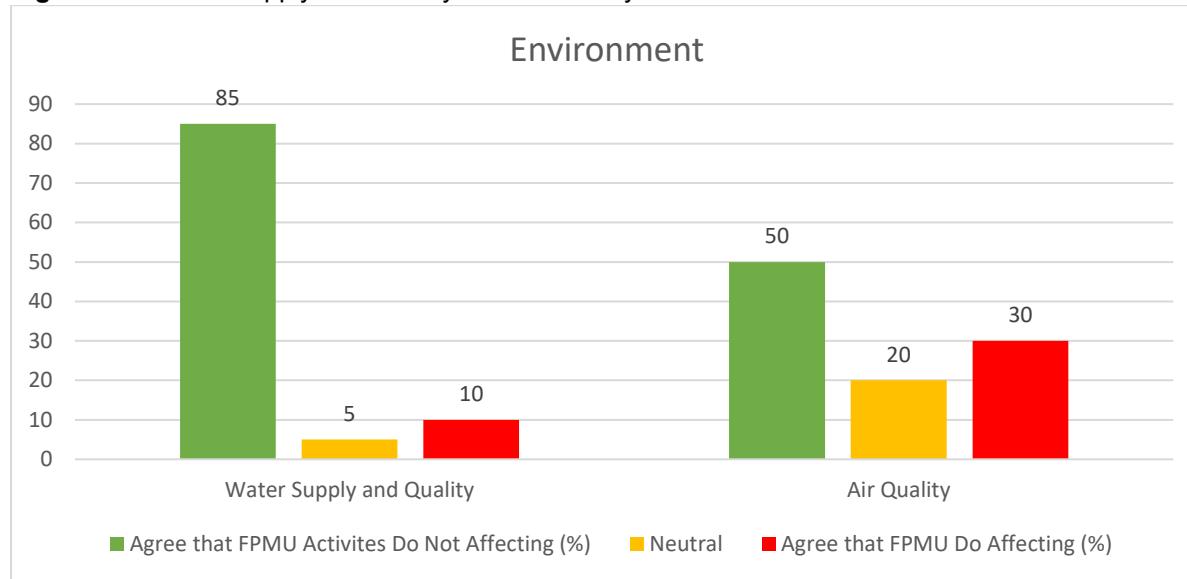
7.6 Social Impact Monitoring (SIM)

7.6.1 Introduction

It is not really feasible to separate the findings of the social impact monitoring (SIM) and use them solely in reference to the ITP operations within the MTCS area. This means that the SIM results must be taken as also referring to greater part of the LPF that is near, or surrounds parts of, the MTCS area - hence the references to FPMU rather than the MTCS area. Furthermore, it should be kept in mind that there are no communities within either the MTCS area or the area of the LPF that might be generally associated with the MTCS area. The main findings of SIM 2024 are set out below.

7.6.2 Water Supply and Quality and Air Quality

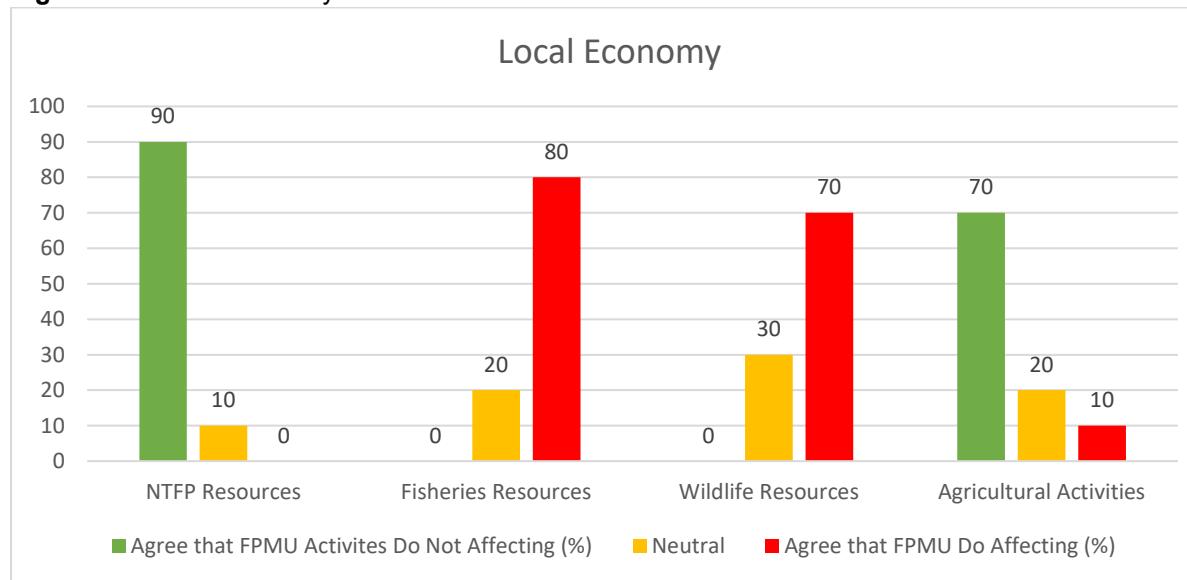
As can be seen in Figure 7.1, based on the annual social monitoring conducted in year 2025, 10% of the assessed local communities agree that their water supply and quality has been affected due to FPMU activities. As for air quality, 50% of the assessed local communities agree that the air quality is not affected by the FPMU activities.

Figure 7.1: Water Supply and Quality and Air Quality

7.6.3 Local Economy

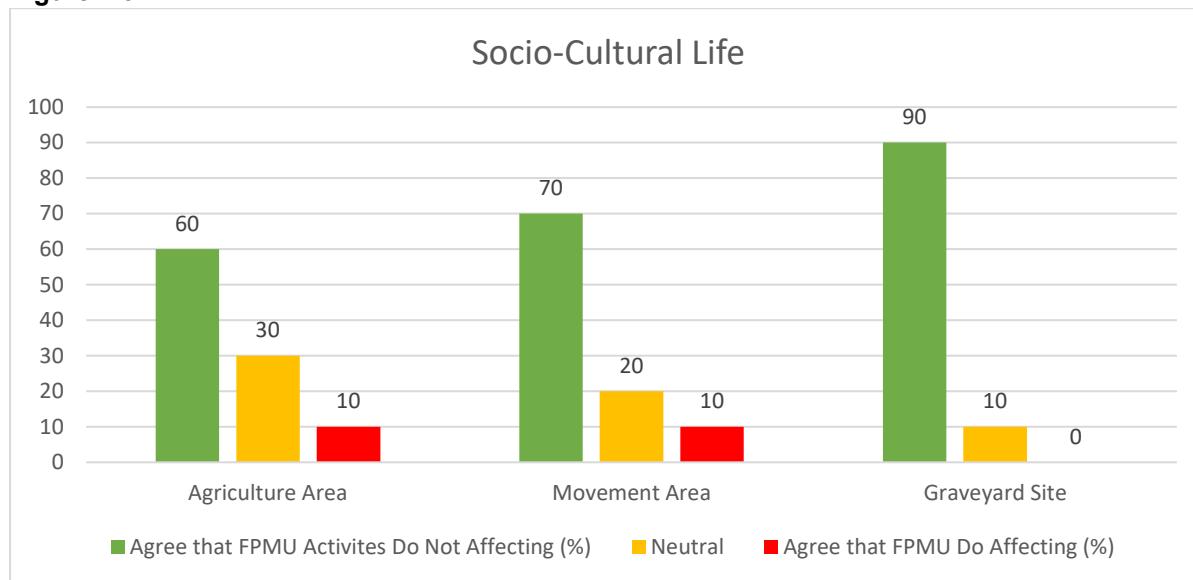
The SIM 2025 results revealed that the assessed local communities who agree that the FPMU activities do not affect the NTFP resources. While for fisheries and wildlife resources are both affected by FPMU activities.

The SIM 2025 results also showed that the 70% of assessed local communities who agree that the FPMU activities do not the agricultural activities.

Figure 7.2: Local Economy

7.6.4 Socio-Cultural Life

The graph shows that most respondents perceive FPMU activities as not affecting socio-cultural life, with the highest percentage at graveyard sites (90%), movement area (70%) and agricultural areas (60%).

Figure 7.3: Socio-cultural life

8. Establishment and Silvicultural Regimes

8.1 General

Planting started in PAONG LPF in 2003, mainly with mangium. The establishment regime for mangium is well known but the most appropriate silvicultural regime required for solid wood products, as opposed to chip logs, has yet to be proven. There is little information available in terms of the methodologies and economics of such practice from either the private sector or government agencies.

Samling's Segan is a leader in developing the management practices required to satisfy the objective of producing logs for solid wood use. (The Sarawak Planted Forest (SPF) objective was to produce chip wood - for a pulp mill that has yet to be built near Samarakan, Bintulu.)

The Sarawak Timber Association (STA) has a Plantation Committee on which SST is represented. This committee is charged primarily with representing the industry in meetings with government to discuss, improve and resolve technical and common management issues. It also provides a valuable forum for discussion and exchange of ideas and practices. STA also organises overseas study tours that present a useful opportunity to learn from longer established ITP based industries.

Samling is now a member of the Borneo Forestry Cooperative together with three or four Sabah ITP companies; it shares knowledge, experience and R&D trials and results.

8.2 Choice of Species

8.2.1 Background

When Samling started planting in Segan in 2000 the management objective was to produce only chip wood. This objective was revised 3-4 years later to the current Samling objective. At that time mangium was the species of choice throughout Malaysia. The perceived wisdom at the time was that mangium would '*grow well - anywhere*'. Time has clearly shown that this is not correct. The initial large-scale planting of mangium in PAONG failed. The cause of failure has still to be determined. PAONG's average annual rainfall of around 5,000 mm might well be all or part of the cause but, somewhat anomalously, 10 plus trees were identified close to the Refor camp that, at 13.2 years old averaged, 1.2 m³ with an average DBH of almost 40 cm (and a maximum of 55 cm).

Mangium suffers from high early mortality. In PAONG LPF mortality was exceptionally high and very early – to the extent that, as noted above, mangium was a failure. In part this might have been due to a high susceptibility to root rot (*Ganoderma* spp.) which experience elsewhere indicates increases in severity with each succeeding rotation. However, without doubt there were other, as yet identified, contributing factors to the failure. Whilst *Ceratocystis* is undoubtedly a serious problem for mangium in Samling's plantations, it appeared too late to become a problem in PAONG LPF as the mangium had already failed.

The decision has been made to plant *A. crassicarpa* on sites not suitable for *E. pellita*. This planting will be rigorously monitored.

The early promise of *Acacia* hybrid has not yet been realised. Whilst the form and branching habit is quite good the growth and survival (susceptibility to pink disease) are generally not. The MAI of both Year Class 4 and 5 was below 10 m³/ha. The PAI was a little higher but not sufficiently high to lift the MAI to an acceptable level. Clones 1 to 14 of the 28 *Acacia* hybrid clones brought in as tissue culture material from Sabah in 2012 were planted in LANA. Not one of the fourteen clones planted is performing well and the form is generally very poor. (Not one of clones 15 to 28 planted in Segan has performed well.)

The initial dependence on a single species is recognised by Samling - and by much of the ITP industry in Sarawak - as a flawed policy and R & D's search for alternative species continues. with a recently increased momentum. R&D's aim is to achieve a degree of species diversity that will help mitigate the risk from pest and disease attack whilst still meeting the objective of economically producing peeler logs of acceptable size and quality.

However, other than *Acacia mangium*, *Eucalyptus pellita* and *A. crassicarpa*, and perhaps *Falcataria moluccana* and *Gmelina arborea* on very select sites, not one of the more than 90 or so species trialled (both native and exotic, see Appendix 1) by Samling to date has shown any promise for use in solid wood ITP.

8.2.2 Site-species matching

There will no doubt be subtleties provided by differing chemical characteristics of the various series and compound associations of the mineral soils but Samling's recognition of any such subtleties and the ability to make use of them is some way off. There are two main soil mapping units in the MTCS area - and six within the LPF. The Merit and Kapit series dominate the LPF and the MTCS area but the compound association (i.e. a mix of two or more soil series) that form the soil mapping units are all capable of supporting ITP species.

Over time the planted species diversity might better reflect the diversity of planting sites available. But any successful increase in species diversity will require: a] a wider range of economic species than has currently been identified; and, b] a much greater knowledge of both the soils and of the requirements of the economic species that might be best suited to them. Soil maps are available from reconnaissance level surveys at a scale of 1:250,000. The EIA refers to soil maps at 1:50,000.

Samling's experience from the actual harvest yields has shown the performance of *E. pellita* to be highly variable - in all LPFs. Several factors might contribute to this variability, one of which might well be due to soil. A system of soil classification, based on in-house soil survey supervised by an external consultant, is in process for all LPFs. In PAONG 108 auger pits have been established and

reviewed by the consultant to date; of these 86 points (80%) were considered to be soils better suited to pellita. Based on the soils work done to date, the consultant is of the opinion that soil should generally not be considered a limiting factor for the growth of pellita in Samling's mineral soil LPFs.

Samling's extensive pellita breeding program still continues with the first of the improved seed collected in 2022.

8.2.3 Planting of native species

The Sarawak Forest Department has long extolled kelampayan (*Neolamarckia cadamba*) as an ITP species. Without doubt the form, growth rate and peeling qualities of this are all very positive attributes of this species. However, in Sarawak to date there is insufficient knowledge of seed sources and related genetics, nursery practice through to ITP silviculture for this species. There has been at least one relatively large-scale failure; success in Sarawak at an operational ITP level seems to be unknown - to Samling at least. Samling has planted kelampayan in other LPFs with no success and it has been planted in PAONG on several small sites, also with no success.

In Chapter 9, Plantations, in 'A Review of Dipterocarps'³, Weinland restates a conclusion drawn by Kollert *et al* (1994) "...The establishment and management of [dipterocarp] plantations are uneconomical on financial terms alone." This conclusion was drawn more than 20 years go. With the changes that have occurred since, particularly in wood processing technology, the possibility that one or more of the dipterocarps, e.g. *S. parvifolia*, might prove to be an economic plantation species is recognised by Samling. There is however more than 100 years of literature on the subject of dipterocarps as plantation species and a review is required before addressing the problem of sourcing seed and then moving to trials can be considered.

Samling has spent much time and money on trials of native species. However, at the present time neither Samling nor - so it would appear - any other company in Sarawak has accessed sufficient and reliable information on the use of Sarawak native species in ITP to implement any other choice of species scenario than that described here.

8.2.4 Utilisation of species selected – end uses

Table 8.2 shows the end uses for the species that will be harvested during the currency of this FPMP – mainly pellita, with some mangium and hybrid being salvaged on clearing for planting.

Table 8.2: End-uses of species being harvested in PAONG

	Plywood	Sawn timber	HDF/door skins/wood pellet
Long Established			
Crassiparpa	Yes	Yes	Yes
Mangium	Yes	Yes	Yes
Acacia hybrid	Yes	Yes	Yes
Pellita	Yes	Yes	Yes
Recently Established			
Gmelina	Yes	Yes	Yes
Falcata	Yes	Yes?	BD (kg/m ³) - 270 cf mangium 460 Possibly too light?

³ Eds. Appanah, S & Turnbull, J. M. CIFOR (1998)

8.3 Current Establishment and Silvicultural Regimes

8.3.1 *A. crassicarpa*

The intention is to produce a percentage of logs that will be suitable for peeling and for sawing. The determinant of suitability is primarily small-end diameter with grading for roundness, straightness and internal defect (centre rot and hollow) undertaken after felling. Logs that are unsuitable for solid wood use will be sent to Samling's HDF mill and wood pellet plant.

Good Quality Stock

As a matter of course PAONG will only plant selected stock with good genetic characteristics with preference given to seeds from in-house collections of elite trees or from the clonal seed orchard which comprises only clones of elite trees.

Site Preparation and Establishment

Before planting takes place some site preparation is necessary. This usually involves a manual slash and a chemical application to kill any emergent weeds, particularly natural regeneration of mangium, thereby reducing competition to newly planted seedlings. Labour shortage often results in the time elapsed between completion of harvest and the commencement of site preparation being overly long. This means that prior to spraying the site must be slashed and time allowed for new growth to flush so that spraying can be more effective.

PAONG plants 1,667 stems per hectare (2m x 3m) and considers a block to be established when a survival rate of 95% or more is achieved 30 days after passing planting QC.

Maintenance

Conditions in the ever-wet tropics are very conducive to vigorous weed growth. Circle weeding, slashing and herbicide spray are all used at a frequency that is determined by the rate of weed growth relative to that of the trees.

Silviculture

The silviculture regime with pruning lifts to 3 metres is intended to produce trees with some "clear wood" in the pruned length. Live knots would be restricted to a small DOS core along the pruned length. This should reduce the amount of veneer repair required, allow a proportion of face and back veneer to be produced and also improve sawn timber recovery.

8.3.2 *Eucalyptus* species

As originally planned the value of the unthinned eucalyptus resource would be maximised by:

aiming to produce a crop that has a final stocking of 600 to 700⁴ SPH of good form and which have at least 80% of these stems pruned to 6.0m.

The regime designed to achieve this is essentially the same as that for mangium except that the rotation length might be 10-12 years. Where performance has been particularly poor the rotation would be shortened. Only when a sufficiently large number of PSPs have been established in blocks of 10 or more years old and when there is grade recovery information from downstream will it be possible to determine the economic rotation age.

⁴ This is considerably higher than the conventional stocking for solid wood ITP – a direct result of the current 'no thin' policy. With improvements in site selection and in the genetic material, thinning may be introduced.

Good Quality Stock

As a matter of course PAONG will only plant improved genetic material. Seed is currently from Samling's own elite tree section. The extensive pellita breeding programme is now well in hand on three sites. The first recommendations for improved seed have been made and it is expected that SPA seed will be available from these areas in 2021/22.

Site Preparation and Establishment

Before planting takes place some site preparation is necessary. This usually involves a blanket herbicide application to kill any emergent weeds, particularly natural regeneration, therefore reducing competition to newly planted seedlings. Labour shortage often results in the time elapsed between completion of harvest and the commencement of site preparation being overly long. This means that prior to spraying the site must be slashed and weed growth allowed to time to flush with new growth before spraying herbicide.

PAONG plants 1,110 stems per hectare (3m x 3m) and considers a block established with a survival rate of 90% assessed 30 days after passing planting QC.

Maintenance

Conditions for weed growth are excellent in the ever-wet tropics. Circle weeding, slashing and herbicide spray are all used at a frequency that is determined by the rate of weed growth relative to that of the trees.

Silviculture

The objective is to produce primarily peeler logs. Samling downstream has undertaken peeling trials of SEGAN pellita logs at 5.6yrs old. The results were satisfactory. There was negative comment only on the small diameter and the existence of dead knots; both of which can be influenced by silviculture. The results of both the sawing and KD trials were also strongly positive.

The intensive silvicultural regime with four pruning lifts was designed to produce trees with a significant volume of "clear wood" in the lower stem. Logs from the lower stem would have primarily green knots restricted to a small DOS core along the pruned length and should yield a significant proportion of face and back veneer.

The rationale behind producing stands with 80% of stems pruned to 6.0m is to allow pruned butt-logs with a minimum small end diameter (sed) of >15cm to yield two peeler logs each of 8 ft (2.5m) with an allowance for end splitting.

With a 'no-thin' regime a residual stocking of around 600 to 700 stems per hectare is expected to remain after natural mortality has taken its toll through to Year 12. Whilst this high stocking will restrict branch size in the logs above the pruning limit it will also restrict "clear wood" production over DOS (diameter over stub) in the pruned stem length.

Pruning above 4.5m might prove to be uneconomic but until PSP data on older trees is available and more information is produced by downstream both as to their intentions regarding re-equipping and the likely recovery rates at various log diameters it is difficult to evaluate the economics of pruning.

In early 2013 a stem canker (*Botryosphaeria?* sp.) was confirmed as widespread in *E. pellita* in Samling LPFs including PAONG (see Dr Lee, S.S. internal report, 12 August 2010). Pruning of eucalyptus stopped in mid-2013. Subsequent R&D trials have shown that green pruning (that is the removal of branches before they die) reduces the incidence of stem canker arising from what is termed *branch associated stem fungal irritation*. Green pruning has now restarted. It also reduces the incidence of dead knots and should more or less totally eliminate them if correctly practiced. Green pruning had a marginal negative effect on DBH increment in the first two years of the trials. Continuation of the trials will show if this impact is maintained or not.

8.4 Scheduling of Silvicultural Operations

Apart from the need to ensure that early competition from weeds is kept to minimum, the key driver behind the silvicultural schedules of those species to be pruned is the timing (but see below). As PAONG is aiming to produce clear wood material in order to maximize veneer recovery and quality, the minimisation of the knotty core (determined by diameter over stub, or DOS, at time of pruning) is essential.

Schedules are produced by the PAONG LPF manager and checked by the visiting HQ manager.

The recognition of *Ceratocystis* sp. in mangium and a stem canker in pellita – both in 2012 - means that the progress in the relationship between pruning and the incidence of these two diseases must be closely monitored.

8.5 Alternative Plantation Regimes

It is acknowledged that ITP silviculture for the production of logs for solid wood, as opposed to chip, use is a new subject both to SRB and within Sarawak, and indeed within Malaysia, and that there is much that is not known. A flexible approach is therefore taken towards the use of a particular establishment or silvicultural regime. Although there are core regimes (set out above) there is very much a “horses for courses” dynamic in place at PAONG LPF. If a block or species warrants a different, seemingly more appropriate, regime to be used then it might well be used.

A good example of this is on the some of the older mangium blocks where the final pruning lifts had not been done by Year 4 and it was decided that no further pruning would be done. It was considered that the investment of time and money into these blocks in an attempt to produce some additional high quality clear wood product was not justified.

PAONG is committed to employing the best practice for all its resource. It is open to employing new or innovative ideas if they are proven to be appropriate and they exceed the performance boundaries of currently accepted best practice.

9. Monitoring Plantation Forest Dynamics

9.1 Permanent Sample Plots

PAONG is active in the use of permanent sample plots (PSPs) to monitor the growth and to develop growth models. The LPF licence conditions require that one plot be established for every 20 hectares planted. From the start of PSP measurement this was reduced to one plot per 5 hectares and this has been maintained in order to build up a strong data base in reasonable time. PSPs are established when trees are 12 months old (previously 24 months). The PSP data are used to construct yield tables, to model the growth in order to update estimates of the sustainable allowable annual cut (SAAC), to determine which blocks should be harvested in any one year to

achieve the SAAC and for long term production forecasts. P&D information is also collected at the time of PSP assessment.

PAONG has established, maintains and regularly measures an intensive allocation of PSPs to monitor forest growth and dynamics. There are more than 1,000 plots distributed over the R.1 area but not all are currently active due to access problems. The first PSPs in R.2 has been established.

Following initial establishment of the PSP subsequent re-measurement should be done on the anniversary of the first measurement over the length of the whole rotation. As the data base strengthens the need to continue the current, very high, level of sampling intensity will be reviewed for each species.

Each plot is randomly (with some restriction) located within the area of the block that the GIS shows as planted. This is done at HQ, in the field, regardless of where it falls, the plot centre is established at the predetermined GPS point. The only exception allowed being to ensure that a plot does not encroach on to a road-line or any non-productive area that has been GPSd and excluded from the productive planted area statement.

PSP measurements are recorded on a paper-based system and then entered into Excel for processing.

9.2 Taper Functions and Volume Equations

A taper function has been developed for *Acacia mangium* (mangium) based on SEGAN volume sample trees and an interim volume equation has been developed for *Eucalyptus pellita* (pellita). A taper function has been developed for Samling's Pellita, in collaboration with Borneo Forestry Cooperative (BFC). Taper functions for other species will be developed when there is a sufficient number of representative trees old enough to provide the required full DBH range of sample trees. At a later stage of plantation development, it will be necessary to test the applicability of a single taper function for each species to all LPFs.

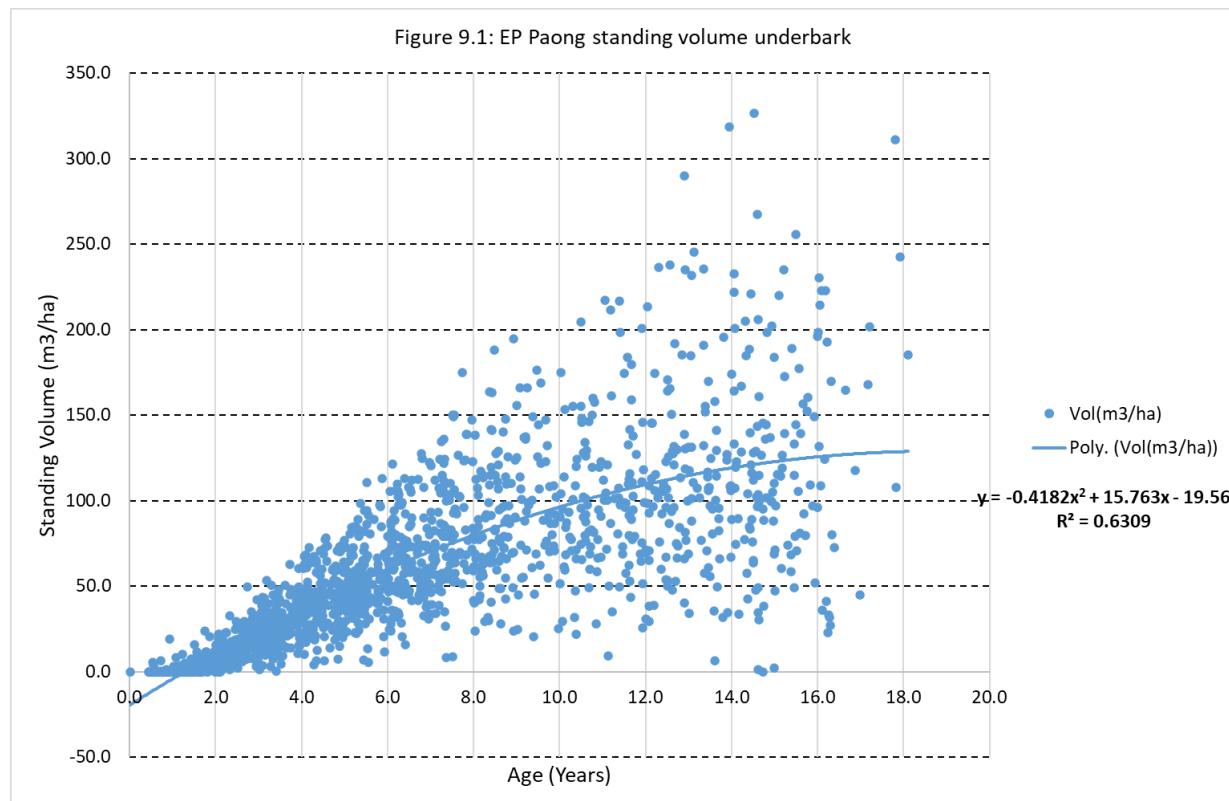
9.3 Result of Monitoring Tree Growth and Site Productivity

9.3.1 Introduction

As mentioned in Section 9.1, a strong system of PSPs is in place to monitor the tree growth of the whole of PAONG LPF. Consequently, as the MTCS area forms a part of the monitored area, the yield tables developed are applicable to the whole LPF and therefore to the MTCS area.

9.3.2 Pellita

The growth of pellita is variable with large differences between the PSP results for plots of the same age. (More than 4,800 plot measurements have been recorded for pellita in the PSP data base.) The increment (CAI) between sequential measurements of the same plot can also vary widely from one year to the next. The optimum harvest age has yet to be determined. It will probably be around 10-12 years. Much depends on the approach taken be downstream to handling small diameter logs. At 31 December 2024 the average age at harvest was 13.8 years.



Source: PSP Summary 202510

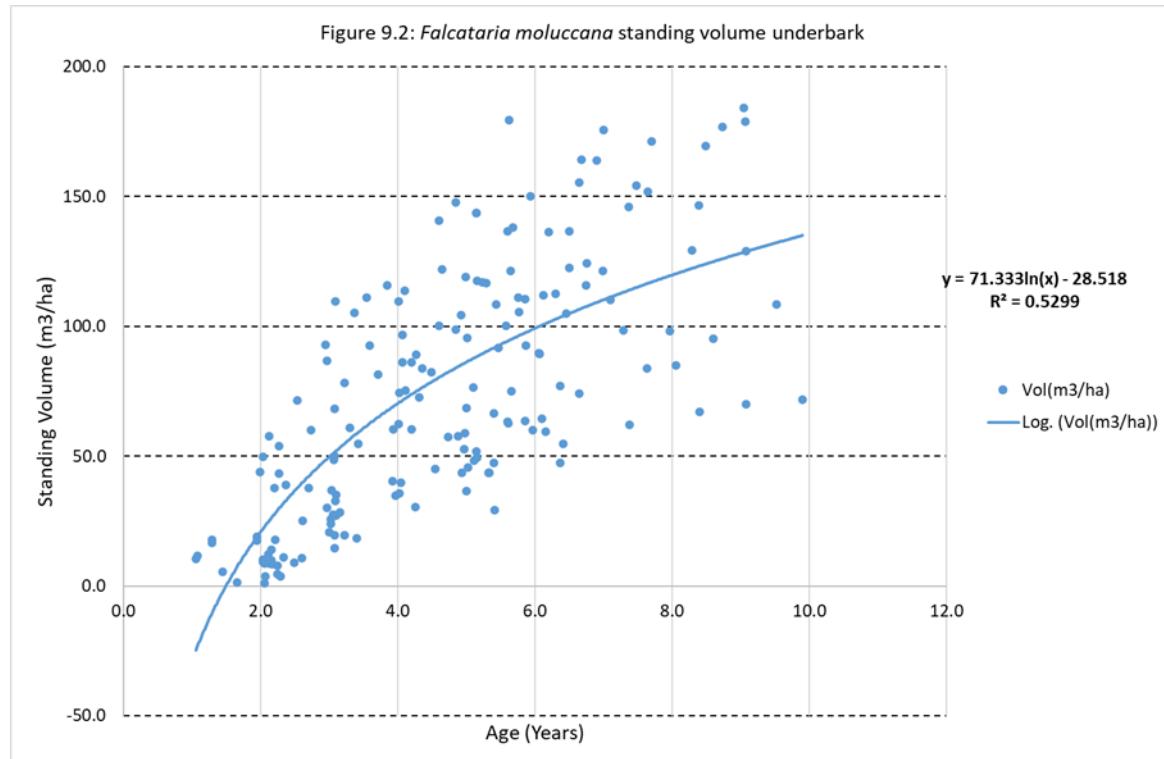
The determination of rotation length is dependent on a robust PSP data base. The growth to date has been disappointing and although there does appear to be an improvement in the CAI of the older stands until further measurements can confirm that this improved growth is being maintained it is planned to harvest at 10-12 years in the future. This assumption does not conflict with the earlier mention of 13.8 years, it merely reflects the delay in starting to harvest. The rotation length will be continually reviewed as more PSP data become available, both from PAONG and Samling's other LPFs, and when more detailed log recovery analysis is undertaken by downstream.

9.3.3 *Falcataria moluccana*

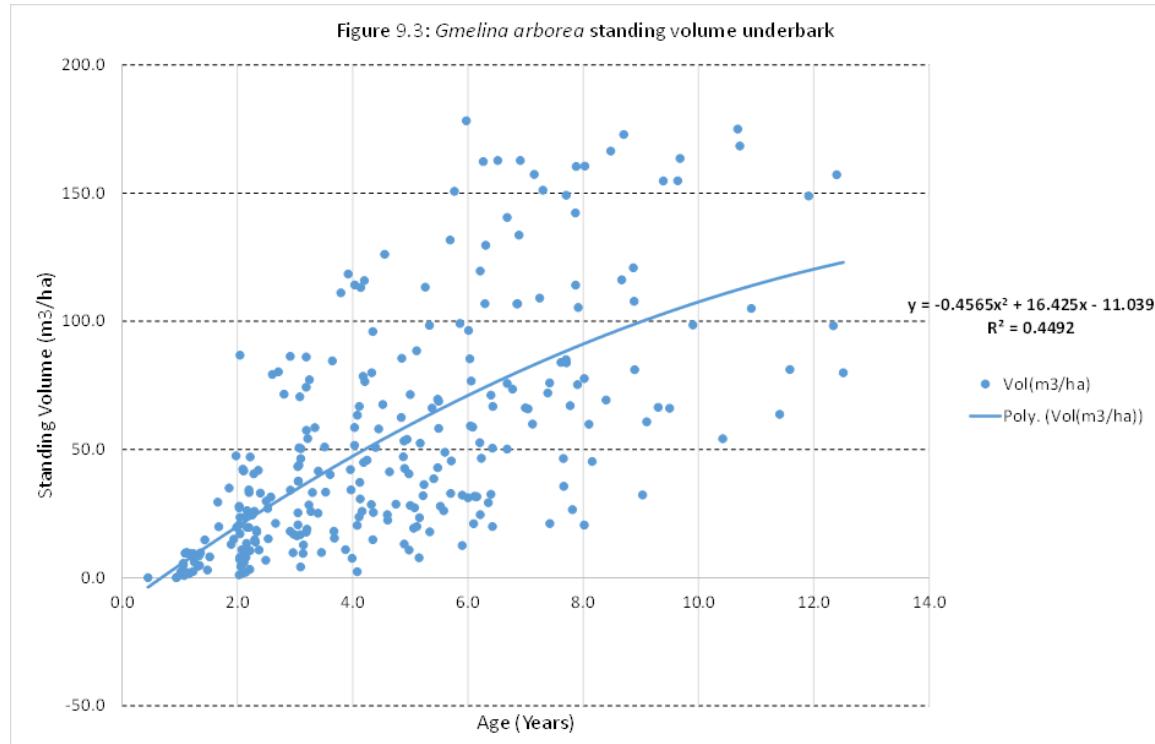
The analysis for *Falcataria* shows a steady increase in standing volume with increasing stand age starting from year 2 onwards. Based on PSP measurements, the standing volume of *Paraserianthes falcataria* shows increase progressively with age, with volume exceeding 100 m³/ha observed in the older age classes.

9.3.4 *Gmelina arborea*

Figure 9.3 shows a steady increase in standing volume with increasing stand age older than two years. The standing volume reach values of over 100 m³/ha at approximately 12 - 14 years.



Source: PSP Summary 202510



Source: PSP summary 202510

9.4 Monitoring of Pests and Diseases

9.4.1 Regular monitoring

Regular monitoring is undertaken by the PSP crew at the time of establishing or re-measuring the PSP plot. Only the occurrence of what are considered to be the more important P&D factors are recorded.

9.4.2 Ad hoc monitoring

Ad hoc monitoring is undertaken for specific purposes by R&D.

10. Sustainability: Annual Cut, Harvesting Plan & System, Financial

Sustainability: an enduring value. *Sustainable [forest] management is a beguiling term and open to many interpretations. It contains many uncertainties and ambiguities.*  *Duncan Poore, 2003.*

10.1 Allowable Annual Cut (AAC)

The AAC for Paong had not been determined at the time the FPMP was originally prepared. The over-age growing stock situation is clearly shown in Figure 5.1. The currently planned log production schedule is as shown in Table 10.1 below.

Table 10.1: Paong's MTCS area: AAC and log production from start-up to December 2025

Harvest	Financial Year (July to June) m3 standing										Total to date	Annual Average harvest
	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31		
Actual	31,291	37,172	91,566	115,317	96001						371,347	74,269
Planned	40,000	71,396	102,680	123,928	120,800	70,355	79,493	73,901	73,901	-	756,454	84,050
Act-Planned	-8,709	-34,224	-11,114	-8,611	-24,799						-87,457	-17,491

Source: a) LPF Trucked Vol (m3) as at Dec 2025; b) Refor harvesting plan as at Dec 2025.

Notes:

- a) Trucking vol. of FY 2023-24 as of June 2024
- b) Trucking vol. of FY 2024-25 as of June 2025
- c) Trucking vol. of FY 2025-26 as of December 2025

The MTCS area is a significant contributor to the all LPF AAC. Because of the over-age situation harvesting is not determined by age but more on the need for a uniform level of annual production that deals with the over-stocked situation in reasonable time.

It should be noted that PAONG is only one of several of Samling's plantations that supply the Samling's mills. It is therefore the sustainability of Samling's total annual plantation log supply that is of critical importance and not necessarily that of the individual plantation.

As can be seen in Fig. 5.1 the age class distributions for both the all species total and the individual species are heavily skewed. This results in a very variable annual cut in terms of both volume and area because neither Gmelina nor Falcataria should be allowed to become too old and so should be harvested as close to their rotation length as is possible. It also means that there might be two years without any harvesting. However, as harvesting progresses management will try to start normalising the area harvested and thus planted for the second rotation.

10.2 Annual Harvest Plan

The harvest plan follows the established Samling harvest plan style and is dynamic and held in soft copy format only. This allows for easy and, more important, for continual revision as new and revised PSP information is generated. It consists of a register of blocks planned for harvest in each of the next ten budget years; the blocks listed against each budget year will be the source of that year's AAC. The register is updated to reflect the reduction factor that considers the variance of the actual yield from that estimated for harvest planning purposes.

A management objective for the MTCS area is to eventually achieve a normal age class structure as the basis for a sustainable yield whilst targeting an AAC that should continue to increase until PAONG MTCS is fully planted. This will mean that some blocks would be harvested at an age other than their ideal rotation age. In some cases, this will result in a loss of increment. This is considered to be a 'cost' of achieving a normal structure more even level of annual production.

10.3 Harvesting System

Because of the steep and broken terrain, double winch system is the primary harvesting system to be used at PAONG. As well as being economically more efficient the use of this system also helps to protect the fragile soils and in particular reduce erosion and compaction. Avoidance of the latter effect is of particular importance when replanting with eucalypts.

PAONG use mix of fully mobile double winch yarders and shovel yarders. This is a system that enable partial or full suspension of felled trees when yarded to a landing for partial processing. Economics demands that extraction of trees harvested near the roadsides must be ground based. Site damage will be limited by the use of shovel mounted grapples.

Other benefits of a yarding system include:

Fully mobile:

- reduced disturbance to soils on steep erodible sites;
- reduced compaction when compared to a ground-based system;
- it can be used from high vantage points minimising construction of new road infrastructure (this helps maintains water quality and minimises site disturbance); and
- it allows access to otherwise economically inaccessible areas.

PAONG only started harvesting the first rotation of ITP in September 2021. Planting was on the residual and degraded MTH areas that resulted from being very heavily harvested. Full use is made of the existing roads and skid trails and little new roading is required other than short extensions of some access spur roads necessary for efficient harvesting.

10.4 Financial Sustainability

The PAONG MTCS area is the major part of the PAONG LPF but only a part of the total ITP area operated by the Samling Group. The Group has clearly been financially supportive of PAONG LPF for the past 20 years (from start-up to starting harvest), and of its other ITPs since their start-ups. It is reasonable to assume that this will continue to be the case for the foreseeable future. However, following the start of harvesting in September 2021, net revenue from internal log sales will cover replanting and overhead costs and it is expected that this will continue to be the case for the remainder of the 60-year licence period.

10.5 Non-Timber Forest Products

There are no non-timber forest products collected for commercial use.

11. Spatial Information and Management System

11.1 Spatial Information

With the ArcGIS Samling has a GIS that contains detailed spatial information for the PAONG LPF. Data are captured by the QS team using Garmin 76CSx. LiDAR commissioned by Samling covers part of the area. GPS tracks are downloaded using OziExplorer. Tracks are then cleaned and processed using Quantum GIS. GIS data is then held by ArcGIS for further processing and mapping. The GIS allows Samling to produce a variety of maps displaying an array of information including legal, coupe and block boundaries, protected areas, land-use and related spatial information, such as contours and transportation features. Harvest planning will be done manually on maps generated from the GIS and where available - with LiDAR providing contours at 5m intervals. Currently, purchase of IFSAR data for those areas not covered by LiDAR is under consideration.

GPS tracks are backed up at PAONG. After arrival at Miri HQ tracks are checked and cleaned and then saved on both Refor hard drives and Samling's local server.

Paper based copies are held as further "backup" should the electronic systems fail.

11.2 Management System

Samling uses the ERP system for financial control and the ATLAS GeoMaster suite to manage block records.

12. Conservation, Conservation Areas and High Conservation Values

12.1 Conservation and Conservation Areas

Some of the area's past history was mentioned earlier. Given the wide spread, heavy harvesting with at least two re-entries using both ground-based equipment and helicopters, it is not surprising that undisturbed primary forest has yet to be identified within the PAONG LPF.

This history mitigates against, but does not necessarily preclude, PAONG MTCS having much relevance to conservation in general and as a haven for rare, threatened and endangered species (RTE) in particular. This is of course especially true for larger animals. But, however limited the potential might be PAONG recognises it has an obligation and commitment to incorporate into its management practices a system that considers the need for conservation awareness and for the identification and protection of RTE species. It also recognises the importance of indigenous biodiversity and the need to protect areas of indigenous vegetation which might have the potential to recover, albeit over a long time, in both structure and biodiversity, to something approximating that which existed prior to the start of natural forest harvesting.

It follows that, no areas of undisturbed primary forest have yet been identified in the PAONG MTCS area. Those areas of remnant forest that have been designated as conservation areas, as opposed to riparian buffer zones (the establishment of which is a mandatory), will be protected as SMZs. Full protection of the conservation areas and other SMZs will allow them to continue to recover and develop their biological diversity. These areas will also provide refuges and ecological corridors for the wildlife in other parts (non-MTCS) of the LPF and adjoining areas.

It is Samling's policy that anyone working in PAONG LPF should have a positive approach to conservation and be involved with the process of protecting RTE species. Contractors are asked to

note, either verbally or in writing, the location and type of any rare or threatened species they come across in their day to day activities.

For example, all new contracts and those renewed for establishment, silviculture and harvesting work contain the following clause:

"Sites which are known to be culturally sensitive or are known to contain rare or endangered species are surveyed and placed on PAONG maps. If these areas are identified on any map(s) issued with the Work Order, it is the responsibility of the Contractor to ensure his workers have been informed of them before work commences. Any new sites or species encountered will be reported to PAONG management immediately."

Where a current contract does not contain this clause then the contractor is required to acknowledge and to agree in writing that he will comply with this clause.

As a forestry company, and with its Sarawak ITPs increasing in significance in terms of log production, Samling also views its forest plantations as a contributor to reducing pressures on the harvesting of MTH in Sarawak and Malaysia (and therefore globally).

The EIA identified some of the protected and totally protected flora and fauna that occur within the LPF and the recent HCV assessment made further identifications

12.2 High Conservation Values (HCV)

The main headings for HCVs are given below.

HCV 1 Biodiversity Values *Forest area contains globally, regionally or nationally significant biodiversity values (e.g. endemism, endangered species, sites of critical temporal use)*

HCV 2 Landscape-level Forest *Forest area contains globally, regionally or nationally significant large landscape level forest where significant populations of most if not all naturally occurring wildlife species exist in natural patterns and abundance.*

HCV 3 Ecosystems *Forest area contains or is part of a threatened or endangered ecosystem.*

HCV 4 Services of Nature *Forest area provides basic services of nature in critical situations.*

HCV 5 Basic Needs of Local Communities *Forest area is fundamental to meeting basic need of local communities.*

HCV 6 Cultural Identity of Local Communities *Forest area is critical to local communities' traditional cultural identity.*

12.3 High Conservation Value Assessment (HCVA)

Ecosol Consultancy Sdn Bhd undertook an HCV assessment in March 2023 and produced a report entitled '*High Conservation Value Assessment (HCVA) for Paong Licence for Planted Forest LPF/0021*'. The assessment methodology followed the WWF Toolkit for Malaysia⁵ and gives a detailed summary of the HCV status of Paong LPF.

⁵ First Edition 2009 WWF-Malaysia

Several HCV attributes were identified as 'present' in the course of the assessment. However, when considering HCV attributes scale and proportion must always be kept in mind. In Table 5.2 it may be seen that the gross area of the MTCS area is 24,834 ha; of this more than 36 % (8,946ha) is already in protected areas (SMZs).

12.4 Analysis of the High Conservation Value Assessment (HCVA)

12.4.1 Background

It should be noted that:

1. the area had generally been very heavily disturbed by logging for about 30 years prior to the issue of the LPF licence;
2. further, that salvage logging took place prior to the release of coupes to the LPF under Op.5 (clearing & site preparation);
3. the LPF has been in continuous operation for 20 years;
4. no rights or privileges have been admitted, either to individuals or to communities, within the Nakan-Kalulong F.R.; however, there has been encroachment by individual families;
5. 36% of the MTCS area is designated as SMZ. This means there is already a very large forested area under protection;
6. there are no registered or unregistered communities (kampongs) within the MTCS area (or within the LPF);
7. hunting by Samling employees and contractors is prohibited and there is little interest shown at present by locals in hunting and fishing for their own consumption within the MTCS area. DF Circular No. 6/99 is obsolete and has been superseded by SFC Circular No. 2/2021 which is adopted as the current regulatory reference for the implementation of forest management and conservation activities within the FPMU;
8. demand by locals for hunting and fishing for their own consumption within the MTCS area is very limited as there are only two adjacent communities; and
9. a number of individual houses along M2 and the Spg Pasir road are actually within the MTCS area, having encroached into the Nakan-Kalulong F.R. (see point 4.)

The first two points, above are, without doubt, 'conservational negatives' as is possibly, the third point. But it is quite clear from the EIA and the HCVA report that, despite these negatives, an interesting degree of biological diversity has been maintained.

The fourth point is primarily positive but of course any encroachment must be considered negative. The fifth point - that such a high proportion (36%) of the area has SMZ status and is therefore already protected from significant invasive human activity – together with the sixth, seventh and eighth points, will surely lead to the existing diversity of the wildlife, already quite considerable, being quantitatively and qualitatively further enhanced over time. The final point is something of a negative

12.4.2 Analysis

In summary, the report on the HCVA shows that, for PAONG MTCS:

HCV 1 and 2 the area does have some HCV1.2, HCV 1.3 and HCV 1.4, e.g. the existence of RTE species and some species endemic to Borneo. However, when the qualitative and quantitative aspects of these attributes are viewed in the context of relevance either to national and Sarawak state needs or to those of the PAONG LPF itself, there is no justification for elevating any of PAONG MTCS conservation areas from their current protected status and according them HCV status under either **HCV 1 or HCV 2**. This point is reinforced by the SMZs providing an equal level of protection for both mammals and birds that are free ranging, i.e. not confined to limited areas of habitat, as would be accorded to an area declared as an HCV area. Similarly, the linkage from the large Conservation Area in the south, across a strip of Samling's MTCS certified Gerenai FMU through to the Usan Apau NP is in no way enhanced by re-naming the Conservation Area an HCV area. No salt licks have been identified to date;

HCV3: no threatened or endangered ecosystem occur within the PAONG MTCS area;

HCV4 - HCV 4.1: the whole of PAONG LPF falls outside the 8km radius from the Water Intake Points (WIPs) of the two nearest water treatment plants; there are no water catchments within the LPF area that are required for gravity feed water systems to supply local communities;

HCV 4.2: reference is only made to riparian buffers, the designation and protection of which are any mandatory under the conditions attached to the EIA Report Approval certificate; and

HCV 4.3: Over a 20-year period of record the annual rainfall has averaged just under 5,000mm. There are, on average, 20 rain days a year. Paong LPF must be considered a wet area for most of the year and for most years. The MTH of the two large Conservation Areas, in the east of the LPF and adjoining the Gerenai FMU, is almost certainly in similar condition to that of the FMU and, in terms of providing a barrier in the event of fire, is not likely to be anymore effective than that of the FMU.

No reference is made in the HCVA report to Terrain Class IV which is present to a very limited extent in the MTCS area but is all within the designated Conservation Areas and is thus protected.

HCV 5: the HCVA report shows that there is now no real dependence on the forest products available in the MTCS area or indeed on those provided by the whole LPF. Although wildlife still supplements the diets of some people, and wild vegetable and wild fruits are still gathered, what activity there is – primarily hunting, fishing and foraging for wild vegetables – is supplemental. It is abundantly clear that there has been little real negative socio-economic impact by the activities within the PAONG MTCS area on the nearby communities. However, there are two main identifiable positive economic impacts as a result of these activities: employment by Paong LPF management and the provision of road access from the LPF area to Tuyut, from where vehicle owners may continue on the sealed government road and from where buses depart to Miri.

All the SA areas that the HVCA report refers to are outside of the MTCS area.

HCV 6: No sites of cultural significance have been identified by the EIA, the SIA or the HCVA.

12.4.3 Recommended Measure to demarcate, maintain and enhance the HCV attributes

The Paong LPF management should where possible follow the proposed measures in the HCV assessment report:

- (i) To promote the environmental education and publicity through discussion and dialogues with workers and local communities. Posters of Protected Animals and Plants to be distributed displayed at Paong camp and quarters. (**HCV 1.2, HCV 1.3**)
- (ii) To plan and supervise the forest plantation activities in regard to road extension, tree felling and salvaging of timber, use of weedicides or fertilizers, harvesting, replanting, and plantation maintenance, which have the potentials to cause some damages. (**HCV 4.2**)
- (iii) To restore any degraded or idle lands with planting of native tree species. For example, planting species such as *Tristaniopsis* (Belaban) and *Duabanga moluccana* (Sawih) for the degraded land; Light Red Merantis (e.g. *Shorea parvifolia*, *S. beccariana*), mixed with non-dipterocarps *Cratoxylon*, *Syzygium*, etc. for more fertile soil. Species to be selected would depend on the planting materials being available, like wildings and fruits. The LPF Licence Area having some areas delineated as Conservation Areas and Special Management Zone (SMZ) which are the protected non-plantable areas. (**HCV 1.4, HCV 2, HCV 4.2, HCV 4.3, HCV 5**)
- (iv) To restore ridges and slopes affected by landslides that may occur in the Licence Area, starting with cow grass as cow grass (*Axonopus imbricatus*) to stabilize the soil, followed planting of some fast-growing secondary tree species such as Benuah (*Macaranga*) and Kerdam (*Ilex*), which naturally inhabit such an area. (**HCV 4.2**)
- (v) To ensure no felling of protected trees and other plants as in List of Threatened/Endangered/Endemic/Protected Flora in the HCV assessment report. (**HCV 1.4**)
- (vi) To follow the DID/NREB Guidelines for riparian buffers, and secure at least 50 m of buffers along main roads and plantation boundaries. Rivers also act as natural fire break. (**HCV 4.2, HCV 4.3**)

12.5 High Conservation Value Stakeholder Consultation

The result of HCV assessment result has been shared to the local communities of Long Tebanyi and Long Ta'ah. The result also has been shared to the relevant stakeholders, on the options to maintain or enhance the identified HCV areas.

Table 12.1: List of Stakeholder in HCV Consultation

Organisation Type	Organisation name
Government	Sarawak Forestry Corporation (SFC)
Government	Forest Department Sarawak (FDS)
Government	Natural Resources and Environment Board (NREB)
NGO	WWF

Feedback obtained:

1. Sarawak Forestry Corporation agreed on the management recommendation by the Assessor. Their comment/ feedbacks as follow:

- The management can assist in the conservation and protection of threatened and endangered species through monitoring the movement of worker in and out of license area to ensure no hunting in the license area.
- Management to assist to promote HWR among the community adjacent with license area.
- To get communities to be appointed as Honorary Wildlife Ranger to promote awareness and conduct education & awareness program.

12.6 Identification, Management and Demarcation of Special Management Zone (SMZ) within FPMU.

The following guideline and procedures are used as a guide in managing and demarcating of Special Management Zone (SMZ) and HCVs, if identified.

- a) Operational Procedure No.: SST/RP/QS/01 Riparian Buffer Zone
- b) Operational Procedure No.: SST/RP/OP/01 Quantity Survey and GIS Mapping
- c) The Guidelines for Fauna Conservation and Ecosystem Management (FDS)
- d) Procedures for Identifying and Demarcating Sensitive Areas for the Protection for Soil and Water (FDS);
- e) Procedure for Monitoring and Management Measures of High Conservation Value Area (HCVAs); and Process of Discovery and Demarcation of New HCVAs (FMC-2023) -Natural Forest.

Zone Types	Action taken by Paong FPMU	
Riparian buffer (RBZ)	<p>a. River Buffer Zone of permanent waster courses are demarcated on the ground with blue paint and on Lana MTCS Map. Any encroachment detected will be reported to FDS Enforcement Unit. Conversion or planting should not be carried out at river buffer zone. Monitoring: The scheduled patrolling is conducted twice a month covering the detection of illegal hunting, road conditions, encroachment, damage of special management zone, safety and health, community interaction, invasion of exotic species and other suspicious activities.</p>	
Width of water course (m)	With of River Buffer Zone (m)	
>40	50	
20-40	40	

		10-20	20
		5-10	10
		<5	5
Source: Table 4 of Lana EIA Jan 2003			
Steeps areas: $\geq 35^\circ$ rare mandatory; upper slopes	<p>b. It is mandatory to exclude this area from ITP productive area. Demarcation on the ground with blue paint and on Lana MTCS Map. Any encroachment detected will be reported to FDS Enforcement Unit. Conversion, clearing or planting should not occur on the steep terrain $\geq 35^\circ$. Monitoring: The scheduled patrolling is conducted twice a month covering the detection of illegal hunting, road conditions, encroachment, damage of special management zone, safety and health, community interaction, invasion of exotic species and other suspicious activities.</p>		
Gulley: Steep riverside areas outside the mandatory buffer zone	<p>c. Due to its steep slope, this part of the area is excluded from ITP productive area and then it protected under special management zone. Demarcation on the ground with blue paint and on Lana MTCS Map. Any encroachment detected will be reported to FDS Enforcement Unit. Conversion, clearing or planting should not occur in protected area. Monitoring: The scheduled patrolling is conducted twice a month covering the detection of illegal hunting, road conditions, encroachment, damage of special management zone, safety and health, community interaction, invasion of exotic species and other suspicious activities.</p>		
Conservation: voluntary designated as such; otherwise it might have been planted. The existed Terrain IV also located within Conservation Area <i>(Refer to section 12.4)</i>	<p>a. Same as other zone types, this area is demarcated on the ground and on the map. The clearing, conversion and planting activities are strictly prohibited in conservation area.</p>		

12.7 Social Impacts

12.7.1 Assessment

The Social Impact Assessment (SIA) was undertaken by Ecosol Consultancy Sdn Bhd in March 2023. The assessment was guided by the '*Guidelines and Procedures for Social Impact Assessment and Monitoring of Forest management Operations (Peninsular Malaysia)*'. (UPM, 2012). A report entitled: *A Social Impact Assessment for Paong LPF/021* (August 2023) was prepared and should be referred to for detailed information.

12.7.2 SIA Report and Analysis

The report identifies no communities within the LPF and only two outside but nearby the LPF boundary and which might therefore be impacted by the activities within the MTCS. These are: Lg Tebanyi (Sebatang) and Lg Ta'ah. However, there are a number of individual families encroaching by into the Naka-Kalulong F.R. These have been reported by Samling to FDS in some detail for their further action.

The SIA report states the objectives of the assessment as:

- To identify and enumerate the baseline data of local communities' conditions within the planted forest management operations area;
- To identify the key social impacts of the FPMU's operations;
- To recommend management action needed to mitigate and monitor the social impacts of forest management operations in PAONG LPF; and
- To establish friendly relationship between Licensee and the affected communities.

The assessment identified and addressed several points, both negative and positive, of impact arising from the forest plantation activities within the LPF:

i) Losses of sources of NTFP and fisheries

On Page C5-1 the report states: "...any impact due to the loss of logged-over remnant forests as a result of the Project is not great, and therefore this would not further affect the supply of NTFPs significantly....". (see also Item iv, below)

ii) Loss of farmland

The HCVA report also noted a concern regarding loss of land ownership and loss of land for farming. However, with regard to the former, the consultant's field team should have clarified with the local communities, there and then, that almost 91% of Paong LPF is inside the Nakan-Kalulong F.R. meaning that only around 9% is State land over which land claims might be entertained. Furthermore, unless the land is titled, then it is owned by the State and so the question of 'ownership' should not arise unless it has been verified as NCR by perimeter survey. In the latter case the NCR land – on State land - would have been excluded from the plantable area.

The concern regarding loss of land for farming is not relevant to the MTCS area as no SA has been included.

iii) Water supply and quality

Ensuring adequate supplies of clean water throughout the year is frequently a major concern for most rural communities in the Baram region, and Lg Tebanyi, which is on Sg Paong, and Lg Ta'ah, which is on Sg Dapoi, are no exception.

Given that Sg Dapoi is outside the LPF from Lg Ta'ah to its source in the Usan Apau, the LPF's activities have no impact on Lg Ta'ah's water supply. Sg Paong enters Paong LPF several kilometres above the community area of Lg Tebanyi. It then passes through the LPF, and its large conservation area in the south, enters the MTCS certified Gerenai FMU for a short distance before it too enters the Usan Apau wherein lies its source.

Almost all the roading in the LPF was completed many years ago, and at present, no areas are being prepared for new planting; the main activity is the harvesting and replanting of the first rotation of ITP. There will inevitably be some increased erosion from the harvesting operations; this will be mitigated to some extent by the river buffer zones (RBZ) that are mandatory along all perpetually flowing waterways.

It is often forgotten that a very significant rate of erosion can and does occur naturally in areas of high and heavy rainfall. This is especially true in the steep and broken terrain which comprises much of the land available to ITP in Sarawak. However, this rate of erosion is exacerbated by the removal of vegetation that establishment of ITP requires and the use of heavy equipment for road construction and timber extraction. This, removal of vegetation and use of heavy equipment, inevitably leads to some increased siltation of the rivers; but just how much can be attributed to which cause is the subject of generally qualitative, unscientific argument.

iv) Impact on sensitive and cultural sites

No sensitive or cultural sites have been identified in the form of burial sites and salt licks in the LPF; nor are there any water catchments in the LPF so no concerns should have been expressed.

v) Impacts from foreign workers

Foreign workers have been employed in the area by Samling for about four decades and by the Paong LPF for more than two of these – foreign workers in the region are hardly a new phenomenon! However, the report states: "...*Most of them [local people] no longer see these foreigners as a threat to their opportunities...*"

vi) Local economy and livelihood**(a) Forest resources**

In the PAONG MTCS area most of the residual MDF is now protected as SMZs. This means that extractive activity is restricted to more or less non-damaging events, e.g. collecting honey, fruit, rattan etc. The felling of any tree within an SMZ is prohibited (unless it is an exotic). This also means that the availability of trees from which to produce timber for construction is perceived by the communities to be restricted – which it is. But what is not known is the true demand for such trees. Given fact that there are only two communities within and adjacent to the LPF with a population totalling less than 500 - of which many of the economically active will not be resident - then the demand for all forest products will be very low. In addition, with the assumed to be diminishing and aging population, together with the trend for using cement in house repair and construction, the

demand for timber and the number of men available and capable of harvesting the required trees, must be trending down.

(b) Income and job opportunities

In 2022 more than 78% of the *staff* was local, i.e. from within the district, but only 19.7% of the workers were local (Table 7.1). The low participation rate of locals in fieldwork reflects the 3 D perception by these locals - dirty, dangerous and demanding -, and the reality, that contract work in forest plantations is physically arduous, and not overly well paid. These perceptions, together with the need for regular and consistent working hours and with the work place being somewhat remote from home comforts, has resulted in this low participation rate. But low worker participation rates are not confined to PAONG LPF; this is the case for the ITP industry throughout Sarawak and, only to a slightly lesser degree, for Sarawak's oil palm industry.

(c) Traditional economic activities

See section vii below

vii Socio-cultural life

a) Health and safety

The SIA has little of substance to say about health and safety apart from noting concerns regarding afflictions due to water pluto, the dust from the plantation roads giving rise to reduced air quality and, rather unfairly, diseases that "... *are attributed to contacts with forest workers...*".

b) Traditional knowledge and skills of local communities

Linked in part to the reduced area of the forest resource is the dwindling traditional knowledge and shrinking traditional skill base of the communities. But the reduced availability of traditional material is not the only cause of diminishing handicraft practices. As the population ages so the number of skilled and practicing artisans decreases; infirmity renders the collection of the raw material from the forest a less attractive activity; and then death takes its toll and further reduces the number of participating artisans.

However, it should also be acknowledged that even some aspects handicrafts move on and that the traditional skill of basket weaving has to some extent flourished with the realisation that PVC strapping can be used as a readymade substitute for rattan for certain handicraft products. With some adaptation of technique and design, this allows the traditional skills of basket weaving to be gainfully practiced without the need for (a) a rattan resource and (b) the very time consuming process of collecting and then processing the rattan to a state in which it can be used for handicraft products.

c) New knowledge and skills

For many, perhaps most, of the younger villagers the effort and time taken to collect raw material from the forest and then process it prior to starting handicraft production – even if the material is available in the forest in adequate quantity – is not a very attractive proposition. When viewed against a wage earning or salaried occupation that new knowledge and new skill opens up to younger people, together with the lure of life in the town and of the internet connected 'digital world', the idea of handicraft production becomes even less attractive.

viii Positive impacts

The report acknowledges positive impacts. These are primarily associated with various opportunities for:

- employment; and
- entrepreneurial activity; and
- the provision of good road access.

Of great and lasting importance is the improved access by way of the, albeit dusty, plantation roads which allow villagers to drive to Tuyut and there join the sealed government road. Lg Tebanyi (Lg Sebatang) lies close to the main road (M2) and Lg Ta'ah is only 4 km away from the main road (M3) all main roads lead to Tuyut.

12.8 Mitigation and Enhancement Measures

12.8.1 Introduction

The component needing some mitigation social impact are listed as:

- Land-Rights and Local Sensitivity and Concern
- Land-Use Conflict and Security Issues due to other timber/plantation operators
- Impacts on Local Water Supply and Quality
- Impacts from Introduction of Foreign Workers
- Road-related Safety and Health
- Socio-cultural Life
- Project Abandonment

The details the recommended management practices to mitigate the potential social impact are described in **Table 12.2**.

12.9 Monitoring – Wildlife and Social Impact

12.9.1 Fauna

Fauna will be monitored by sightings based on the patrol reports, *ad hoc* sightings, camera trapping and visits by Samling's Conservation Team. Sightings will be summarised on an annual basis and presented in Table 12.2 (Pge C12-10)

12.9.2 Flora

Apart from the permanent sample plots (PSPs) the monitoring of the flora in the MTCS area will be restricted to observations of the movement of exotics species as described in Section 6.4.

PSPs are established and then used to monitor the subsequent growth and survival of the planted species. PSPs and the results of the monitoring are discussed in some detail in Ch. 9.

12.9.3 Social Impacts

Social impact Monitoring will be conducted annually with two (2) adjacent communities: Long Tebanyi (previously Long Sebatang) and Long Ta'ah, Social impact monitoring result has been incorporated in Section 7.6.

Elements that will be covered by the SIM are:

- Environment (Water Supply and Quality)
- Local Economy (NTFP resources, fisheries resources, wildlife resources, agricultural activities

- Socio-Cultural Life (agricultural area, movement area, graveyard)
- Accessibility (Road network, workplace)
- New skills and knowledge (product from NTFP, forest plants and herbs, new skills, job opportunity) of the local communities.

Table 12.2: Recommended Management Practices to mitigate the potential social impact.

No	Key Potential Social Impact	Best Management Practices
1	Land-Right and Local Sensitivity and Concern	<p>a) The Licensee needs to ensure that due diligence and accountability to human rights, including its gendered dimensions, are integrated into sustainable policies and practices.</p> <p>b) A grievance mechanism should be effectively established and functioned to ensure that the concerns and grievances of the PACs need to be made fully aware of their rights verbally and in writing during consultation, survey, and time of compensation. Any agreement to be signed must be signed with the presence of witness (a third party such as Government's elected Headmen and Officers) to ensure transparency and accountability. Proper records must be kept at all times for all the compensation and allowances paid to the relevant PACs to avoid future disputes.</p> <p>c) tribal customs of Kenyah and Sebop would have to be observed. The rights-of-way would need to be properly negotiated. Where possible, the budget should be set aside to provide the maintenance and repair of secondary roads used by PACs in order to foster a good relationship between the Licensee and PACs as well as a part of the CSR projects.</p> <p>d) Area to be developed area to be preserved (wherever required) should be clearly defined and verified.</p> <p>e) any gravity-feed WSC, burial grounds, historically sites and any other sensitive localities not presently identified inside the Tree Planting Plan but found later in and around the development area should be protected from disturbance by the plantation activities.</p> <p>f) artefacts and articles of archaeological value found should be handed over to the Museum Department of Sarawak.</p>

Source: Social Impact Assessment for Paong August 2023

Table 12.2: Recommended Management Practices to mitigate the potential social impact (Cont).

No	Key Potential Social Impact	Best Management Practices												
2	Land-Used Conflict and Security Issue due to other timber/plantation operators.	<p>a) signages such as 'No Hunting should be installed at suitable locations within the Licence Area. However, some local hunter may enter and hunt inside the Area. In any case, if hunting by the local people is permitted by Sarawak Forestry Corporation (SFC), there must be some understanding between Licensee and local hunters as to where and when hunting by the latter could be allowed to prevent any untoward mishap and accidents.</p> <p>b) Long-term issue regarding maintenance and repairs of the common access roads used by other stakeholders (particularly neighbouring timber licences and oil palm plantations/estates) should be properly negotiated and dealt with.</p>												
3	Impacts on Local Water Supply and Quality	<p>a) Any gravity-feed WSC not presently identified inside the Tree Planting Plan but found later in and around the development area should be protected from disturbance by the plantation activities. In addition, 100m buffer should be allocated.</p> <p>b) Preserve riparian buffer according to NREB/DID guideline for riparian buffer requirement:</p> <table border="1"> <thead> <tr> <th>Width of River/ Stream (m)</th> <th>Width of riparian buffer (m)</th> </tr> </thead> <tbody> <tr> <td>>40</td> <td>50</td> </tr> <tr> <td>20 - 40</td> <td>40</td> </tr> <tr> <td>10 - 20</td> <td>20</td> </tr> <tr> <td>5 – 10</td> <td>10</td> </tr> <tr> <td><5</td> <td>5</td> </tr> </tbody> </table>	Width of River/ Stream (m)	Width of riparian buffer (m)	>40	50	20 - 40	40	10 - 20	20	5 – 10	10	<5	5
Width of River/ Stream (m)	Width of riparian buffer (m)													
>40	50													
20 - 40	40													
10 - 20	20													
5 – 10	10													
<5	5													

Source: Social Impact Assessment for Paong August 2023

Table 12.2: Recommended Management Practices to mitigate the potential social impact (Cont).

No	Key Potential Social Impact	Best Management Practices
3	Impacts on Local Water Supply and Quality	<p>c) Discarded logs, off-cut (cut ends), other woody debris, rubbish and other solid wastes should not be thrown indiscriminately into the waterways. If any debris gets into waterways accidentally, they should be removed as soon as possible. Rubbish from the camps (including temporary camps) and log pond should be regularly collected and buried at an appropriate site away from the waterways; the discarded logs (and cut ends) should be buried as vegetative waste.</p> <p>d) Direct discharge of sewage into waterways should be prohibited. Prefabricated individual septic tanks systems should be provided at the Paong Refo Camp and log pond for the treatment of sewage.</p> <p>e) Hydrocarbon wastes such as use oil and lubricant shall be properly managed accordance with the guidelines prescribed by Department of Environment (DOE).</p>
4	Impact from Introduction of Foreign Workers	<p>Communicable Diseases:</p> <p>a) A structured health screening programme should be drawn up to regularly inspect the health status of the workers. Foreign forest workers should rigorously screen for diseases before employment.</p> <p>b) Clean and reliable water supplies should be made available at the Paong Refo Camp and logpond. Appropriate and adequate containers should be provided to collect rainwater at temporary camps/ <i>rumah Tarik</i>. Whenever necessary, the Licensee can help by transporting water from a suitable source to the temporary camps, especially during the dry season.</p> <p>c) Ensure that there are no stagnant pools of water at the living quarters for the mosquitoes to breed. Garbage especially empty container that may hold water must be properly disposed of e.g. dump in the designated pit and cover with a layer soil material. Once full, a new site of dumpsite would need to be identified. At least 100m away from the nearest river stream or other water bodies. Periodic fogging around the Paong Refo Camp and log-pond could be scheduled.</p> <p>d) Ensure that environment and living conditions at the Paong Refo Camp and log-pond are kept tidy and hygienic at all times.</p>

Source: Social Impact Assessment for Paong August 2023

Table 12.2: Recommended Management Practices to mitigate the potential social impact (Cont).

No	Key Potential Social Impact	Best Management Practices
5	Road-related Safety and Health	<p>a) The haulage vehicles should not be overloaded to avoid accidents and dangerous mechanical failure of vehicles. The logs should be securely fastened, and very long logs should be trimmed to manageable lengths so that they do not protrude too far beyond the bodies of the trucks; in this respect, any guideline from the relevant authorities should be followed.</p> <p>b) Transportation activities from the operating blocks inside the Plantation to the log-pond should be properly arranged, segregated, and restricted to daytime. In this case of several other users, sensible scheduling of transportation activities is pertinent; it will help to spread out such activities so that the volume of traffic generated is not concentrated into a short period of time.</p> <p>c) Drivers should be adequately educated on road safety rules and regulations. Only experienced drivers with good driving records are to be engaged; their working hours should be restricted (not more than 10 hours per day) to ensure that their judgements and alertness while driving are not impaired by fatigue.</p> <p>d) Broken-down vehicles should be removed to a safe place away from normal traffic flow as soon as possible. If they have to be left overnight, proper warning signs should be posted to alert other motorists of such potentially dangerous obstructions.</p> <p>e) Speed limit should be imposed. Near the living quarters, for example, the speed limit may be set at 30 km/hr or less. The speed limit signboards must be clearly posted.</p> <p>f) Signage indicating the direction/lane to use should be erected.</p> <p>g) Proper transport facilities should be provided to ensure safe transporting of workers within the operating blocks.</p>

Table 12.2: Recommended Management Practices to mitigate the potential social impact (Cont).

No	Key Potential Social Impact	Best Management Practices
6	Socio-cultural Life	<p>Safety</p> <p>a) All roads that are not essential for access to other areas should be closed to prevent illegal entry and hunting activities especially in sensitive areas.</p>
7	Project Abandonment	<p>b) For foreign workers, a proper repatriation program should be instituted to ensure a smooth and proper departure; this is to ensure that none of foreign labourers would remain in our State as “illegal immigrants”.</p> <p>c) Where possible, workers should be re-deployed to other work places. If the workers have to be retrenched, proper procedure should be followed and certain compensation commensurable with their last pays given.</p>

Source: Social Impact Assessment for Paong August 2023

Table 12.3 Wildlife Monitoring – Incidental Wildlife Sighting

Annual summary of sightings						
Common/ Local Name	Scientific Name	Year				Total
		2022	2023	2024	2025	
Mammalia						
Civet (all)	Family Viverridae	0	0	0	1	1
Masked Palm Civet	<i>Paguma larvata</i>	0	0	0	1	1
Yellow-throated Marten	<i>Martes Flavigula</i>	0	0	0	1	1
Malay civet (Tangalung)	<i>Viverra tangalunga</i>	0	0	1	0	1
Short-tailed Mongoose (Dumbang)	<i>Urva brachyurus</i>	0	0	1	0	1
Otter (all)	Family Mustelidae	0	0	0	1	1
Barking Deer (Kijang)	<i>Muntiacus muntjak</i>	1	1	3	8	13
Long-tailed Macaque (Kera)	<i>Macaca fascicularis</i>	9	0	26	56	91
Malayan Porcupine (Landak)	<i>Hystrix brachyura</i>	0	1	0	30	31
Long-tailed Porcupine (Landak Kecil)	<i>Trichys fasciculata</i>	0	1	0	0	1
Mouse Deer (Pelandok)	<i>Tragulus napu</i>	0	0	1	4	5
Pig-tailed Macaque (Nyumbuh/Beruk)	<i>Macaca nemestrina</i>	9	4	5	71	89
Bornean Gibbon	<i>Hylobates muelleri</i>	0	0	0	1	1
Hose's Langur (Berangad)	<i>Presbytis frontata</i>	0	1	14	0	15
Plaintain Squirrel (Tupai Pinang)	<i>Callosciurus notatus</i>	2	0	1	14	17
Giant Squirrel (Engkerabak/ Tupai Besar)	Family Sciuridae	0	1	0	0	1
Flying Squirrel (all)	Family Sciuridae	0	0	0	3	3
Sambar Deer (Payau/ Rusa)	<i>Cervus unicolor</i>	9	13	30	18	70
Slow Loris (Bengkang/ Kongkang)	<i>Nycticebus coucang</i>	1	0	0	0	1
Sun Bear (Jugam/ Beruang Madu)	<i>Helarctos malayanus</i>	0	0	1	1	2
Reptilia						
Snake (all)	-	0	0	0	7	7
Python (all)	Family Pythonidae	1	0	0	1	2
Cobra (all)	<i>Naja</i> sp.	0	1	1	1	3
All Frogs (Katak)	-	0	3	0	0	3
Aves						
All eagles (Menaul/Lang)	Family Accipitridae	7	18	16	5	46

All owls (Burung hantu)	-	0	0	1	0	1
All swiftlets (Lelayang)	Family Apodidae	0	23	10	0	33
Black Hornbill (Burung rangak)	<i>Antracoceros malayanus</i>	2	0	0	5	7
Pheasants (all)	Family Phasianidae	0	0	0	3	3
Bornean Crested Fireback	<i>Lophura ignita</i>	0	0	5	0	5
Oriental magpie-robin (Burung Murai)	<i>Copsychus saularis musicus</i>	0	0	0	1	1
Rhinoceros Hornbill (Kenyalang)	<i>Buceros rhinoceros</i>	6	3	2	4	15
Slender-Billed Crow (Gagak)	<i>Corvus enca</i>	0	1	15	21	37
White-rumped Shama	<i>Copsychus malabaricus</i>	0	0	0	1	1
White-chested Babbler	<i>Trichastoma rotratum</i>	0	0	0	1	1
Insecta						
Rajah Brooke's Birdwing	<i>Tragopoptera brookiana</i>	0	0	0	0	0

Source: Ad hoc sightings as at December 2025

Table 12.4: Wildlife species captured (Camera Trapping) and Observed (Incidental Sighting) 2025.

No	Common Name	Scientific Name	Total No.		Conservation Status		
			CT	IS	WLPO 1998	CITES	IUCN
Mammal							
1	Civet (all)	Family Viverridae	1		P	-	-
2	Otter (all)	Family Mustelidae	0	2	P	-	-
3	Malayan Porcupine	<i>Hystrix brachyura</i>	16	14	P	NL	LC
4	Pig-tailed Macaque	<i>Macaca nemestrina</i>	71	0	P	App. II	EN
5	Long-tailed Macaque	<i>Macaca fascicularis</i>	0	56	P	App. II	EN
6	Yellow-throated Marten	<i>Martes Flavigula</i>	1	0	P	NL	LC
7	Rusa	<i>Rusa unicolor</i>	0	18	-	NL	VU
8	Red Barking Deer	<i>Muntiacus muntjac</i>	8	0	-	NL	LC
9	Masked Palm Civet	<i>Paguma larvata</i>	1	0	P	App. III	LC
10	Mousedeer	<i>Tragulus napu</i>	4	0	-	NL	LC
11	Plaintain Squirrel	<i>Callosciurus notatus</i>	0	14	-	NL	LC
12	Flying Squirrel (all)	Family Sciuridae	0	3	P	-	-
Aves							
13	White-chested Babbler	<i>Trichastoma rostratum</i>	1	0	-	NL	NT
14	White-rumped Shama	<i>Copsychus malabaricus</i>	1	0	P	NL	LC
15	Oriental Magpie Robin	<i>Copsychus saularis</i>	1	0	-	NL	LC
16	Fireback (Malay-Sempidan)	<i>Lophura sp.</i>	0	3	P	-	-

17	Rhinoceros Hornbill	Buceros rhinoceros	0	4	TP	App. II	VU
18	Slender-billed crow	Corvus enca	0	21	-		
Reptilia							
19	Snake (all)	unidentified	0	7	-	-	-
20	Sumantran Cobra	Naja sumatrana	0	1	-	App. II	LC
21	Python (all)	Family Pythonidae	0	1	P	-	-

Source: Camera Trapping record and incidental wildlife sighting as of December 2025.

13. Social Multiple-Use

13.1 Local Population

13.1.1 Recreational Pursuits

Personal safety on the logging roads is an unavoidable issue and security of both the company's and contractors' equipment and of workers' property, is an on-going problem. This leaves little opportunity for recreational pursuits within the LPF by the general public. Members of the Natural Science Society, Bintulu (NSSB) and other such organizations are of course encouraged to approach SST/SRB to discuss arranging visits which should serve to further our knowledge of the area's biodiversity.

13.1.2 Hunting and Fishing

Hunting is prohibited other than by members of the local communities and then only for personal consumption, and not whilst actively employed by Samling within the LPF. The opportunities for fishing within the MTCS area are limited.

13.1.3 Water Catchments

The boundary of any water catchment within the LPF must be clearly marked on the ground with blue paint on standing trees, GPSd and then be shown in all the relevant LPF maps. Water catchments are special management zones and there should be no disturbance of the vegetation within these areas.

13.1.4 Shifting Cultivation/Agriculture (SA)

Whilst not multi-use of the *forested* area, the use of the long-established SA areas within the LPF (but which are excluded from the plantable area statement in LPF licence) still continues. There is however no SA within the MTCS area.

13.1.5 Land Rights

The Nakan-Kalulong F.R. covers 91.8% of the MTCS area. Gazetted in 1984, under G.N. No. 3147 (Appendix 4), no rights were admitted within the forest reserve. However, the two main roads constructed by Samling in the early 1980s gave access to significant linear encroachment into the forest reserve. This has been reported to FDS.

Claims made by members of the local population regarding land rights within the 2,030 ha of state land, e.g. NCR claims, must be addressed and verified by the relevant government departments. Where boundaries are subsequently agreed and surveyed by the relevant government agency, the boundaries will be shown on the relevant LPF maps following receipt of the shape files from FDS.

Verified landowners who wish to enter into an agreement with Samling to develop their land for ITP may do so on terms mutually acceptable to both parties. Copies of any such agreement should be kept in the PAONG LPF office.

13.1.6 Public Health and Work Place Safety

The Occupational Safety and Health Act 1994 will apply to all members of the local population who are employed by Samling, or by Samling contractors, in the PAONG LPF in the same way as it applies to all any other Samling employee.

They will also benefit from all other provision of the applicable laws of Sarawak and Malaysia with regard to conditions of employment and safety in the workplace.

13.2 Others

Samling entered into a long-term R&D co-operative agreement with SFC. PAONG LPF was an active participant in this R&D and hosted a site for a *Falcata moluccana* breeding program. Unfortunately, SFC is no longer active in R&D and the status of the agreement has yet to be resolved. However, the site is still actively maintained by Samling and the results should benefit the MTCS area by way of improved genetic material in time to come. It is expected that the first of the improved seed will be collected sometime in 2024.

Samling, through STA's Plantation Committee, has cooperated with Swinburne University (Kuching) in the development of a biofertilizer for *E. pellita*. It is uncertain whether or not this will move into commercial production but if it does then it will be trialled on Samling's LPFs with the hope that the results will show a cost-effective benefit for Samling's *E. pellita*.

14. Cultural and Historic Values

No sites of cultural or historic value were identified within the MTCS area by the EIA (2000), or by the SIA (2023) or HCVA (2023). None has been subsequently identified on the ground and local knowledge indicates that there are none.

There are no burial grounds or graveyards within the LPF. No salt licks have been located within the LPF nor have any other sites of cultural or historic interest been identified within the LPF.

15. OCCUPATIONAL HEALTH AND SAFETY AND ENVIRONMENT

15.1 Introduction

In the conduct of forestry operations, a safe and healthy work place, as far as practicable, is assured by compliance with the Occupational Safety and Health Act 1994 and the relevant legislative regulations and guidelines that are applicable to the respective work places.

15.2 Health, Safety and Environment (HSE) Policy Statement

The management is committed to the following principles:

- Provision of systems of work, work environment, plant, equipment and the maintenance of the same, in so far as practicable, that are safe and without risk to health and adverse impact to the environment;
- Provision of adequate welfare, religious and recreational facilities for all employees without adverse impact to the environment;

- Provision of a safe means of access, egress to and from work places, emergency response (ERT) for rescue, control of environmental spill and natural disaster in so far as practicable;
- Provision of information, work instruction, training and supervision for all staff to enhance work competencies, skills and awareness in HSE, and the implementation of Best Management Practices (BMPs) in the industry;
- Review the HSE standards and practices periodically to ensure continued relevance and appropriate to the organisation.

15.3 Safety Practice Guidelines for Forestry Activities

Safety practice is the responsibility of both the management and employees regardless of level or job designation. All employees must be mindful at all times of the Safety Practice Guidelines (Appendix VII).

However, the camp management is required to play an active role in carrying out measures to ensure the safety and health of all employees in the work areas. The role of camp management is as follows:

- To hold regular Health, Safety and Environment Committee meetings and to enforce procedures to reduce or eliminate safety and health hazards in the work place;
- To carry out safety and health inspections and enforce disciplinary measures on errant employees to ensure the safe operation of the Samling's machinery, tools and equipment, and to provide a healthy environment;
- To give proper instruction and orientation on safe working procedures and health, awareness to all new employees when they report for work and to ensure that hazardous activities are only to be carried out by competent personnel;
- To select key personnel to undergo training on safety and health matters as may be decided by Samling;
- To ensure that all employees use appropriate Personal Protective Equipment (PPE), such as safety helmets, gloves and vests, during field operations;
- To consider the Safety Officer's and /or the HSE Committee's findings and recommendations with regard to the cause of any accidents and to review any form of unsafe practices as and when reported and to take appropriate corrective actions;
- To promote co-operation among all Samling's employees and contractors in propagating, developing and carrying out measures to ensure safety for everybody;
- To prohibit the consumption of alcohol in the work place and to have zero tolerance of any form of drug abuse;
- To ensure proper road safety signboards are displayed;
- To notify the relevant authorities of any accident arising out of employment by Samling that results in death, or in serious bodily injury that prevents an employee from attending his normal work for more than four calendar days, by the quickest means available; and
- Where a dangerous incident occurs in the work place, to notify forthwith to the nearest Department of Occupational Safety and Health (DOSH) office by the quickest means available, and within seven days, report the incident using the approved DOSH form.

Within the framework of the Safety Practice Guidelines, camp management must take due consideration of all employees' health and safety during tree felling, skidding, log handling and scaling, land and river transportation, road construction and maintenance, and of those working in the camp office and workshop or in any of Samling's working areas located within the FMU. Where practicable relevant salient points reflecting those set out above, will be incorporated into work instructions.

15.4 Training of Forest Workers

As required under The Forests (Trained Workmen) Rules, 2015, workers who are engaged in any one of the following: tree felling, log extraction or log loading, must be trained by STA Training Sdn Bhd trainers or by other STA or SFC approved trainers.

15.5 In-house Training for Occupational Health and Safety and Environment

15.5.1 Health, Safety and Environment Committee

A Health, Safety Environment and Committee (HSEC) comprises: (a) Chairman; (b) Secretary; (c) representatives of employer; and (d) representatives of employees. The functions of the HSEC are as follows:

- It shall assist in the development of safety and health rules and safety systems of work;
- It shall review the effectiveness of the safety and health program;
- It shall carry out studies on the trends of accidents, near-miss accidents, dangerous occurrences, occupational poisonings or occupational diseases which occur at the place of work;
- It shall report to the Samling management any unsafe or unhealthy s;
- It shall review the safety and health policies at the place of work and make recommendations to the employer for any revision of such policies;
- It shall meet as often as may be necessary but shall not meet less than once in three months;
- It shall furnish a copy of the minutes of every meeting to every member and to the Samling management within two weeks after the meeting has taken place; and
- It shall ensure the Notification of Accident, Dangerous Occurrence, Occupational Poisoning and Occupational Disease (NADOPOD) Regulations 2004 are complied with.

15.5.2 DOSH Guidelines

DOSH's *Guidelines for Occupational Safety and Health in the Logging Industry* are used as the basis to develop the Safety Practice Guidelines for the better prevention of injury and health problems in harvesting operations. It provides training information and guidelines for risk control in the core activities of the upstream timber industry which are primarily: tree felling, ground-based and cable log extraction, loading and transportation of logs by road, road building and maintenance.

16. Monitoring

16.1 Introduction

The MTCS area of the Paong LPF was certified in 8th March 2024.

16.2 Elements to be Monitored

The following elements will be monitored in compliance with the MC&I SFM:

- a) **Yield of forest products (logs)** harvested is monitored through the daily trucking reports. These reports are summarised by year in Section 10.1 of Chapter 10. Table 10.1 shows the monitoring of the past log production. Figure 10.1 shows the result of monitoring the accumulated production to date and comparing it against the ACC.
- b) **Growth rates** are monitored through a strong network of PSPs. The actual growth rates of mangium based on the real production and that for pellita based on PSP data are discussed in Chapter 9.
- c) By means of planting records and maps the composition and changes of the **flora are monitored** and recorded over time.
- d) The annual summaries for the **monitoring of fauna** are shown in Table 12.3.
- e) The SIA (2023) shows that the MTCS area is not fundamental to meeting the basic needs of the more distant communities and that there is little to monitor in this regard. Furthermore, any use that might be made of the MTCS area for NTFP will surely lessen as the rural population decreases and continues to change its consumption patterns to those of a more modern way of life.
- f) The extracts from the annual **Social Impact Monitoring** report show that the **impact of harvesting and operating** in ITP area has no, or negligible, social impact other than in providing employment for those with the relevant skills or for those who wish to obtain such skills. Employment levels are monitored by recording the actual numbers of locals employed each year – see Table 7.1.
- g) Monitoring of the environmental impacts of harvesting and other operations and of compliance with the EIA/EMP requirements is monitored by implementation of Environmental Compliance Audit (ECA).
- h) Productivity (for harvest productivity this has already been covered in volumetric terms in Chapter 10) and the efficiency of forest management are **monitored by budgetary controls** under the HQ accounts section.
- i) The risk of **invasion⁶ by exotic species** planted by PAONG or of invasion of the LPF by exotic species planted by external third parties is **monitored** during the regular patrol reports. To date no invasion of significance has been noted as attested by the patrol reports.
- j) **Regular monitoring of pests and diseases** is through information captured at the time of PSP measurement together with *ad hoc* monitoring.

⁶ 'Invasion' here means an exotic species is growing where it was not intended that it should.

17. Climate Change - Adaption, Mitigation and Monitoring

17.1 Introduction

Forests have a significant function in climate change mitigation by acting as “sinks”, i.e. absorbing carbon from the atmosphere and storing it in biomass and soils. However, when the forests are cleared or degraded, they are also significant sources of greenhouse gas emissions. Forests, therefore, are important components in strategies for adapting to climate change.

Sustainable Forest Management (SFM) can help reduce the negative effects of climate change on forests and forest-dependent people. SFM is consistent with climate adaptation and mitigation whereby the planning will factor climate change and the management practices will be adjusted accordingly. The planning will put greater emphasis on risk management and to weigh the costs of changes in forest management against the likely benefits.

In 2010, the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) adopted a decision on reducing emissions from deforestation and on the conversion of forests, sustainable management of forests, and enhancement of forest carbon stocks, usually known as *REDD+*. The accessibility of benefits from *REDD+* activities to individual forest managers would depend on the arrangements in place in the country for *REDD+* benefit-sharing.

Last but not least, the forest management should also be aware of the policy incentives instituted by governments, or market incentives, such as carbon credits or demand for bio-energy. Forestry projects are favoured by the voluntary carbon markets because of their additional social and environmental benefits (known as co-benefits).

17.2 Policies on Climate Change

Forest management is affected by climate change policies made at the national and global levels. Under the Malaysian Timber Certification Scheme (MTCS ST 1002:2021), forest management shall comply with the National Policy on Climate Change, 2002 and the UN Framework Convention on Climate Change, 1992.

17.3 Adaption and Mitigation in Forestry

Adaption and mitigation are the two main responses to climate change. The mitigation addresses the causes of climate change whereas the adaptation on its impacts.

In the forest sector, adaptation encompasses changes in management practices design to decrease the vulnerability of forests to climate change and interventions intended to reduce the vulnerability to climate change.

Mitigation strategies in the forest sector can be grouped into four categories: reducing emissions from deforestation; reducing emissions from forest degradation; enhancing forest carbon sinks and product substitution.

17.4 Adaption Actions

The actions for adaptation to climate change shall address risks or impacts. These actions are drawn mostly from existing forest management practices.

17.5 Mitigation Actions

Mitigation actions on climate change shall focus reducing Green House Gases (GHG) emissions at source and increasing GHG removals by sinks. These actions can be grouped into four general categories:

- Maintaining the area under forest by reducing deforestation and promoting forest conservation and protection;
- Increasing the area under forest (e.g. through afforestation and reforestation);
- Maintaining or increasing carbon density at the stand and landscape level by avoiding forest degradation and managing timber sustainably; and through the restoration of degraded forests, e.g. enrichment planting; and
- REDD+ activities: using the voluntary carbon markets as a means to sell carbon credits generated from carbon sequestered by the forests.

17.6 Monitoring and Evaluation

Monitoring of the climate change adaption and mitigation actions shall be additional and significant burden. Nevertheless, the existing databases, criteria and indicator processes and forest certification schemes shall form the framework for monitoring.

Regardless of the scale of monitoring required, forest management shall use precautionary approach and involve participation by local people on the social and environmental impacts.

Monitoring will require the collection of data on indicators of climate-induced impacts (e.g. forest productivity, forest health and forest pests). Many of these data will normally be collected in standard forest inventory.

For biodiversity, the ideal species for monitoring are those that are expected to be vulnerable to climate change and that are also easy to census. Ideally, such species will also be species of special concern.

For water monitoring, dry season base flow and suspended sediments during periods of low flow might be the most appropriate indicators. Macro-invertebrates in streams can serve as good indicators of ecological integrity.

For fire susceptibility, monitoring fuel loads and moisture content are the first steps in assessment.

Social factors can be monitored by engaging with Community through Annual Community Awareness and Engagement Program.

For forest carbon monitoring for mitigation projects, some aspects of monitoring will need to be outsourced, e.g. academic institutions with undergraduate and graduate researchers.

Where forest carbon needs to be monitored this will almost certainly be a requirement for the continued verification of validated carbon project registered under the likes of Verra. Such a project would require a Carbon Licence issued by FDS and would be outside the scope of a forest management certification program such as the MTCS.

17.7 Greenhouse Gas (GHG) Inventory Accounting

The initiative to reduce GHG emissions in Samling's timber operations started in 2023 with baseline accounting of GHG emissions for Scope 1 and Scope 2 for the year 2022. This in-house accounting reporting exercise was conducted by a third-party consultant engaged to ensure that the scope coverage, methodologies and verifications used in the accounting exercise were in accordance with the:

- GHG Protocol Corporate Accounting Reporting Standard, covering Scope 1 and Scope 2,
- 2006 IPCC Guidelines for National Greenhouse Gas Inventories ("2006 IPCC Guidelines"); and the
- 2019 Refinement to the 2006 IPCC Guidelines.

Scope 3 studies will be developed at a later stage.

18. Cost Benefit Analysis

18.1 Cost Relating to LPF Development

18.1.1 Financial Costs

- Transport Cost (tough road condition)
- Land rent and license fee
- Plantation establishment and infrastructure costs.

18.1.2 Non-Financial Costs

- Change in environment and landscape – from residual natural forest to ITP monoculture.
- Change in social dynamics

18.2 Benefits Relating to LPF Development

18.2.1 Financial Benefits

- Residual logging income from preparing the sites for planting
- Planted forest logs income

18.2.2 Non-Financial Benefits

- Log material sustainability through planted forest
- Alleviates the pressure of natural forest by producing higher volumes of tree plantation
- Working opportunities for locals around concession area and establish economy in the area.

18.3 Social Aspects

Samling's Paong ITP will contributes to the livelihood of the local communities living adjacent to the area. Local communities welcome the employment and the income-generation opportunities presented. Potential land claim issued have been identified and to be mutually handled should it arise. Cooperation between the company, relevant government agencies and the community will help to minimise this impact and increase the benefits brought about by the forest management operations.

19. Forest Plantation Management Plan – Review and Revision

19.1 Background

ITP is still a relatively very young industry in Malaysia. Planting only started in SEGAN in 2000. The Samling downstream mills that use Segan's ITP logs are still addressing the technical challenges and changes required when processing plantation logs and in marketing the products made from BORNEOTEAK®. The recent change of emphasis from mangium to crassicarpa will give Samling's downstream further exploratory work to do.

To take into account new knowledge, Samling's R&D findings, developments within the ITP sector and to ensure that as far as is possible SEGAN meets downstream's evolving requirements, an annual review of the FPMP may, at management's discretion, still be necessary. This will be followed by revisions as deemed appropriate. This somewhat frequent review schedule is recognised by Samling as being an important part of an on-going learning and implementation process. This process will assist in ensuring continual improvement of the management of SEGAN ITP and, in particular, the achievement of the primary management objective.

19.2 Review and Revision

Reviews and revisions will be conducted as in the following sections.

19.2.1 Optional Review

An annual review of the PAONG Forest Plantation Management Plan will be considered and undertaken if thought appropriate. A revision may follow if deemed necessary.

19.2.2 Revisions

The FPMP will be reviewed and revised as deemed necessary in the last year of this 10 year plan.

In order to incorporate any major policy change in the management plan a specific *ad hoc* revision may be required.

Other than a mid-term or end of term review that indicates the need for a revision of the FPMP a revision may result from any one of a number of triggers such as:

- new information from operational monitoring or research becoming available and being used to make significant improvements or necessary changes;
- new information becoming available to senior management and resulting in policy change;
- biotic or weather events the nature of which have or might have a significant impact on the management objectives;
- changes in downstream planning or requirements; and
- new or revised regulations imposed by the government.

20 Internal Audit and Management Review

20.1 Introduction

Forest management activities are subject to internal audit and management review at planned intervals as required under Malaysian Criteria & Indicator (MTCS ST 1002:2021 SFM) of the Malaysian Timber Certification Scheme for sustainable forest management. Both internal audit and management review will ensure that there is continual improvement in the management system.

The Internal Audit and Management Review Procedure is used as the basis for the annual internal audit. It outlines the frequency, methods, responsibilities, planning requirements and reporting of the internal audit process.

20.2 Internal Audit

The internal audit shall be planned and conducted once a year. The objectives of the audit plan shall ensure that the FMU:

- (a). meets the requirements of its management system; and
- (b). its management system conforms to the requirements of MC&I ST 1002:2021 (SFM).

The internal audit plan shall define the audit criteria and scope of each audit. The auditors conducting the audit must ensure objectivity and impartiality of the audit process. The results of the audit will be presented during the management review meeting. All information gathered during the internal audit should be documented and retained as evidence of the implementation of the audit program and of the audit's results.

20.3 Management Review

The Management Review shall be conducted annually and shall include at least the following:

- (a). The status of actions from previous management reviews;
- (b). Changes in external and internal issues that are relevant to the management system;
- (c). Information on the FMU's performance, including trends in:
 - Non-conformities and corrective actions;
 - Monitoring and measurement results;
 - Audit results.
- (d). Opportunities for continual improvement.

20.4 Non-conformity and Corrective Action

When any non-conformity is encountered, applicable action shall be taken to control and correct it. The consequence shall also be dealt with. The non-conformity shall be reviewed and the causes of it shall be determined. The need for the action shall be evaluated to eliminate the causes of the non-conformity and ensure that similar non-conformity does not recur or occur elsewhere.

Any action needed shall be implemented and the effectiveness of any corrective action taken should be reviewed. Changes shall be made to the management system, if necessary.

Corrective actions shall be appropriate to the effects of the non-conformity encountered. Information as evidence of the nature of the non-conformity and any subsequent action taken including the results of any corrective action shall be documented and retained.

20.5 Continuous Improvement

By undertaking the annual internal audit and management review, the sustainable management of the forest shall be continuously improved by addressing the suitability, adequacy and the effectiveness of the sustainable management system. The sustainable management system shall also conform to the Malaysian Criteria and Indicators for Sustainable Forest Management (MC&I MTCS ST 1002:2021 -SFM) under the Malaysian Timber Certification Scheme.

20.6 Risk and Opportunity Assessments

20.6.1 Risk assessment

Risk assessment is done to understand the internal elements (strengths and weaknesses) and external factors (opportunities and threats) which impact on the business strategic direction. All the relevant issues of internal strengths and weaknesses should be identified. Those items of potential high risk should be discussed and evaluated during the management review meeting before approval.

20.6.2 Opportunity assessment

All relevant opportunities identified should be analysed and be managed in order to maximize the benefits to the company.

20.7 Internal Audit and Management Review Procedure

The Internal Audit and Management Review Procedure is used as the basis to the annual internal audit. It outlines the frequency, methods, responsibilities, planning requirements and reporting of the internal audit process.