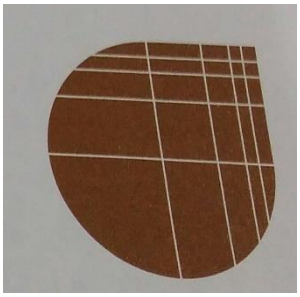

Asrama Raya Sdn Bhd

(ARSB)

ENVIRONMENTAL

MONITORING

REPORT

2021

15 December 2021

ASRAMA RAYA SDN BHD

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ENVIRONMENTAL MONITORING REPORT 2021

1. VULNERABLE SOIL AND STEEP AREA MONITORING

The vulnerable soil and steep areas in ARSB HS Petuang concession were monitored through:

i. Topography map

- Satellite image and digital topography map (**Figure 1 and Figure 2**) were used to check on the topography and land condition of the areas.
  - Refer steep area mapping and monitoring files for monitoring record.

- Forest manager checked the forest areas on the topography map and ensure the sensitive and steep areas of elevation 1,000 m above sea level (a.s.l.) are avoided for any forest road construction and harvesting activities.

ii. Field examination

- Forest manager and forest supervisor monitored the forest road construction and harvesting activities (Figure 3).
  Observation and monitoring record
  - All of the forest operation activities were not conducted at the steep areas especially areas at elevations greater than 1,000 m a.s.l.
  - All the forest operation activities were conducted and compliance with the Garis Panduan Jalan Hutan 2010 (Pindaan 2013) and Guidelines for Reduced Impact Logging in Peninsular Malaysia (Revised 2018) from Forestry Department Peninsular Malaysia (FDPM).

- ARSB also cooperate with Terengganu State Forestry Department (TSFD) in conducting field examination and ground observations of the vulnerable soil and steep areas.

iii. Remote sensing applications

- ARSB cooperate with TSFD to monitor the condition of these areas using remote sensing application such as Forest Monitoring Using Remote Sensing.

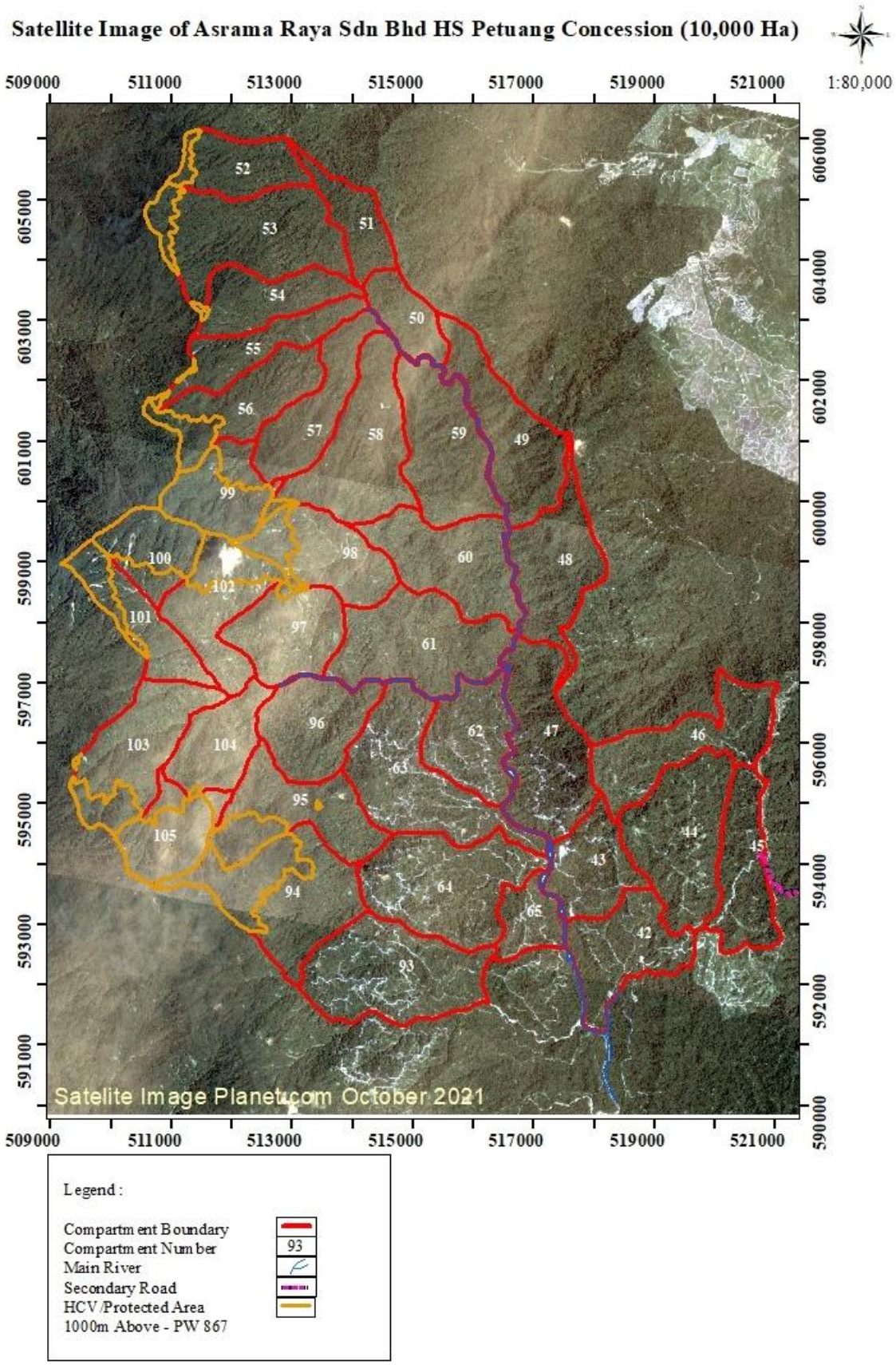

Figure 1. The satellite image of the 10,000 ha of ARSB HS Petuang concession. The protected area boundary (orange colour boundary) is mountainous area which is greater than 1,000 m above sea level (a.s.l) covering 1,087.74 ha.

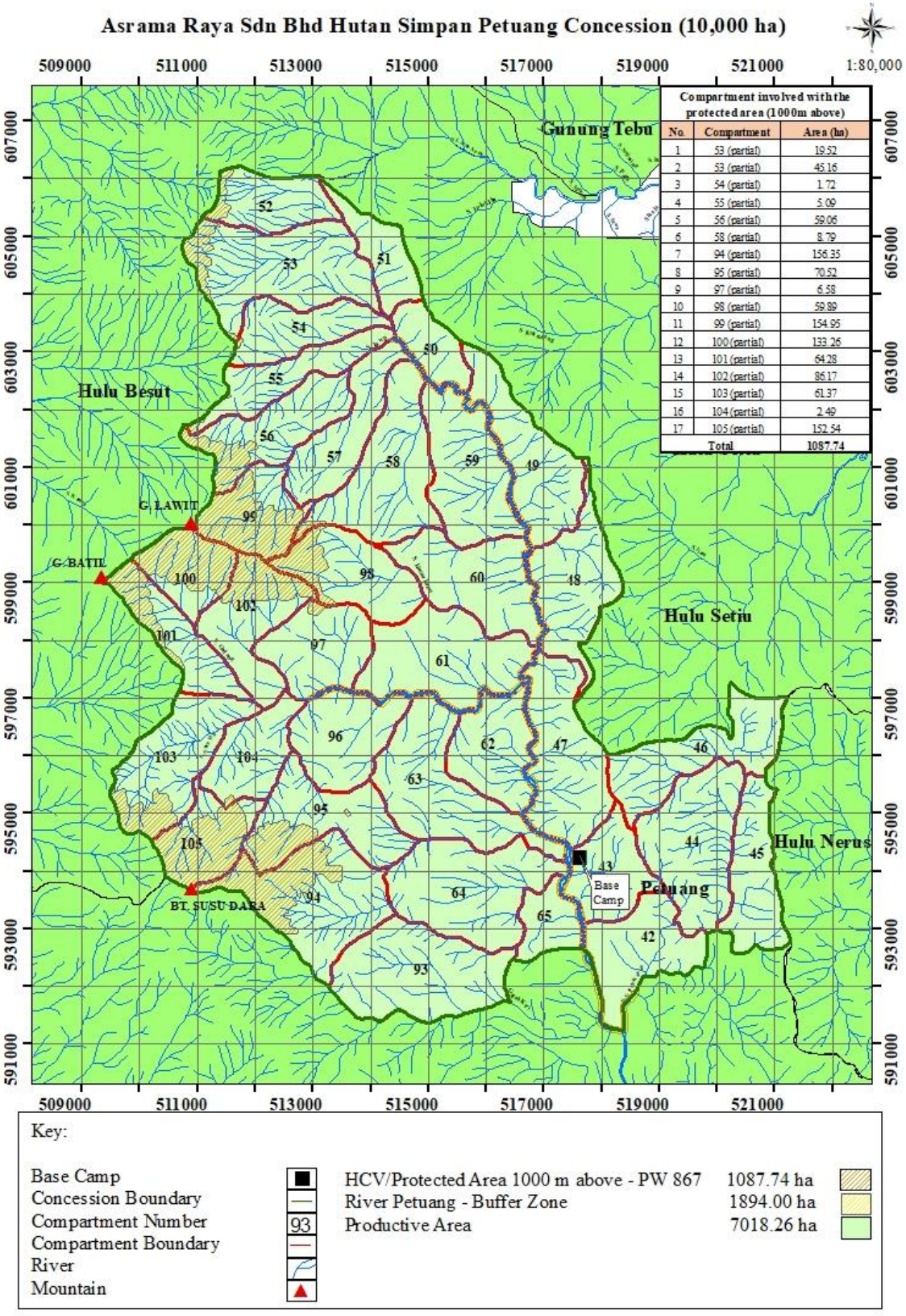

Figure 2. Map of ARSB HS Petuang concession (10,000 ha). * Note: Map is not to scale.

Figure 3. Forest manager is monitoring the forest harvesting activities.

2. LOGGING CAMP AND LOGGING WORKSHOP MONITORING

- Forest manager and forest supervisor monitored the cleanness and conditions of the logging camp and logging workshop to ensure they are well maintained.

  Observation and monitoring record

  - The logging camp and logging workshop were clean and well maintained (Figure 4 and 5).
  - All the hazardous substances for forest harvesting operations were handled, stored and disposed based on the standard of procedure (SOP).
  - The conditions and usage of fuel tank and lubricant oil were recorded and under controlled condition.
  - All the wastes and scheduled wastes were taken out from ARSB HS Petuang concession / forest for disposing.

Figure 4. Logging camp of ARSB HS Petuang concession is clean and well maintained.

Figure 5. Notice board and rest areas are provided at logging camp of ARSB HS Petuang concession for forest workers.

3. WATERCOURSE MONITORING

- Forest manager monitored the buffer zones of watercourse and identified watercourses which needed for protection.
  Observation and monitoring record
  - The trees located along the border of buffer zones are not harvested.
  - The trees located along the are painted with one (1) yellow ring at not more than 10-meter intervals.
- Forest manager and forest supervisor always monitor and ensure all the buffer zones of watercourse are established in accordance with the FDPM standard and Garis Panduan Jalan Hutan 2010 (Pindaan 2013).

- ARSB conducted regular monitoring of the water quality of the watercourses and river in ARSB HS Petuang concession.
  Observation and monitoring record
  - Most of the rivers in ARSB HS Petuang concession are clean and river shows greenish-blue colours (Figure 6).

Figure 6. River in ARSB HS Petuang concession shows greenish-blue colours.

- ARSB also collaborate with FDPM and Forest Research Institute Malaysia (FRIM) in conducting water quality analysis to monitor the quality and health status of the watercourse (Figure 7).

Observation and monitoring record

- Water quality analysis was conducted to determine the quality and health status of the watercourse (Figure 7-11). The water quality parameters such as pH, total suspended solids (TSS), dissolved oxygen (DO), biochemical oxygen demand (BOD), chemical oxygen demand (COD) and ammoniacal nitrogen (AN) were used to determine the water quality index. Turbidity was measured to determine the cloudiness of the water in the river. (Figure 9). Rainfall also measured using rain gauge (Figure 12).

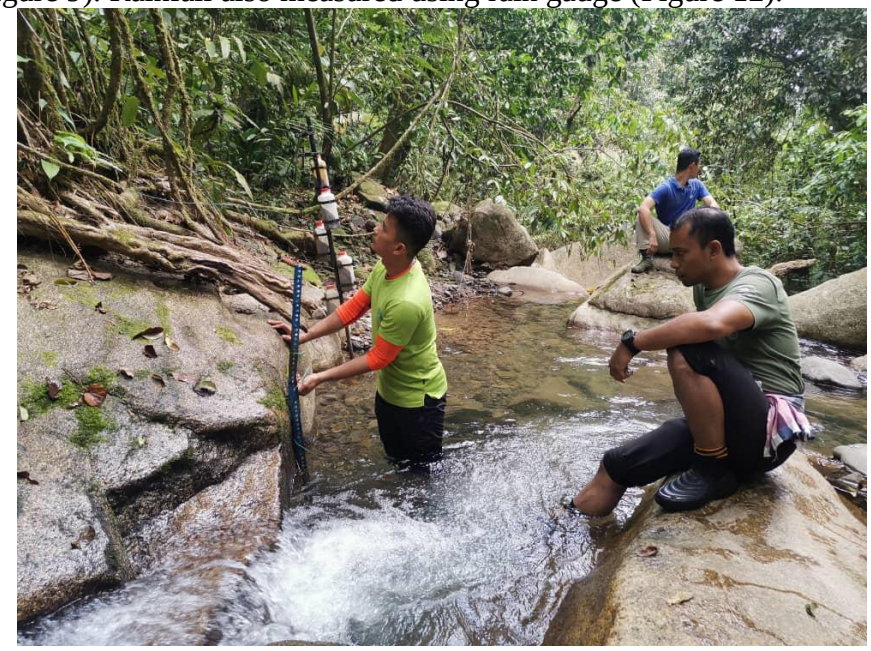

Figure 7. FRIM researchers are conducting the water quality analysis at the river of ARSB HS Petuang concession.

Figure 8. Aquatroll 600 Multiparameter Sonde is used to measures and monitor water quality.

Figure 9. (a) Turbidity and temperature probe (Analite NEP495P). (b) Set up of probe at Petuang river.

Figure 10. A multistage sampler is used to collect the TSS in water.

Figure 11. Equipment for measuring the water level of the river.

Figure 12. Rainfall was measured using rain gauge.

Water Quality Monitoring Record

Parameters which are sampled and monitored for water quality of Sungai (Sg.) Petuang in compartment 63 block A include pH, TSS, DO, BOD, COD and AN. Based on the water quality results, Sg. Petuang showed high water quality index (WQI), ranged from 73.8 to 98.6. All these rivers were classified as Class I and II with status as clean river based on the Department of Environment (DOE) WQI.

In 2019, low TSS values were recorded in 11 locations of Sg. Petuang (compartment 63 block A). They were classified as class I and class II with status as clean river in 2019. On 14 July 2020, the TSS value of SP1 was increased to 145.76 mg/l. The high TSS value recorded in SP1 was classified as class III based on DOE WQI classification. The water samples collected in SP6 also showed high TSS content (49 mg/l) on 14 July 2020. The water samples collected from SP3, SP8 and SP9 also showed high TSS content on 11 August 2020. The TSS showed significant increased because road construction was carried out in July 2020. However, The TSS was shown decreased for the following months. A lot of TSS reading cannot be retrieved for SP10, SP11, SP12 and SP13 as the measurement instrument shown some technical error during the sampling periods. Therefore, we cannot interpret the data correctly for the data collected in SP10, SP11, SP12 and SP13.

4. PLANT MONITORING

- Forest manager conducted the plants / trees monitoring and make sure all the protected tree species, rare and endangered tree species, mother trees are not harvested.

- ARSB collaborated with Universti Putra Malyasia (UPM) and expert team to conduct tree sample plot in ARSB HS Petuang concession (Figure 13).
  - Six sampling plots with measurement of 50 m x 50 m have been carried out at compartment 63 block A (Figure 14).

Figure 13. UPM researchers and students are conducting plant survey in ARSB HS Petuang concession.

- Stripline sampling and **permanent sample plot (PSP)** were also conducted and monitored in ARSB HS Petuang concession. The PSP was used to analyse frequency distribution of key dipterocarp species and tree growths.

<u>Observation and monitoring record</u>

- A total of four PSPs each with a size of 1.0 ha have been established in ARSB.
- Two PSP are set up in compartment 92, one PSP is set up in compartment 62 and 64 respectively (Figure 16).
- The PSP were monitored annually and remeasurement of tree growth will be conducted after 3 years.
- **Refer permanent sample plot (PSP) data for monitoring results.**

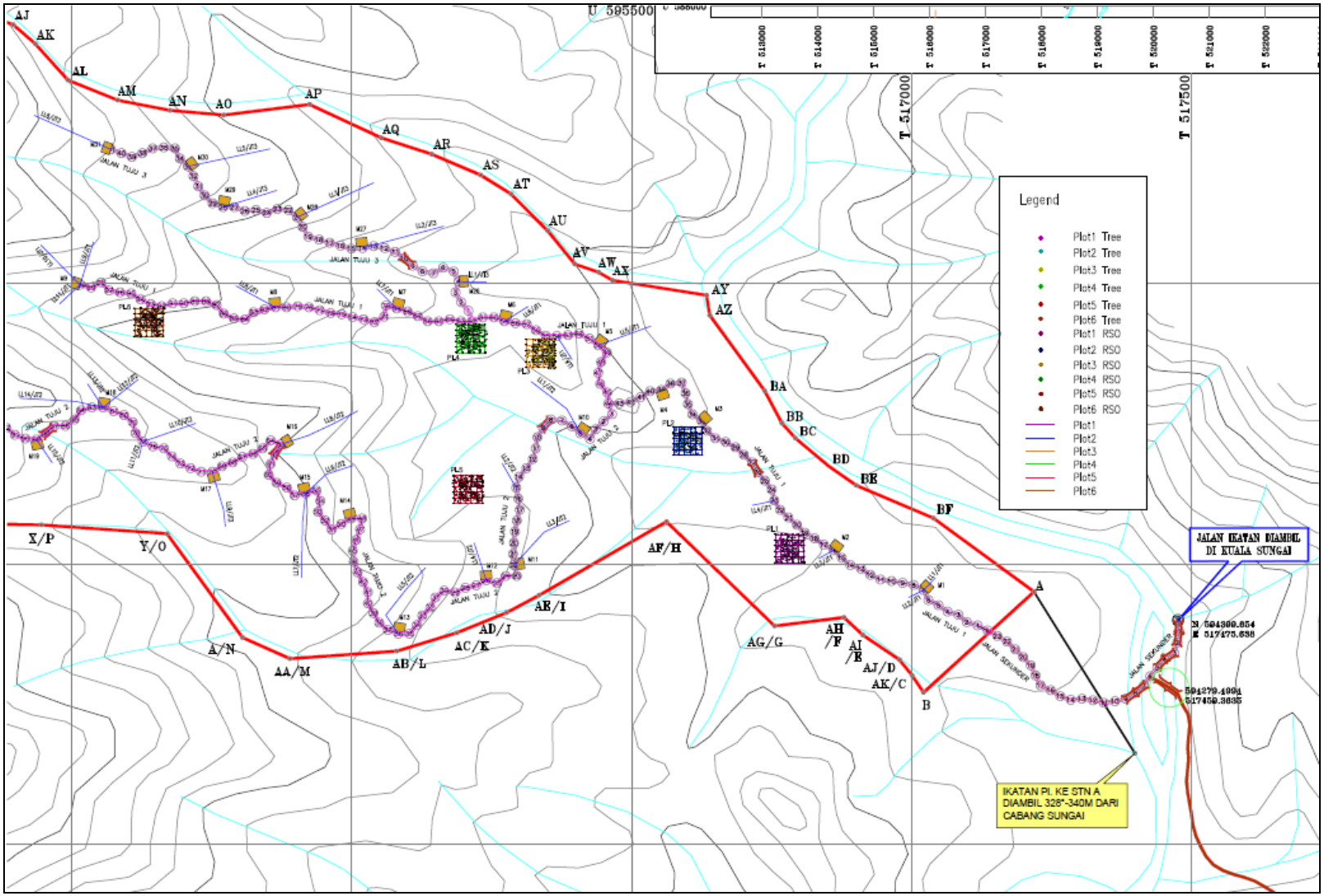

Figure 14. Six tree sample plots which have been carried out at compartment 63 block. A*Note: Map is not to scale.

Figure 15. PSP setup and tree inventory

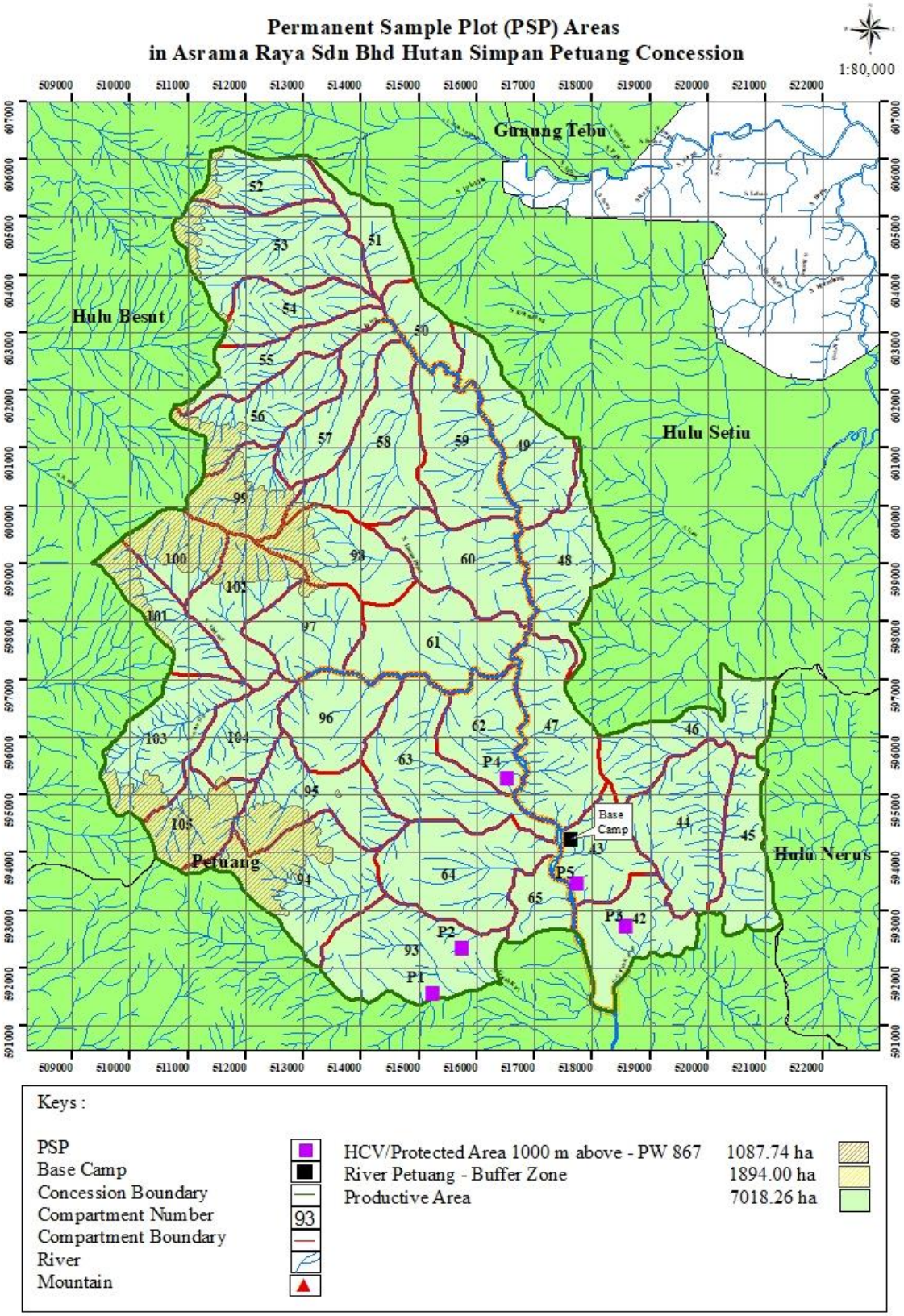

Figure 16. Map of PSP Location in ARSB HS Petuang concession. *Note: Map is not to scale.

Table 1. List of flora found in compartment 42, 44, 62A, 63A, 64(2), 65, 93A and 93B of ARSB HS Petuang concession.

No.	Local Plant Name	Scientific Name
1	Ara	*Ficus* spp.
2	Balau	*Shorea* spp.
3	Balau Laut Merah	*Shorea kunstleri*
4	Balik Angin	*Mallotus paniculatus*
5	Bayur	*Pterospermum diversifolium*
6	Bekak	*Aglaia* spp.
7	Berangan	*Castanopsis* spp.
8	Berumbung	*Timonius wallichianus*
9	Bintangor	*Calophyllum* spp.
10	Damar Hitam	*Shorea* spp.
11	Delek	*Anisophyllea griffithii*
12	Delik	*Anisophyllea corneri*
13	Dendulang	*Paropsia vareciformis*
14	Durian	*Durio* spp.
15	Durian Hutan / Durian Daun	*Durio lowianus*
16	Durian Punggai	*Durio* spp.
17	Gading-gading	*Diplospora malaccensis*
18	Geronggang	*Cratoxyllum* spp.
19	Gerutu	*Parashorea* spp.
20	Hampas Tebu	*Gironniera hirta*
21	Jangkang	*Xylopia* spp.
22	Jangkang	*Xylopia* spp.
23	Jangkang Bukit	*Xylopia ferruginea*
24	Jelawai	*Terminalia* spp.
25	Jelutong	*Dyera costulata*
26	Kandis	*Garcinia* spp.
27	Karas	*Aquilaria malaccensis*
28	Kasai	*Pometia* spp.
29	Kasai Daun Kecil	*Pometia pinnata alnifolia*
30	Kaum Kopi	-
31	Kayu Arang	*Diospyros* spp.
32	Kedondong	*Canarium/Santiria/Scutinanthe/Tiromma* spp.
33	Kedondong Gergaji	*Canarium littorale*
34	Kedondong Kerantai	*Santiria* spp.
35	Kekatong	*Cynometra* spp.
36	Kelat	*Eugenia* spp.
37	Kelat Jambu Laut	*Eugenia grandis*
38	Keledang	*Artocarpus* spp.
39	Keledang Bangkong	*Artocarpus sivestris*

No.	Local Plant Name	Scientific Name
40	Kelumpang	*Sterculia* spp.
41	Kembang Semangkok	*Scaphium* spp.
42	Kembang Semangkuk Bulat	*Scaphium linearicarpum*
43	Kempas	*Koompassia malaccensis*
44	Keranji	*Diallium* spp.
45	Keranji Kuning	*Diallium platysepalum*
46	Kerdas	*Archidendron bubalirum*
47	Keredas	*Pithecellobium bubalinum*
48	Keruing	*Dipterocarpus* spp.
49	Keruing Kipas	*Dipterocarpus costulatus*
50	Keruing Mempelas	*Dipterocarpus crinitus*
51	Keruing Merah	*Dipterocarpus verrucosus*
52	Keruing Ternek	*Dipterocarpus palembanicus*
53	Kulim	*Scorodocarpus borneensis*
54	Kungkur	*Pithecellobium splendens*
55	Langsat Hutan	*Lansium domesticum*
56	Leban	*Vitex* spp.
57	Ludai	*Sapium baccatum*
58	Machang	*Mangifera* spp.
59	Mahang	*Macaranga* spp.
60	Mata Keli	*Gynotroches axillaris*
61	Mata Ulat	*Kokoona* spp.
62	Medang	*Actinodaphne*/*Cinnamomum* spp.
63	Medang	*Litsea* spp.
64	Medang Daun Desar	*Litsea grandis*
65	Medang Daun Lebar	*Litsea grandis*
66	Medang Payung	*Actinodaphne maingayi*
67	Medang Sarsi	*Cinnamomum* spp.
68	Medang Teja	*Cinnamomum iners*
69	Melunak	*Pentace* spp.
70	Membuluh	*Pellacalyx saccardianus Scort.*
71	Mempening	*Lithocarpus* spp.
72	Mempisang	*Annonaceae* spp.
73	Mempisang	*Polyalthia cauliflora*
74	Mempoyan	*Rhodamnia cinerea*
75	Mengkal	*Nauclea subdita*
76	Mengkulang	*Heritiera* spp.
77	Mengkulang Siku Keluang	*Heritiera simplicifolia*
78	Menterbang	*Aidia densiflora*
79	Mentiong	*Gardenia tubifera*
80	Mentulang	*Alangium uniloculare*

No.	Local Plant Name	Scientific Name
81	Meraga	*Pertusadena euryncha*
82	Meransi	*Carallia brachiata*
83	Meranti	*Shorea* spp.
84	Meranti Bukit	*Shorea platiclados*
85	Meranti Daun Besar	*Shorea hemsleyana*
86	Meranti Langgong	*Shorea lepidota*
87	Meranti Melantai	*Shorea macroptera*
88	Meranti Nemesu	*Shorea pauciflora*
89	Meranti Paang	*Shorea bracteolata*
90	Meranti Rambai Daun	*Shorea acuminata*
91	Meranti Sarang Punai	*Shorea parvifolia*
92	Meranti Sarang Punai Bukit	*Shorea ovata*
93	Meranti Sengkawang Merah	*Shorea singkawang*
94	Meranti Tembaga	*Shorea leprosula*
95	Merawan	*Hopea* spp.
96	Merawan Jangkang	*Hopea nervosa*
97	Merbatu	*Atuna* spp.
98	Merbatu	*Parinari spp.*
99	Meribut	*Diospyros buxifolia*
100	Merpauh	*Swintonia* spp.
101	Mersawa Durian	*Anisoptera laevis*
102	Minyak Berok	*Xanthophyllum* spp.
103	Nipis Kulit	*Memecylon* spp.
104	Nyatah ekor	*Payena lanceolata*
105	Nyatoh	*Ganua hirtiflora/Palaquium* spp.
106	Nyatoh Nangka Kuning	*Pouteria malaccensis*
107	Paracroton	*Paracroton pendulus*
108	Pelong	*Pentaspadon* spp.
109	Penaga	*Mesua ferrea*
110	Penaga Lilin	*Mesua ferrea*
111	Penarahan	Myristca sp.
112	Penarahan	*Gymnacranthera* spp.
113	Penarahan	*Horsfieldia* spp.
114	Penarahan	*Knema* spp.
115	Penarahan Arang	*Myristca cinnamomea*
116	Pepijat	*Prunus* spp.
117	Perah	*Elateriospermum tapos*
118	Perupok	*Lophopetalum* spp.
119	Petai	*Parkia* spp.
120	Petaling	*Ochanostachys amentaceae*
121	Podo Bukit	*Podocarpus neriifolius*

No.	Local Plant Name	Scientific Name
122	Punah	*Tetramerista glabra*
123	Putat	*Barringtonia* spp.
124	Putat	*Barringtonia racemosa*
125	Rambai Hutan	*Baccaurea kunstleri*
126	Rambutan	*Nephelium spp.*
127	Rambutan Hutan	*Nephelium lappaceum*
128	Rambutan Pacat	*Xerospermum* spp.
129	Rambutan Pacat	*Xerospermum noronhianum*
130	Ramin	*Gonystylus* spp.
131	Rengas	*Gluta/Melanorrhoea* spp.
132	Resak	*Cotylelobium* spp. / *Vatica* spp.
133	Resak	*Vatica yeechongii*
134	Saga Daun Tumpul	*Adenanthera pavonina*
135	Sanggol Lotong	*Nephelium cuspidatum*
136	Sebasah	*Aporusa symplocoides*
137	Sebasah	*Aporosa aurea*
138	Sentil Tembakau	*Solanum verbascifolium*
139	Sentul	*Sandoricum koetjapa*
140	Sepetir	*Sindora* spp.
141	Sesenduk	*Endospermum diadenum*
142	Setambun	*Baccaurea spp.*
143	Setambun Tahi	*Baccaurea parviflora*
144	Simpoh	*Dillenia* spp.
145	Simpoh Daun Merah	*Dillenia garandifolia*
146	Susun Pelepah / Tumbuh Kelapa	*Arthrophyllum diversifolium*
147	Tampoi	*Baccaurea maingayi*
148	Tampoi	*Baccaurea spp.*
149	Tempinis	*Streblus elongatus*
150	Tenggek Burung	*Euodia redleyi*
151	Terap	*Artocarpus* spp.
152	Terap Nasi	*Artocarpus elasticus*
153	Terentang	*Campnosperma* spp.
154	Terentang Daun Kecil	*Campnosperma squamatum*
155	Tinjau Belukar	*Randia scortechinii*
156	Tinjau Belukar	*Porterandia anisophylla*
157	Tulang Daing	*Callerya atropurpurea*

5. WILDLIFE MONITORING

- ARSB regular monitor ARSB HS Petuang concession from encroachment, illegal activities and hunting.

- ARSB engaged with local community of Kg. Petuang and TSFD for helping in monitoring ARSB HS Petuang concession from encroachment and hunting.

- ARSB conducted periodic monitoring of wildlife.
  I. Monitored the occurrence of animals through camera trapping (Figure 17).
     - **Refer camera trapping data and results for monitoring results.**

  II. Monitored the occurrence of animals through opportunistic sightings.
     - **Refer opportunistic sightings data for monitoring results.**

Figure 17. Forest supervisor/ 'Kepala Hutan' set up the camera trap by mounting up the camera at the tree.

Table 2. List of wildlife found in ARSB HS Petuang concession based on camera trap result.

No.	Common name	Species name	IUCN conservation status
1	Malayan tapir	*Tapirus indicus*	Endangered
2	Sun bear	*Helarctos malayanus*	Vulnerable
3	Southern pig-tailed macaque	*Macaca nemestrina*	Vulnerable
4	Pale-thighed langur	*Presbytis siamensis*	Near Threatened
5	Banded civet	*Hemigalus derbyanus*	Near Threatened
6	Green broadbill	*Calyptomena viridis*	Near Threatened
7	Horse-tailed squirrel	*Sundasciurus hippurus*	Near Threatened
8	Banded Linsang	*Prionodon linsang*	Least Concern
9	Mouse-deer	*Tragulus* sp.	Least Concern
10	Barking deer /muntjac	*Muntiacus muntjak*	Least Concern
11	Long-tailed macaque	*Macaca fascicularis*	Least Concern
12	Plantain squirrel	*Callosciurus notatus*	Least Concern
13	Wild boar	*Sus scrofa*	Least Concern
14	Grey-bellied squirrel	*Callosciurus caniceps*	Least Concern
15	Malayan civet	*Viverra tangalunga*	Least Concern
16	Malayan porcupine	*Hystrix brachyura*	Least Concern
17	Malaysian wood rat	*Rattus tiomanicus*	Least Concern
18	Bird	Unknown sp.	Least Concern
19	Black civet	Unknown sp.	Least Concern
20	Blue-coloured bird	Unknown sp.	Least Concern
21	Lizard	Unknown sp.	Least Concern
22	Monitor lizard	Unknown sp.	Least Concern
23	Rodent	Unknown sp.	Least Concern
24	Wild fowl	Unknown sp.	Least Concern

- Refer camera trapping data for more detail information.
- The camera trapping only shows the occurrence of the wildlife, do not show any frequent appearance of same species in the same location.
- The camera trapping did not record any wildlife habitat and pattern of wildlife distribution or diversity in ARSB HS Petuang concession.