FOREST RESOURCES ASESSMENT OF SUNGAI MEDIHIT WATERSHED, LIMBANG

(Activity 1.1)

BY

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COMMUNITY-BASED SUSTAINABLE FOREST MANAGEMENT OF

SUNGAI MEDIHIT WATERSHED, SARAWAK, MALAYSIA

(Serial #: APFNet/2013/PP/05)

ASIA-PACIFIC NETWORK (APFNet) FOR SUSTAINABLE FOREST MANAGEMENT & REHABILITATION

FOREST DEPARTMENT SARAWAK, MALAYSIA

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1.0 Introduction

The baseline survey on forest resources assessment is one of the APFNet project output under the community-based sustainable forest management of Sg. Medihit Watershed project at Limbang Division. This inventory meets a need for information required to identify the forest resources of Sungai Medihit catchment area. This area has been subject to several round of logging in the past. It was known that this area had been previously been worked under Forest Timber Licence No. T/0129, Limbang Trading Company since 1976 which is expired on 31 July 2009. Currently this area is within Forest Timber Licence No. T/9161 issued to Sarawak Timber Industry Development Corporation (STIDC) since December 2009 and will expire until December 2024. This area also overlaps with LPF 0038 awarded to Limba Jaya Company and within the Limbang Stateland and part of Limbang Protected Forest. Most part of the area is covered by Hill Mixed Dipterocarp Forest. Terrains condition is rugged, steep and certain area can be categorized as Terrain Class IV (through ground experience).Therefore, knowing on reliable stand and stocking density for natural regenerating forests are essential for initial assessment of current timber resources and future growth assessment of logged-over hill mixed forest of this project area. First field trip was commencing from 28/09/15 until 13/09/15 (16 days). Six (6) plots had been established within Coupes 3A and Coupe 13 A of T/9161 belongs to Lee Ling Timber Sdn. Bhd. Second field trip was commencing from 11/04/2018 until 24/04/2018. Altogether 11 plots consist of 1 hectare for each plot has been established over the whole APFNet project area. Six laborers from nearby communities were engaged by the APFNet to help in carry out the forest resource assessment in this project area.

2.0 Objectives

The objectives to carry out this assessment are as follows:

1.1 to obtain information on forest stand, its species composition, size class distribution, standing commercial timber volume and standing potential timber volume.

1.2 To obtain more information with regards to growth performances of non-dipterocarp and dipterocarp species in hill mixed logged-over forest in the state.

1.3 To support the requirements in terms of total number of stand density in hill mixed logged-over area for the implementation of policy direction on forest management certification in the state.

1.4 To identify and marked some of the attractive attributes over the APFNet project area that could be marked as High Conservation Value Forest.

3.0 Sampling Design

Strip samples have only one cluster line of 1 KM. Each line consists of ten continuous principal plots of ½ * 5 chains (10*100 meters). Each principal plot is subdivided into five subplots of ½ * 1 chain (10 * 20 meters) and includes two of 2 meters * 2 meters sub-sub plots in sub-plot 3. Strips are excluded at least 2 chains before and after hitting logging road. The area of a strip is 1 hectare. The diagram of a strip sample is illustrated in appendix 1.

The sample area be at least one ha (to reduce sampling error) in order to capture the variation of commercial tree stock in a few main species groups,

- At least three samples per coupe area (e.g. 75 samples per management unit of 25 coupes), be randomly selected from 1 km grid intersections,
- Commercial trees be enumerated down to a dbh below the lowest cutting limit, (e.g. 40 cm), preferably with a sub-sample down to 20 cm.

The general instructions for all plots are to apply (except for PSP or RP). These are listed below.

1. To measure each tree 5 cm and above (without buttress) at dbh (exact position) with yellow or red paint(mainly at Sub plot 3 of each Principle plots).
2. to mark trees by spraying with yellow on dbh i.e. as tree has buttress or bump (B) shall be recorded at the REMARK column.
3. to check tree number, species, code, diameter, total length, sawlog length, logging damage, grading and climber with the previous records.
4. to mark conditions of tree i.e. living (L) or dead (D) at the REMARK column.
5. to measure the maximum slope at the center of each third subplot.
6. to record trees down to species level if possible.
7. to keep tree tag firmly in place.
8. to confirm the border trees of each principle plot.
9. to measure quality and height.
10. to measure dbh accurately.

A rectangle-shaped aluminum plate is tagged in front of each plot. The plate contains the numbering of each strip sample, principal plot and subplot for identification and verification. In addition one PVC pole is pegged at the beginning and the end of each strip.

A line is cut at the center of ½ chain (½ chain = 10 meter). A 100% count of tree seedling/saplings of minimum height of 30 cm and up to dbh < 5 cm will be carried out in each subplot 3 on two 2 * 2 meters located at the north-west and south-east corners of subplot 3. Seedling/saplings will be counted by species/groups as detailed as possible. If no species recognition, record as “unidentified”. Various trees on the either sides of the line, within each principal plot are enumerated. The instructions for cluster and strip sample can be summarized as follows:

Parameter	Subplot 3		Subplot 1,2,4,5
	Tree 5-30	Tree ≥ 30	Tree ≥ 30
Species	x	x	x
Code	x	x	x
Diameter	x	x	x
Total Length	-	x (grade 1-3)	x (grade 1-3)
Sawlog Length	-	x (grade 1-3)	x (grade 1-3)
Logging Damage	x	x	x
Grading	-	x	x
Climber > 5 cm	-	x	x
Seedling/sapling on two 2* 2 meter	Count all of minimum height of 30 cm and by species /groups	up to dbh < 5 cm	-

4.0 Itinerary

4.1 The itinerary for first inventory trip is as below:

DAY	DATE	PROGRAMME/ ACTIVITY
1	28.09.15	To Bintulu by Land cruiser
2	29.09.15	To Limbang by Land cruiser.
3	30.09.15	Conducted briefing and having discussion with staff involve with the inventory project at Purnama Hotel. Buying food ration to supply for the whole inventory period.

4	1.10.15	Proceed to Camp Site at Sg Terasak, Lg Napir, APFNet Project Area.
5	2.10.15	Setting up camp site at Sg Terasak. Preparation on field equipments to be used in the inventory project.
6	3.10.15	Carry out inventory at Strip Sample No. 1 at Coupe 3A. Total no. of trees enumerated is 254 trees including poles with a size ≥5 cm at subplot no. 3.
7	4.10.15	Carry out inventory at Strip Sample No. 2 of Coupe 3A. Total no. of trees enumerated is 239 trees including poles with a size ≥5 cm at subplot no. 3.
8	5.10.15	Carry out ground truthing to establish plots at Coupe 12 A and Coupe13A of T/9161.
9	6.10.15	Carry out inventory at Strip Sample No. 3 of Coupe 13A. Total no. of trees enumerated is 238 trees including poles with a size ≥5 cm at subplot no. 3.
10	7.10.15	Carry out inventory at Strip Sample No. 4 of Coupe 13A. Total no. of trees enumerated is 128 trees including poles with a size ≥5 cm at subplot no. 3.
11	8.10.15	Searching for other location of plots at Coupe 3A of T/9161. Having discussion with Camp Manager of T/9161, requesting for extra transport to bring our field equipments to Limbang.
12	9.10.15	Carry out inventory at Strip Sample No. 5 of Coupe 13A. Total no. of trees enumerated is 246 trees including poles with a size ≥5 cm at subplot no. 3.
13	10.10.15	Carry out inventory at Strip Sample No. 6 of Coupe 3A. Total no. of trees enumerated is 202 trees including poles with a size ≥5 cm at subplot no.

		3.
14	11.10.15	Proceed to Limbang and stayed overnight at Purnama Hotel
15	12.10.15	Proceed to Sarikei and stayed overnight at Lee Hua Hotel
16	12.10.15	Proceed back to Kuching.

4.2 The itinerary for second inventory trip is as below:

DAY	DATE	PROGRAMME/ ACTIVITY
1	11.04.18	To Bintulu by Land cruiser
2	12.04.18	To Limbang by Land cruiser.
3	13.04.18	Proceed to Long Napir, APFNet Project Area.
4	14.04.18	Identifying starting point for 5 Strip Sample Plots inside the area that has been claim as "Penan Area of Kampung Bahagia" which is falls within APFNet Project Area.
5	15.04.18	Carry out inventory at Strip Sample Plot No. 6A of Coupe 13A. Total no. of trees enumerated is 212 trees including poles with a size ≥5 cm at subplot no. 3.
6	16.04.18	Carry out inventory at Strip Sample Plots No. 4A and 5A at Coupe 13A. Total no. of trees enumerated for Strip Sample Plots No. 4A is 230 trees including poles with a size ≥ 5 cm at subplot no. 3.
7	17.04.18	Measuring "Big Tree" inside Coupe 3A. The tree has been identified as *Shorea Collaris* or locally known as Merakunyit with the dbh of 314.2 cm diameter and total height approximately at 75 meter.

8	18.04.18	Carry out inventory at Strip Sample Plots No. 1A Coupe 13A. Total no. of trees enumerated is 291 trees including poles with a size ≥5 cm at subplot no. 3.
9	19.04.18	Carry out inventory at Strip Sample Plots No. 2A of Coupe 13A. Total no. of trees enumerated is 379 trees including poles with a size ≥5 cm at subplot no. 3.
10	20.04.18	Continue to carry out inventory at Strip Sample Plots No. 5A of Coupe 13A. Total no. of trees enumerated is 247trees including poles with a size ≥5 cm at subplot no. 3.
11	21.04.18	Proceed to Limbang and stayed overnight at Purnama Hotel
12	22.04.18	Proceed to Bintulu and stayed overnight at Kemena Hotel
13	23.04.18	Proceed back to Kuching.

5.0 Findings and Conclusion

The forest resource data and management are important to ensure the survival of the forest in this area to be managed sustainably. It was found that all the eleven (11) assessment plots fall within Coupe 3A and Coupe 13 A of logged-over hill mixed dipterocarp forest of T/9161 operated by Le Ling Group of Companies as well as overlap with LPF/0038 (map attached) operated by Limba Jaya Sdn. Bhd. Total number of trees and poles recorded for ≥ 5 cm dbh and above for Dipterocarp and Non-Dipterocarp is 2684 trees. Out of this, total number of Dipterocarp species is 199 or 7.41 % and total no of Non-Dipterocarp species is 2485 or 92.58 % from the total amount of tress enumerated respectively. It shows that most of the Non-Dipterocarp species will be the most dominance species that can be harvested in the next cutting cycle. All the information above is depicted in table below.

Category	Total number tree recorded	Trees per ha
Dipterocarp	199	64.3 (7.41%)
Non-Dipterocarp	2485	913.9 (92.58%)
TOTAL	**2684**	

Most of the family recorded is Non-Dipterocarp species belongs to Euphorbiaceae family which mostly consists of *Macaranga spp.* The highest diameter of trees is 131.30 cm dbh belongs to Dipterocarpaceae family known as *Shorea crassa* (Selangan Batu). It was located at Strip Sample No. 1A within Principal Plot No.7. The second highest tree diameter also belongs to Dipterocarpceae family known as *Shorea sagittata* (Meranti daun mata lembing) with the diameter of 100 dbh. It was located at Strip Sample No.5 within Principal plot No 5. The third highest diameter is from Moraceae family under non –dipterocarp group known as *Artocarpus elasticus* (Terap) with the diameter of 84.0 dbh. It was located at Strip Sample No. 6 within Principal Plot No. 2. Total no. of volume for trees more than 5cm dbh for 11 plots is 1,451.98 cubic meter with an average of 131.99 m^3/ha and total volume of trees more than 30 cm dbh is 724.12 m^3 with an average of 65.82 m^3/ha (potentially

extractable). Based on study carried out by Zedtee Sdn. Bhd (2015), the only certified area in Sarawak, total volume of trees ≥30 cm dbh is 97.41m3/ha. This figure shows that the potentially extractable trees from the APFNet Project area is much lower compare to Zedtee Sdn Bhd. Table below shows the total no. of volume that has been derived based on 11 plots at APFNet project area.

No.	Strip Sample No.	Volume (m^3)			Total volume (m^3/ha)	Year Enumerated
		5 cm - 29.9 cm	5 cm - 29.9 cm/ha	≥ 30 cm/ha		
1	1	15.66	78.28	96.33	174.60	2015
2	2	9.99	49.92	63.85	113.78	2015
3	3	12.33	61.63	52.83	114.46	2015
4	4	4.25	21.25	55.86	77.11	2015
5	5	11.73	58.67	96.57	155.23	2015
6	6	12.48	62.38	42.47	104.85	2015
7	1A	16.31	81.56	87.60	169.16	2018
8	2A	16.89	84.43	74.92	159.35	2018
9	4A	18.29	91.44	47.98	139.42	2018
10	5A	17.13	85.67	49.20	134.88	2018
11	6A	10.53	52.63	56.51	109.15	2018
	TOTAL	**145.57**	**727.86**	**724.11**	**1451.98**	

Based on study by FOMISS (2001), project in logged-over forests at Baram area, total gross volume of commercial and non-commercial species of trees above 5 cm dbh adds up to about 250 m^3/ha as compare to project site which is only 131.99 m^3/ha. This means that total no. of volume that can be derived from this area is

quite low as compare to data produced by FOMISS project from the previous study. The reasons for the lower volume in this area could be due to over harvested in the past and also due to high intensity of felling damages to the residual stand. It was known from the record that this area has been subject to several round of logging previously. All the inventory data for eleven (11) strip sample plots has been installed by using Excel Spreadsheet. Finally we would like to express our sincere thanks to Lee Ling Groups of Company as well as Limba Jaya personnel, local communities and APFNet Project Manager for providing us with necessary facilities and guidances during the assessment period.

References:

1. Forest Department of Sarawak. (2001). Forest Management Plan for Forest Management Unit, Selaan Selungo, Malaysian German Technical Cooperation Project FOMISS(Unpublished)

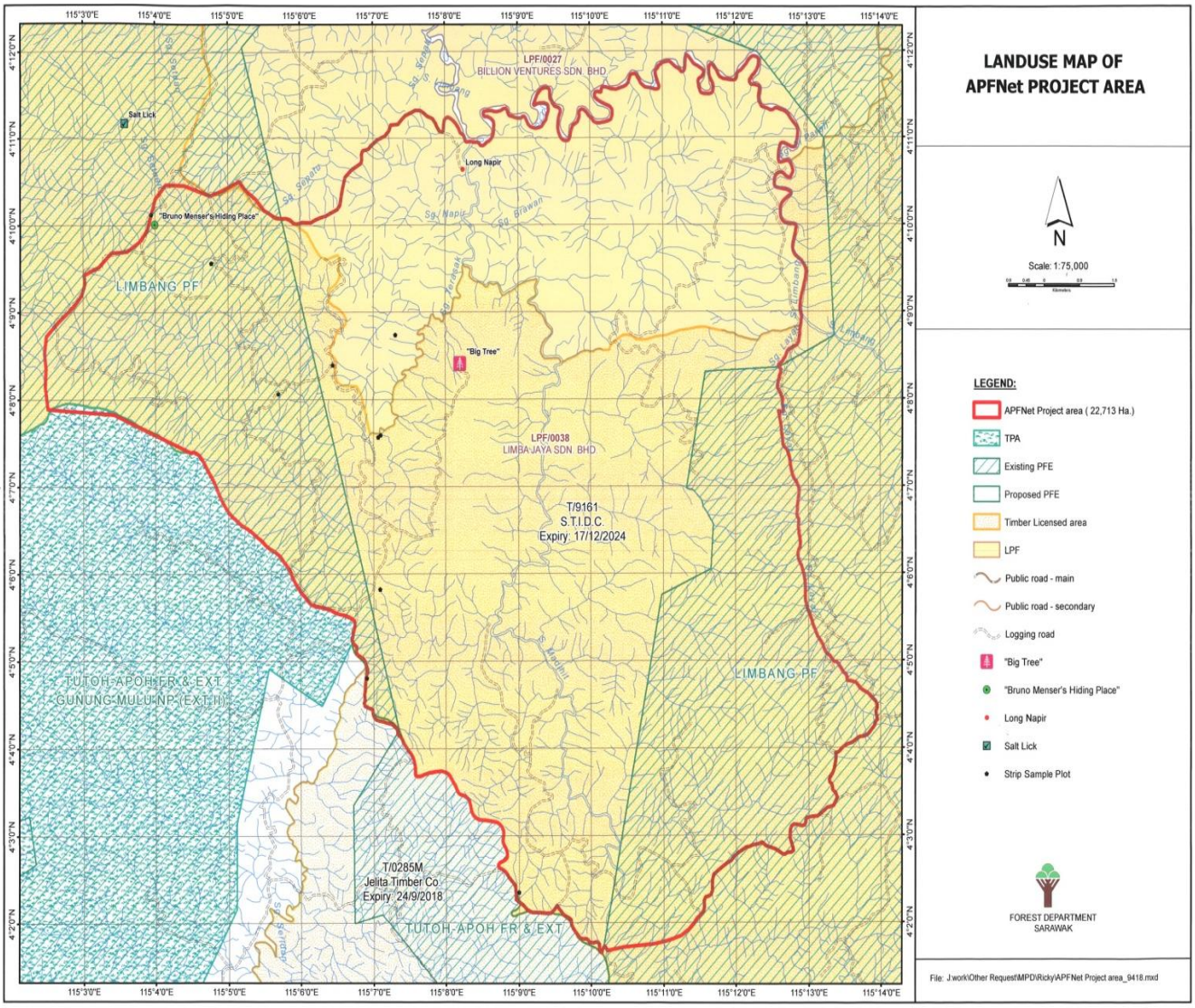
2. John Tasan (2015), Recent Study on Permanent Sample Plots at Zedtee Sdn. Bhd. (Unpublished)

3.Forest Management Plan for Bahau-Kahei Forest Management Unit (2018), Jaya Tiasa Group.[Unpublished]

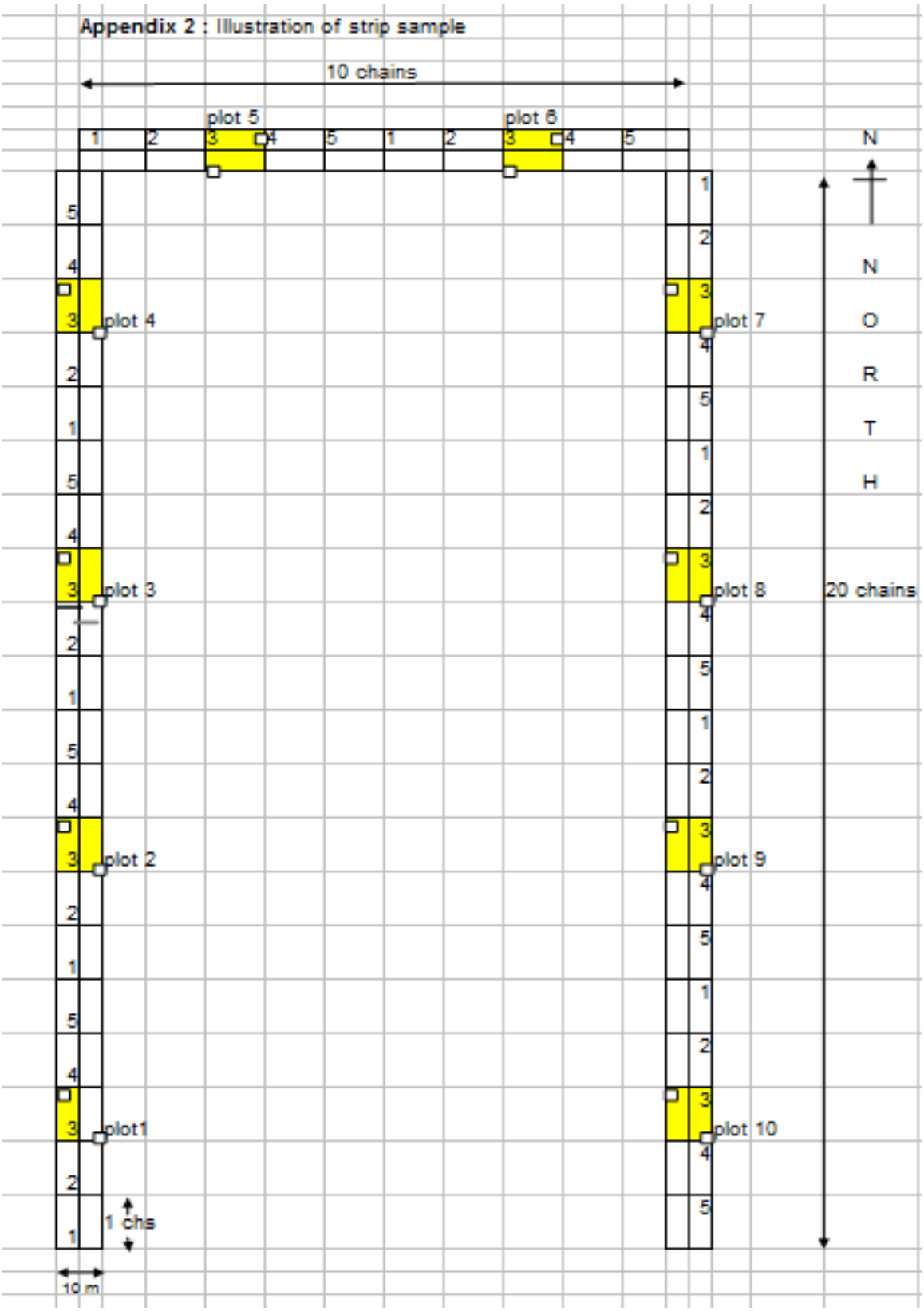
Appendix: 1

Map showing of GPS Point for Eleven Strip Plots at APFNet Project area.

NO.	STRIP	READING TAKEN AT	LATITUDE	LONGITUDE	REMARK
1.	S.1	Tie Point	N: 04° 07' 34.0"	E: 115° 07' 04.1"	Hulu Sg. Terasak
2.	S.2	Tie Point	N: 04° 05' 49.5"	E: 115° 07' 05.5"	From main road
3.	S.3	Tie Point	N: 04° 04' 48.4"	E: 115° 06' 54.3"	From main road
4.	S.4	Tie Point	N: 04° 02' 21.0"	E: 115° 09' 00.0"	From main road
5.	S.5	Tie Point	N: 04° 07' 35.5"	E: 115° 07' 06.2"	Hulu Sg. Terasak
6.	S.6	Tie Point	N: 04° 08' 44.3"	E: 115° 07' 18.6"	From feeder road
7.	S.1A	Tie Point	N: 04° 10' 07.3"	E: 115° 03 59.9”	From feeder road
8.	S.2A	Tie Point	N: 04° 08 23.6"	E: 115° 05 26.6”	From feeder road
9.	S.4A	Tie Point	N: 04° 10 05.8"	E: 115° 04 47.2”	From feeder road
10.	S.5A	Tie Point	N: 04° 09 33.9"	E: 115° 04 46.1”	From feeder road
11.	S.6A	Tie Point	N: 04° 08 03.9"	E: 115° 05 41.8”	From feeder road
Note : GPS reading with Datum Timbalai 1984					


LANDUSE MAP OF
APFNet PROJECT AREA
N
Scale: 1:75,000
LPF/0027
BILLION VENTURES SDN. BHD
LPF/0038
LIMBA JAYA SDN. BHD
T/9161
S.T.I.D.C.
Expiry: 17/12/2024
T/0285M
Jelita Timber Co.
Expiry: 24/9/2018
LIMBANG PF
TUTOH-APOH FR & EXT
GUNUNG MULU NP (EXT'N)
"Big Tree"
"Bruno Menser's Hiding Place"
Long Napir
Salt Lick
LEGEND:
APFNet Project area (22,713 Ha.)
TPA
Existing PFE
Proposed PFE
Timber Licensed area
LPF
Public road - main
Public road - secondary
Logging road
"Big Tree"
"Bruno Menser's Hiding Place"
Long Napir
Salt Lick
Strip Sample Plot
FOREST DEPARTMENT
SARAWAK
File: J:work\Other Request\MPD\Ricky\APFNet Project area_9418.mxd

Appendix 2 : Illustration of strip sample



Appendix: 3

Pictorial Reports for Forest Resource Assessment Activities at APFNet Project Area, Long Napir, Limbang.

Some of the staff involved in forest resource assement activity unde , APFNet Project Area. Some of the laborers were engaged from the communities inside the project area.

Measuring of tree diameter ≥30 cm dbh

Measuring of tree diameter ≥ 60 cm dbh.

Counting of seedlings/saplings with minimum height of 30 cm and up to dbh ≤ 5 cm by species group inside 2 by 2 meter in each sub plot 3.

Tree identification as well as tree tagging and marking by yellow paint by our botanist from UNIMAS

This picture shows the marking of Strip Sample No.6, Principal 1 and Sub Plot 3

Determination of the location of the strip sample on the ground

Measuring the highest diameter of trees enumerated during the forest resource assessment under APFNet Project at 131.30 cm dbh belong to Dipterocarpaceae family known as Shorea crassa (Selangan Batu). It was located at Strip Sample Plot No. 1A within Principal Plot No.7.

One of tree stump found inside the sample plot believe to be harvested approximately more than 5 years old.

This picture shows one of the log with a size of more than 80 cm dbh being harvested previously but unable to be extracted by the felling crews.

Pheasant dancing ground was found inside one of the sample plot

Payment of casual laborer engaged by the APFNet Project