

APPENDIX 1

LIST OF TOTALLY PROTECTED AND PROTECTED TREES

SECOND SCHEDULE

(Section 2(1))

PART I

TOTALLY PROTECTED PLANTS

	<i>Scientific Name</i>	<i>Common Name</i>
1	All <i>Rafflesia</i> species	Bunga Pakma
2	<i>Dipterocarpus oblongifolius</i>	Ensurai

PART II

PROTECTED PLANTS

1	<i>Shorea macrophylla</i>	Engkabang jantung
2	<i>Shorea splendida</i>	Engkabang bintang
3	<i>Shorea helmsleyana</i>	Engkabang gading
4	<i>Shorea siminis</i>	Engkabang terendak
5	<i>Shorea palembanica</i>	Engkabang asu
6	<i>Shorea stenoptera</i>	Engkabang rusa
7	<i>Shorea pinanga</i>	Engkabang langai bukit
8	<i>Shorea ochracea</i>	Raru
9	All <i>Ficus</i> species	Pokok ara
10	<i>Sonneratia alba</i>	Perepat
11	<i>Sonneratia caseolaris</i>	Pedada
12	<i>Avicennia alba</i>	Api-api hitam
13	<i>Avicennia lanata</i>	Api-api
14	<i>Avicennia marina</i>	Api-api merah
15	<i>Avicennia officinalis</i>	Api-api sudu
16	<i>Lumnizera littorea</i>	Teruntum merah
17	<i>Koompassia excelsa</i>	Tapang
18	<i>Koompassia malaccensis</i>	Menggris
19	<i>Aetoxylon sympetalum</i>	Kayu gahru
20	<i>Aquilaria beccariana</i>	Kayu gahru, engkaras (I)
21	<i>Aquilaria malaccensis</i>	Kayu gahru
22	<i>Aquilaria microcarpa</i>	Kayu gahru
23	<i>Didesmandra aspera</i>	
24	<i>Casuarina equisetifolia</i>	Rhu laut

25	All <i>Rhododendron</i> species	
26	All <i>Nepenthes</i> species	Periok kera
27	All <i>Orchidaceae</i> species	Orkid
28	<i>Salacca magnifica</i>	
29	<i>Johannesteysmannia altifrons</i>	Ekor buaya
30	<i>Areca triadra</i>	Pinang
31	<i>Areca jugahpunya</i>	Pinang
32	<i>Pinanga mirabilis</i>	Pinang
33	<i>Areca subcaulis</i>	Pinang
34	<i>Licaula orbicularis</i>	Biris
35	<i>Eurycomalongifolia</i>	Tongkat ali, sengkayap
36	<i>Goniothalamus velutinus</i>	Kayu hujan panas
37	All <i>Monophyllaea</i> species	
38	<i>Antiaris toxicaria</i>	Ipoh
39	All peat swamp species of <i>Madhuca</i>	Ketiau
40	<i>Calophyllum lanigerum</i>	Bintangor
41	<i>Calophyllum teysmanii</i>	Bintangor
42	<i>Cycas rumphii</i>	Paku gajah, pakulaut
43	All epiphytic <i>Lycopodium</i> species	Ekor tupai
44	All <i>Begonia</i> species	Riang, telinga gajah
45	All <i>Aeschynanthus</i> species	
46	All <i>Cyrtandra</i> , <i>Didymorcarpus</i> and species	Melebab
47	All species of plants listed in Appendices I and II of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), excluding those already listed in Part I	

APPENDIX 2

PRE-FELLING INVENTORY RECORDING SHEET FOR HARVESTABLE TREES MARKED FOR FELLING

LICENCE NO:	TEAM LEADER:
COUPE NO:	BLOCK NO:
SHEET NO:	SKID TRAIL NO:
DATE:	NAME OF RECORDER:

LEFT SIDE FROM THE TRAIL(FRONT/BACK)				
NO.	TREE TAG NO.	SPECIES CODE	DBH (cm)	HEIGHT (m)

RIGHT SIDE FROM THE TRAIL(FRONT/BACK)				
NO.	TREE TAG NO.	SPECIES CODE	DBH (cm)	HEIGHT (m)

* For Licensee Record only

APPENDIX 3

STOCK SHEET FOR LIST OF POTENTIAL CROP TREE (PCT) FOR PROTECTION

LICENCE NO:	TEAM LEADER:
COUPE NO:	BLOCK NO:
SHEET NO:	SKID TRAIL NO:
DATE:	NAME OF RECORDER:

LEFT SIDE OF THE TRAIL (FRONT/BACK)				
NO	DIPTEROCARP		NON-DIPTEROCARP	
	SPECIES	DBH (cm)	SPECIES	DBH (cm)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

RIGHT SIDE OF THE TRAIL (FRONT/BACK)				
NO	DIPTEROCARP		NON-DIPTEROCARP	
	SPECIES	DBH (cm)	SPECIES	DBH (cm)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

SUMMARY

DESCRIPTION	COUNT OF NUMBER OF TREES		
	LEFT SIDE	RIGHT SIDE	TOTAL
DIPTEROCARP SPECIES			
NON-DIPTEROCARP SPECIES			

* For Licensee Record only

APPENDIX 4

STOCK SHEET FOR LIST OF TOTALLY PROTECTED AND PROTECTED SPECIES, FRUIT TREES AND MOTHER TREES FOR PROTECTION

LICENCE NO:	TEAM LEADER:
COUPE NO:	BLOCK NO:
SHEET NO:	SKID TRAIL NO:
DATE:	NAME OF RECORDER:

LEFT SIDE OF THE TRAIL (FRONT/BACK)							
NO.	CODE	SPECIES	DBH *FOR MT ONLY	NO.	CODE	SPECIES	DBH *FOR MT ONLY
1				16			
2				17			
3				18			
4				19			
5				20			
6				21			
7				22			
8				23			
9				24			
10				25			
11				26			
12				27			
13				28			
14				29			
15				30			

RIGHT SIDE OF THE TRAIL (FRONT/BACK)							
NO.	CODE	SPECIES	DBH *FOR MT ONLY	NO.	CODE	SPECIES	DBH *FOR MT ONLY
1				16			
2				17			
3				18			
4				19			
5				20			
6				21			
7				22			
8				23			
9				24			
10				25			
11				26			
12				27			
13				28			
14				29			
15				30			

SUMMARY

CODE	DESCRIPTION	COUNT OF NUMBER OF TREES		
		LEFT SIDE	RIGHT SIDE	TOTAL
TP	Totally Protected tree			
P	Protected tree			
MT	Mother tree			
FT	Fruit tree			

* For Licensee Record only

APPENDIX 5

RILP 5

OPERATIONAL INVENTORY RECORDING SHEET

(UNDERSIZED TREES ALLOWED TO BE FELLED WITHIN CLEARED WIDTH OF LOGGING ROAD ALIGNMENTS & ALONG SKID TRAIL PATHS)

LICENCE NO:	ACCOUNT NO:
LICENSEE:	PEC REF. NO.:
PA HOLDER/CONTRACTOR:	DATE OF ISSUE:
MANAGEMENT PLAN:	BLOCK NO./AREA (ha):
FOREST TYPE:	ROAD NO/ SKID TRAIL NO.*:

TREE NO.	SPECIES CODE	DBH (cm)	HEIGHT (m)	VOL. (m³)
SUBTOTAL:				

TREE NO.	SPECIES CODE	DBH (cm)	HEIGHT (m)	VOL. (m³)
SUBTOTAL:				

PREPARED BY:

DATE OF INVENTORY:

* To be submitted to the authority

APPENDIX 6

SLOPE CORRECTION TABLE

SLOPE GRADIENT IN %	CORRECTION FACTOR (1/COS *)	HORIZONTAL DISTANCE (M)					
		2	3	5	10	20	52.5
		DISTANCE ALONG SLOPE (M)					
10	1.00	2.00	3.00	5.00	10.00	20.00	52.50
15	1.01	2.02	3.03	5.05	10.10	20.20	53.03
20	1.02	2.04	3.06	5.10	10.20	20.40	53.55
25	1.03	2.06	3.09	5.15	10.30	20.60	54.08
30	1.04	2.08	3.12	5.20	10.40	20.80	54.60
35	1.06	2.12	3.18	5.30	10.60	21.20	55.65
40	1.08	2.16	3.24	5.40	10.80	21.60	56.70
45	1.10	2.19	3.29	5.48	10.96	21.92	57.54
50	1.12	2.23	3.35	5.59	11.17	22.34	58.64
55	1.14	2.28	3.42	5.71	11.42	22.83	59.93
60	1.67	3.33	5.00	8.33	16.65	33.3	87.41
65	1.19	2.38	3.58	5.96	11.92	23.84	62.58
70	1.22	2.44	3.66	6.10	12.20	24.40	64.05
75	1.25	2.50	3.75	6.25	12.49	24.98	65.57
80	1.28	2.56	3.84	6.40	12.80	25.60	67.20
85	1.31	2.62	3.93	6.56	13.11	26.22	68.83
90	1.35	2.69	4.04	6.73	13.46	26.91	70.65
95	1.38	2.76	4.14	6.89	13.79	27.57	72.37
100	1.41	2.83	4.24	7.07	14.14	28.28	74.24
105	1.45	2.90	4.34	7.24	14.48	28.96	76.02
110	1.48	2.97	4.45	7.42	14.85	29.70	77.96
115	1.52	3.05	4.57	7.62	15.24	30.48	80.01
120	1.57	3.13	4.70	7.83	15.67	31.33	82.25
125	1.60	3.20	4.80	8.00	16.00	32.00	84.00
130	1.64	3.27	4.91	8.18	16.36	32.72	85.89
135	1.67	3.35	5.02	8.37	16.75	33.49	87.92
140	1.72	3.44	5.17	8.61	17.22	34.44	90.41
145	1.76	3.52	5.27	8.79	17.58	35.16	92.30
150	1.80	3.61	5.41	9.02	18.04	36.08	94.70
155	1.84	3.69	5.53	9.22	18.44	36.89	96.83
160	1.89	3.77	5.66	9.44	18.87	37.74	99.07
165	1.93	3.86	5.80	9.66	19.32	38.64	101.44
170	1.97	3.94	5.91	9.85	19.70	39.41	104.44

APPENDIX 7a

SAMPLE OF SKID TRAIL MAPPING SHEET

Sheet No.

LICENCE NO:	TEAM LEADER:
COUPE NO:	DATE:
BLOCK NO:	SKID TRAIL NO:

STATION NO.		FORWARD BEARING (°)	SLOPE (%) (+ / -)	GROUND DISTANCE (m)	HORIZONTAL DISTANCE HD (m)	CUMMULATIVE HD (m)	REMARKS
FROM	TO						
Total							

* For Licensee Record only

APPENDIX 7b

SKID TRAIL SUMMARY SHEET

Distances by skid trail numbers

SKID TRAIL NO.	DISTANCE IN METRES
MT-1	
ST-1-1	
ST-1-2	
FT-1-1-1	
MT-2	
ST-2-1	

Table showing distance of individual skid trail to be attached to the map

** To be submitted to the authority*

APPENDIX 8a

RILP 1a

**OPERATIONAL INVENTORY SUMMARY SHEET COVERING EACH SKID TRAIL
OF INDIVIDUAL BLOCK
(100% TREE ENUMERATION FOR HARVESTABLE TREES)**

LICENCE NO:	ACCOUNT NO:
LICENSEE:	PEC REF. NO.:
PA HOLDER/CONTRACTOR:	DATE OF ISSUE:
MANAGEMENT PLAN:	BLOCK NO./AREA (ha):
FOREST TYPE:	SKID TRAIL NO./DISTANCE (m):

LEFT SIDE OF THE TRAIL (FRONT/BACK)				
TREE NO.	SPECIES CODE	DBH (cm)	HEIGHT (m)	VOL. (m³)
SUBTOTAL:				

RIGHT SIDE OF THE TRAIL (FRONT/BACK)				
TREE NO.	SPECIES CODE	DBH (cm)	HEIGHT (m)	VOL. (m³)
SUBTOTAL:				

PREPARED BY:

DATE OF INVENTORY:

** To be submitted to the authority*

**OPERATIONAL INVENTORY SUMMARY SHEET COVERING EACH SKID TRAIL
OF INDIVIDUAL BLOCK
(100% TREE ENUMERATION – LOCALITY OF INDIVIDUAL HARVESTABLE TREES RECORDED BY
GPS)**

LICENCE NO:	ACCOUNT NO:
LICENSEE:	PEC REF. NO.:
PA HOLDER/CONTRACTOR:	DATE OF ISSUE:
MANAGEMENT PLAN:	BLOCK NO./AREA (ha):
FOREST TYPE:	SKID TRAIL NO./DISTANCE (m):

TREE NO.	SPECIES CODE	DBH (cm)	HEIGHT (m)	VOL. (m3)	GEOGRAPHICAL COORDINATES	
					Northern Latitude Deg. / Min. / Sec.	Eastern Longitude Deg. / Min. / Sec.
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
Total:						

PREPARED BY:**DATE OF INVENTORY:**

* To be submitted to the authority

APPENDIX 9

RILP 2

**SUMMARY OF SKID TRAIL NETWORK & TREES TO BE HARVESTED
FOR INDIVIDUAL BLOCK**

FOREST TIMBER LICENCE NO:		COUPE NO:			
BLOCK NO.	BLOCK SIZE (ha.)	PEC REF. NO.	DATE OF PEC ISSUED		
RILP SUMMARY					
SKID TRAIL NETWORK		HARVESTABLE TREES			
SKID TRAIL NO.	DISTANCE (m)	TAG CODE	NO. OF TREES	VOLUME (m³)	REMARKS
TOTAL					
SIKD TRAIL DENSITY (m/ha):					
TREE DENSITY (No. of trees/ha):					
PREPARED BY:					
DATE:					

** To be submitted to the authority*

SUMMARY OF TREES FOR PROTECTION WITHIN INDIVIDUAL BLOCK

LICENCE NO.:			COUPE NO.:				BLOCK NO.:	
SKID TRAIL NO.	LENGTH OF SKID TRAIL (m)	NUMBER OF TREES TO BE PROTECTED						
		TP	P	MT	FT	PCT	TOTAL	
GRAND TOTAL								

ABBREVIATIONS	
TP - Totally Protected tree	MT - Mother tree
P - Protected tree	FT - Fruit tree
PCT - Potential crop tree	

** To be submitted to the authority*

SUMMARY OF TREES FOR PROTECTION WITHIN THE COUPE

LICENCE NO.:		COUPE NO.:					
BLOCK NO.	LENGTH OF SKID TRAIL (m)	NUMBER OF TREES TO BE PROTECTED					
		TP	P	MT	FT	PCT	TOTAL
GRAND TOTAL							

ABBREVIATIONS
TP - Totally Protected tree
P - Protected tree
MT - Mother tree
FT - Fruit tree
PCT - Potential crop tree

** To be submitted to the authority*

SUMMARY OF COUPE OPERATIONAL INVENTORY ANALYSIS

LICENCE NO.:						COUPE NO.:			
PEC REF. NO.:									
BLOCK NO.	BLOCK AREA (ha.)	TOTAL LENGTH OF SKID TRAILS (m)	SKID TRAIL DENSITY (m/ha.)	TOTAL NO. OF TAGGED HARVESTABLE TREES	ENUMERATED VOLUME (m³)	AVERAGE NO. OF TREES PER HA.	AVERAGE VOLUME PER HA.	AVERAGE VOLUME PER TREE	
TOTAL									

** To be submitted to the authority*

APPENDIX 12

LOGGING ROAD DESIGN STANDARDS* (for new road construction)

Description	Road Class		
	Main Road	Secondary Road	Feeder Road
Lanes	Dual lane	Single lane	Single lane
Design speed	50 km/hr to 60 km/hr	25 km/hr to 40 km/hr	15 km/hr to 25 km/hr
Formation width	9 m to 12 m	8 m to 10 m	6 m to 8 m
Cleared width	40 m to 50 m	30 m to 40 m	20 m to 30 m
Maximum road gradient:	8% to 10%	10% to 14%	14% to 18%
<ul style="list-style-type: none"> • Favourable grade i.e. uphill towards forest 	6% to 8%	8% to 12%	10% to 14%
<ul style="list-style-type: none"> • Adverse grade i.e. uphill towards mill • Preferred maximum length at maximum 	1,000 m	1,000 m	1,000 m
Road camber	2% to 6%	2% to 6%	2% to 6%
Super elevation	1:10	1:12	1:15
Minimum curve radius	50 m	30 m	20 m
Embankment (height to width)			
<ul style="list-style-type: none"> • Hill side 	1:1	1:1	1:1
<ul style="list-style-type: none"> • Valley side 	1:2	1:2	1:2
<ul style="list-style-type: none"> • Rocky terrain 	1:0.2 to 0.5	1:0.2 to 0.5	1:0.2 to 0.5
Culverts			
<ul style="list-style-type: none"> • Type 	Corrugated/Round metal pipes or Timber/log type culverts	Corrugated/Round metal pipes or Timber/log type culverts	Corrugated/Round metal pipes or Timber/log type culverts
<ul style="list-style-type: none"> • Size 	Big enough to allow free flow of water and to prevent ponding	Big enough to allow free flow of water and to prevent ponding	Big enough to allow free flow of water and to prevent ponding
Bridges			
<ul style="list-style-type: none"> • Type 	<ul style="list-style-type: none"> • Wooden • Pre-fabricated steel truss or concrete bridge 	<ul style="list-style-type: none"> • Wooden • Pre-fabricated steel truss or concrete bridge 	<ul style="list-style-type: none"> • Wooden
<ul style="list-style-type: none"> • Minimum width 	4 metres	4 metres	4 metres

* Based on Forest Engineering Plan

APPENDIX 12a

DESIGN OF TYPICAL ROAD CROSS-SECTION IN HILLY TERRAIN



