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Developing Oil Palm Replanting Operation Procedure by Integration of LiDAR and Aerial Photo

Presenter : Dato' Razain Abd Razab

Company Profile



Project Experience

No	State	Location	Area	Client
1	Johor	Air Tawar, Semanchu	108,000 Ha	Jabatan Tanah Felda
2	Terengganu	Chalok , Chalok Barat	14,800 Ha	Jabatan Tanah Felda
3	Kedah	Chuping, Laka Selatan	5,430 Ha	Jabatan Tanah Felda
		Lubok Merbau, Teloi Kanan, Sg. Tiang	2,055.42 Ha	Jabatan R&D Felda
4	Pahang	Sturgeon – Taman Negara	75 Ha	Jabatan Inovasi & Projek Khas Generasi Baru
		Lurah Bilut	2,135.34 Ha	Jabatan R&D Felda
5	Sabah	Esscom, Sahabat, Umas, Kalabakan	147, 828.54 Ha	Jabatan Tanah Felda
6	Perak	Lasah	361.77 Ha	Jabatan R&D Felda
7	Pahang	Jengka, Kota Gelanggi, Sg. Tekam, Kg. Awah, Bukit Tajau, Sg. Nerek, Ulu Jempol Sg. Rentang, Padang Piol	88, 446.40 Ha	Jabatan Tanah Felda
8	Terengganu	Cherul, Chalok Barat, Chalok, Jerangau, Selasih, Neram, Belara, Bukit Bading, Mengkawang, Seberang Tayor, Tenang Besut, Tersat, Kerteh	56, 608.03 Ha	Jabatan Tanah Felda
9	Sarawak	Samarahan	15,600 Ha	Koperasi Permodalan Felda (KPF)
Total Area			441340.5Ha	

Introduction

- Currently plantation industry used ground based works for plantations works which consume a lot of cost and time.
- Ground based works often exposed to errors and bring loss in term of profits such as error in terracing.
- Furthermore, there is no clear blue print on developing replanting area and it all based on the knowledge and experience of the operator

What happen if the Contractor don't have experience???

Are we willing to put our 20 years of oil palm yield in the hand of the contractor??????





2008/







2008/



Our Aims

Objective

- To integrate **Remote Sensing and GIS technologies** to enhance oil palms estate management



Procedure

- Extracting **LiDAR data and Aerial Photo** to generate relevant information for replanting operation procedure



Goal

- To create a **systematic operation procedure** for replanting program

Flow Chart of Replanting Operation Procedure

Process Step	Activity
Preliminary Work & Data Acquisition	<ul style="list-style-type: none"> Revise offer letter from client Obtain the boundary of the area that needs to be replanted Conduct a comprehensive ground verification Extract plantation boundary from topographic map Prepare LiDAR flight plan



Process Step	Activity
Data Processing	<ul style="list-style-type: none"> Generate DSM, DEM and DTM and 1 metre contour from LiDAR data Design the terrace according to the slope classification (client standard) Design planting points and road network respective to the terrace



Process Step	Activity
Deliverables & Technical attachment	<p>Deliverables :</p> <ul style="list-style-type: none"> Produce DTM, DEM & DSM Digital Orthophoto Topographical Maps Flythrough Video+3D Modelling LiDAR RAW Data Contour at 1 metre interval Drainage Pattern Tree counting Equipment for Execution and Monitoring <p>Technical attachment :</p> <ul style="list-style-type: none"> Produce service technical attachment for client staff Conduct learning process, data management, data processing and analysis for client staff

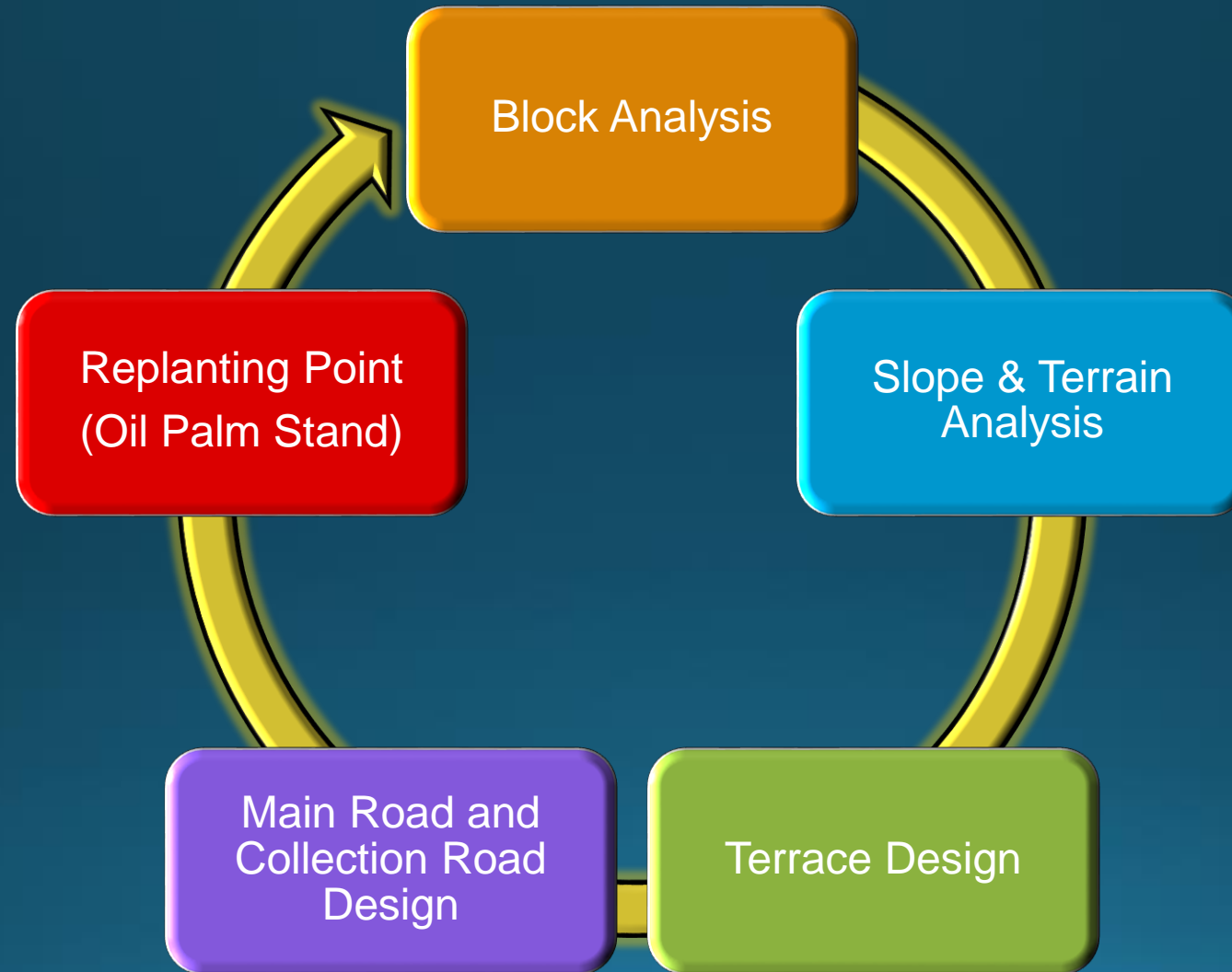


Process Step	Activity
Verification & Quality Control	<ul style="list-style-type: none"> Verify LiDAR point heights produced after processing Conduct ground verification

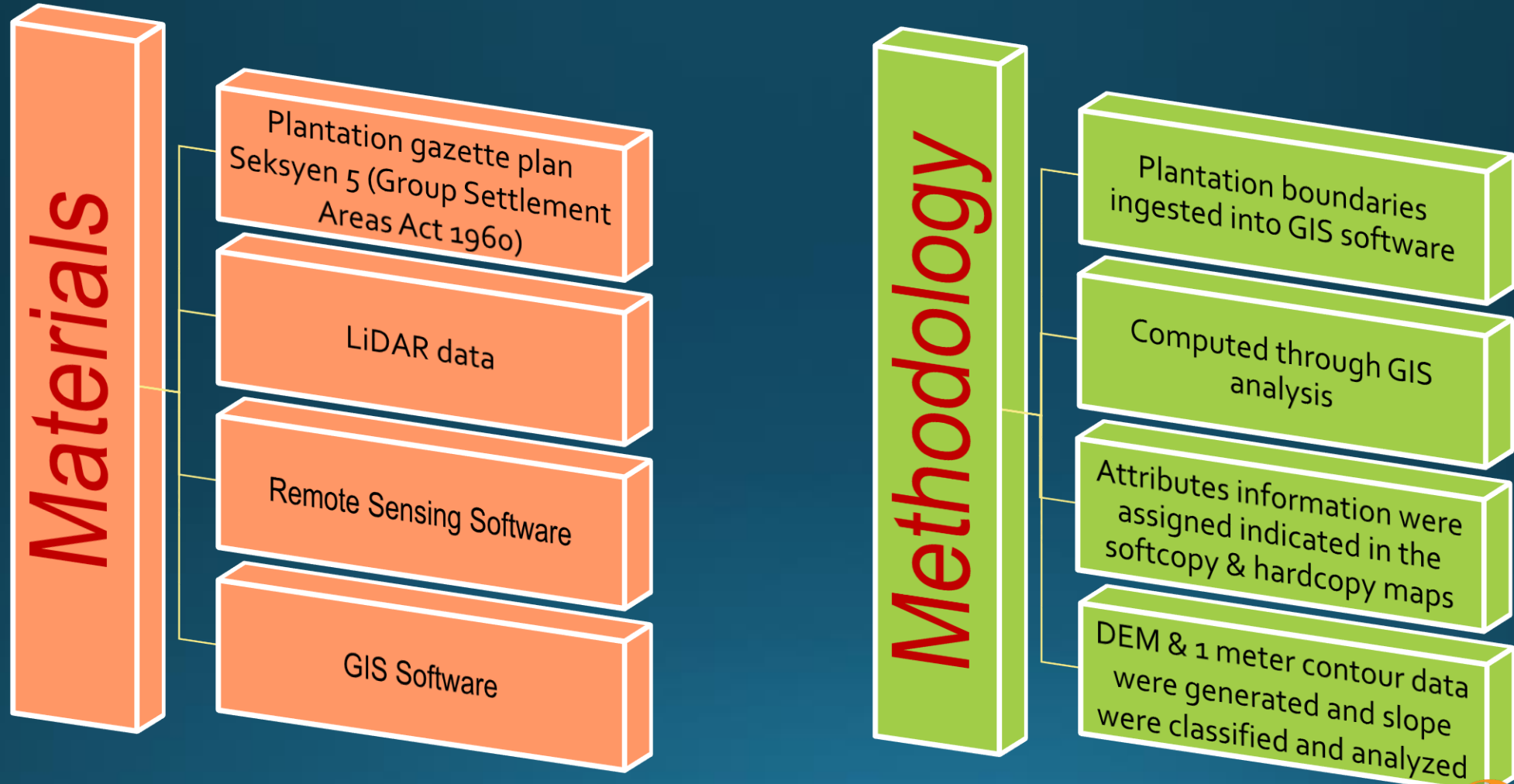


Process Step	Activity
Implementation	<ul style="list-style-type: none"> Results from the OPRP and assessment are delivered to ground operational department for implementation.

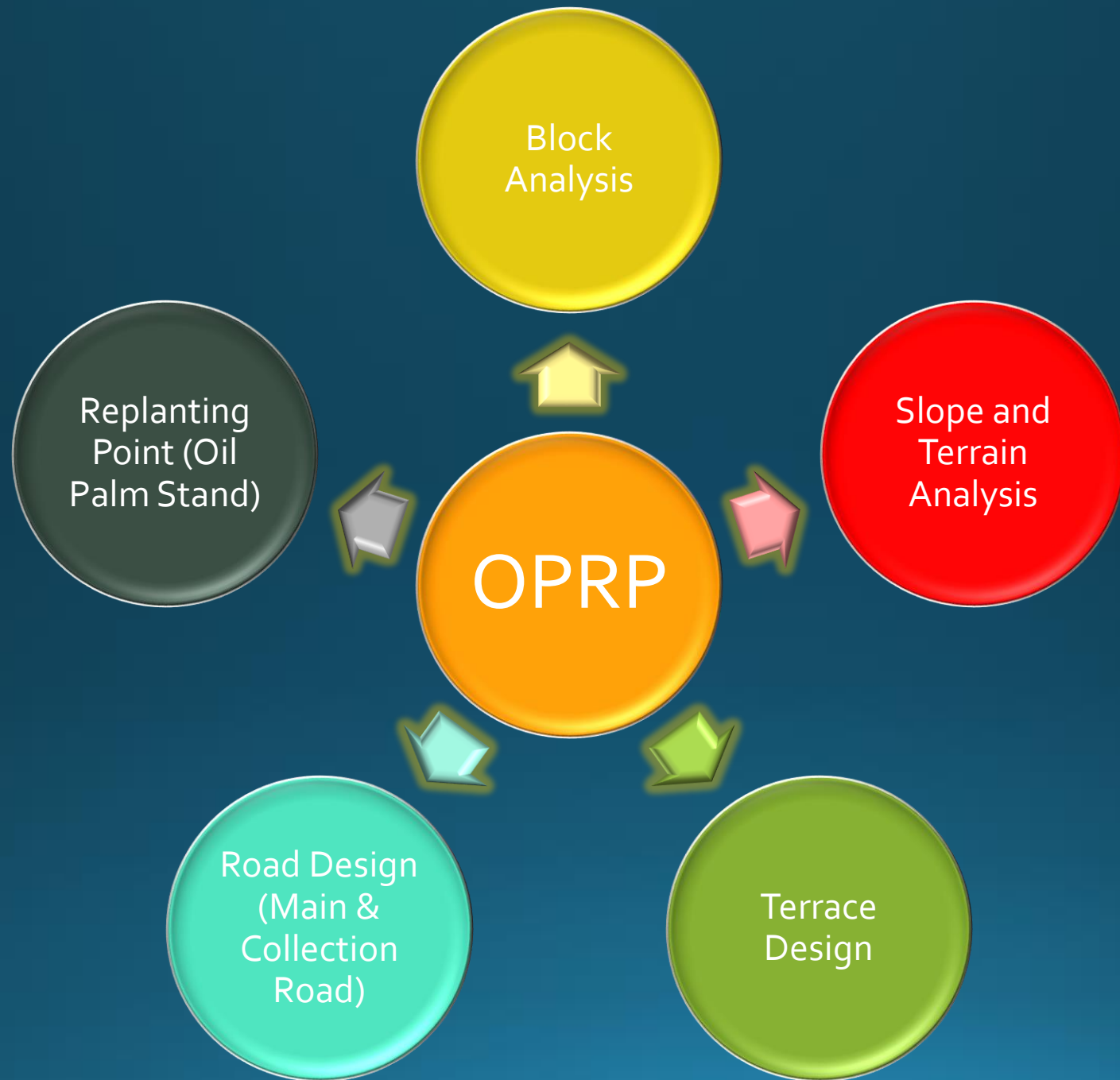
Replanting Program Applications



MATERIALS & METHODOLOGY (Replanting Program)



SAMPLE OF REPLANTING PROGRAM PROJECT

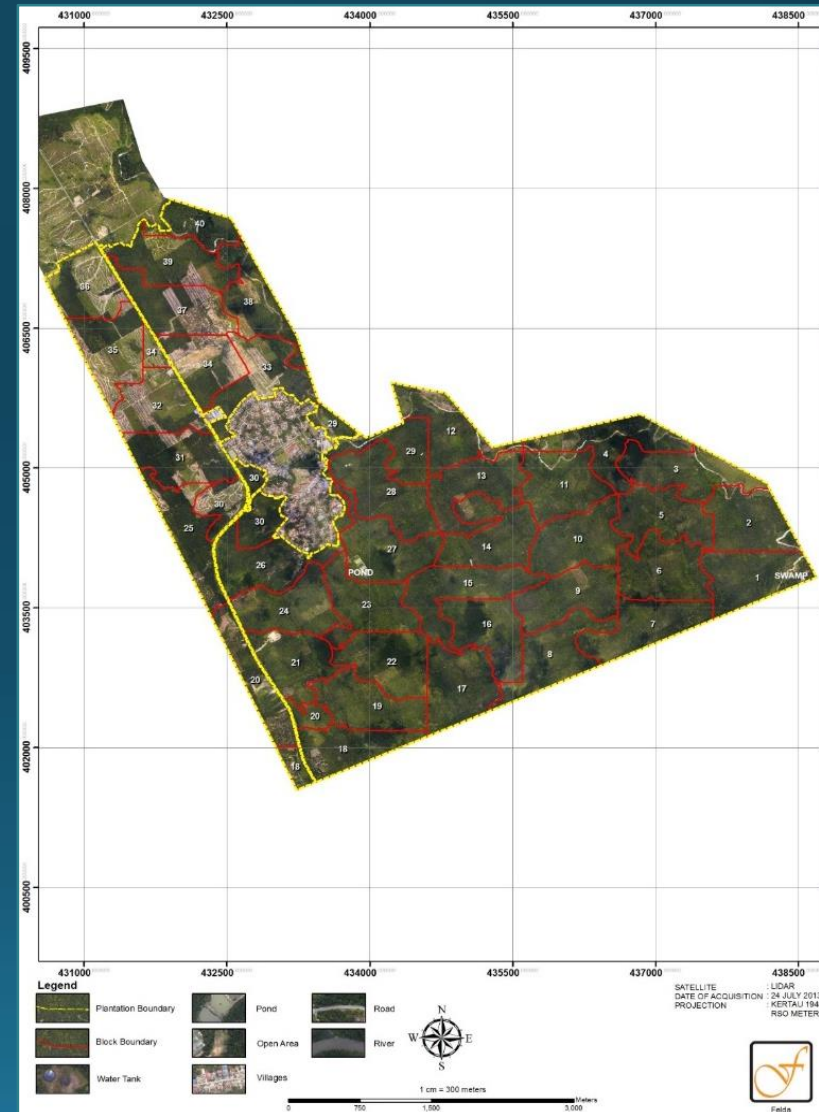


Sample Area

- **Area** : FELDA Lurah Bilut, Pahang, Malaysia (26 July 2013)
- The total perimeter boundary is **2,135.34 hectares**.

Table of Land use analysis of FELDA Lurah Bilut

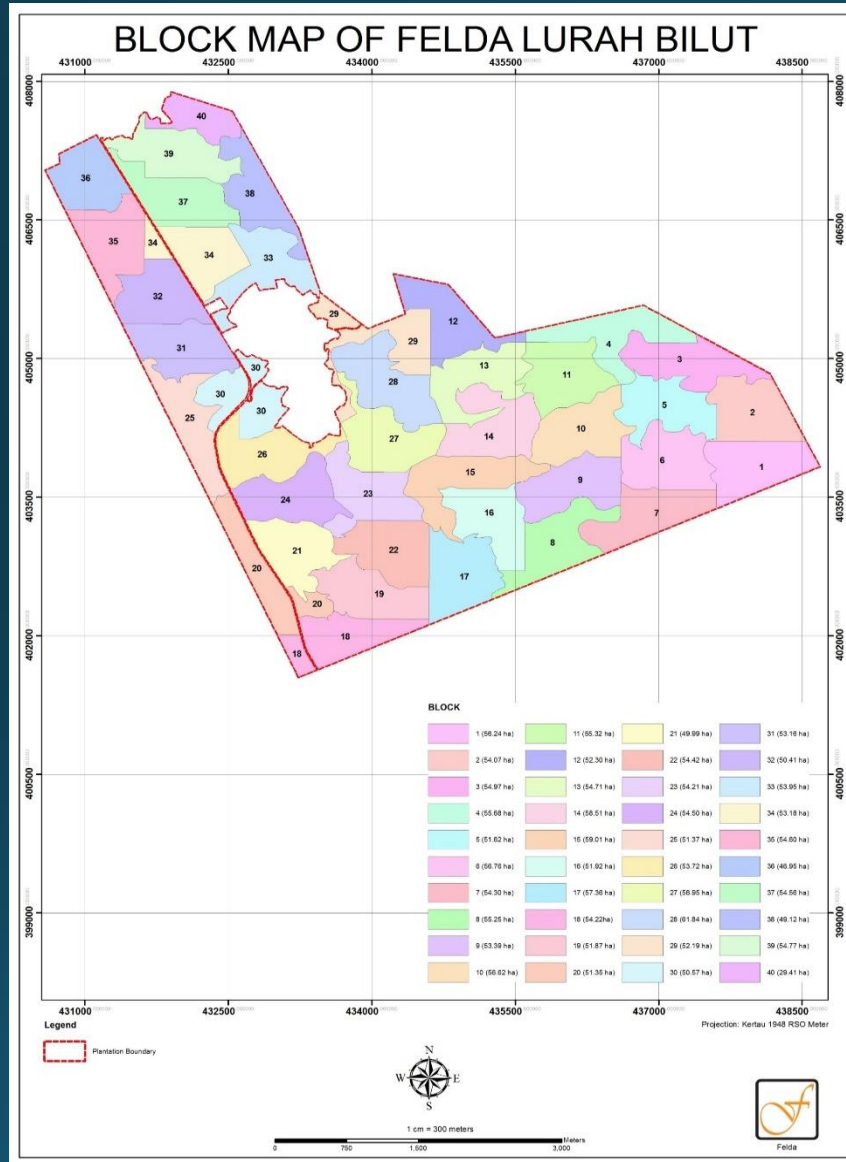
LAND USE	AREA (HA)	PERCENTAGE (%)
A) Plantable Area	1,878.17	87.96
B) Non-Agriculture area		
Road (Main Road and Field Road)	101.58	4.76
Swamp	0.35	0.02
Non-plantable terrain (>25 Degree)	132.71	6.21
River	18.67	0.87
Pond	3.86	0.18
Sub-total	257.17	12.04
Perimeter Land Area	2,135.34	100



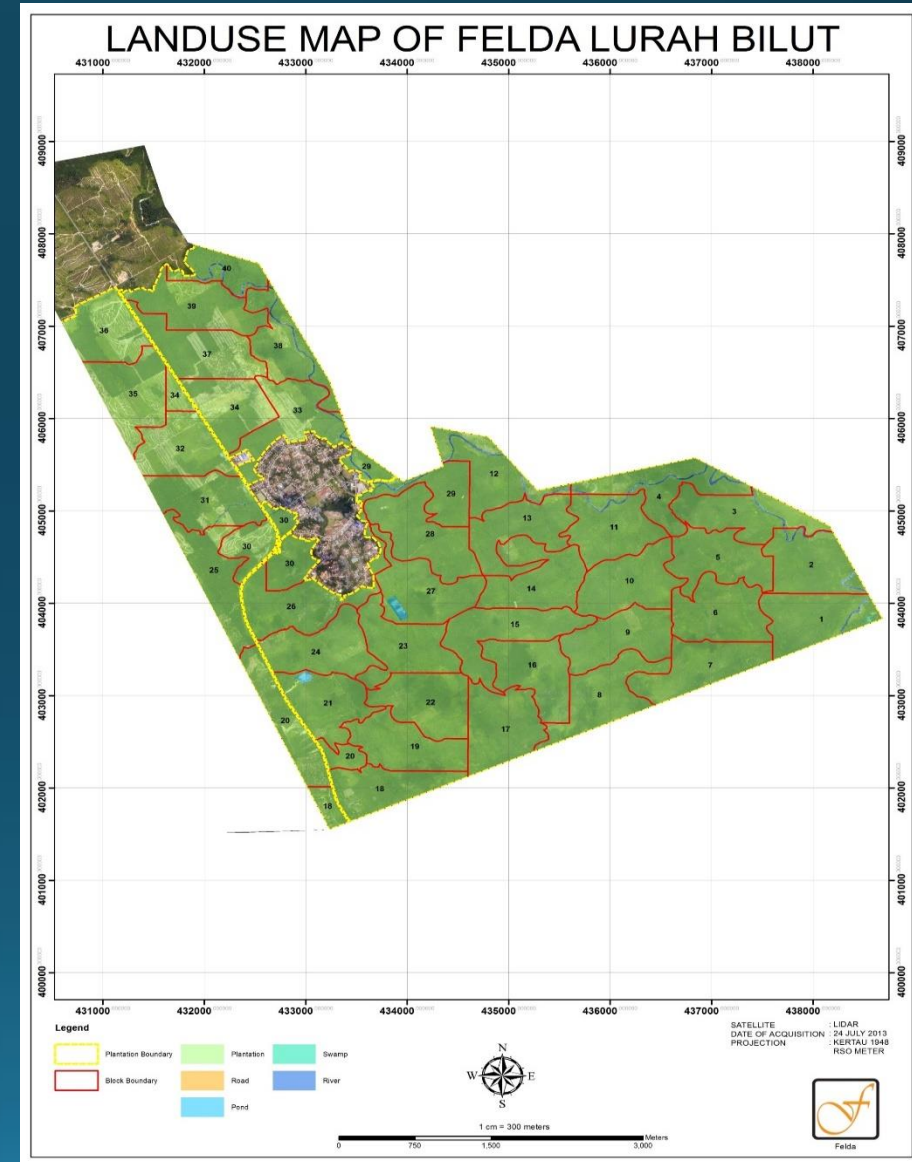
Aerial Photo Map of FELDA Lurah Bilut



Block Analysis (Map)



Block Boundary of FELDA Lurah Bilut



Landuse Map of FELDA Lurah Bilut

Block Analysis (Attribute Table)

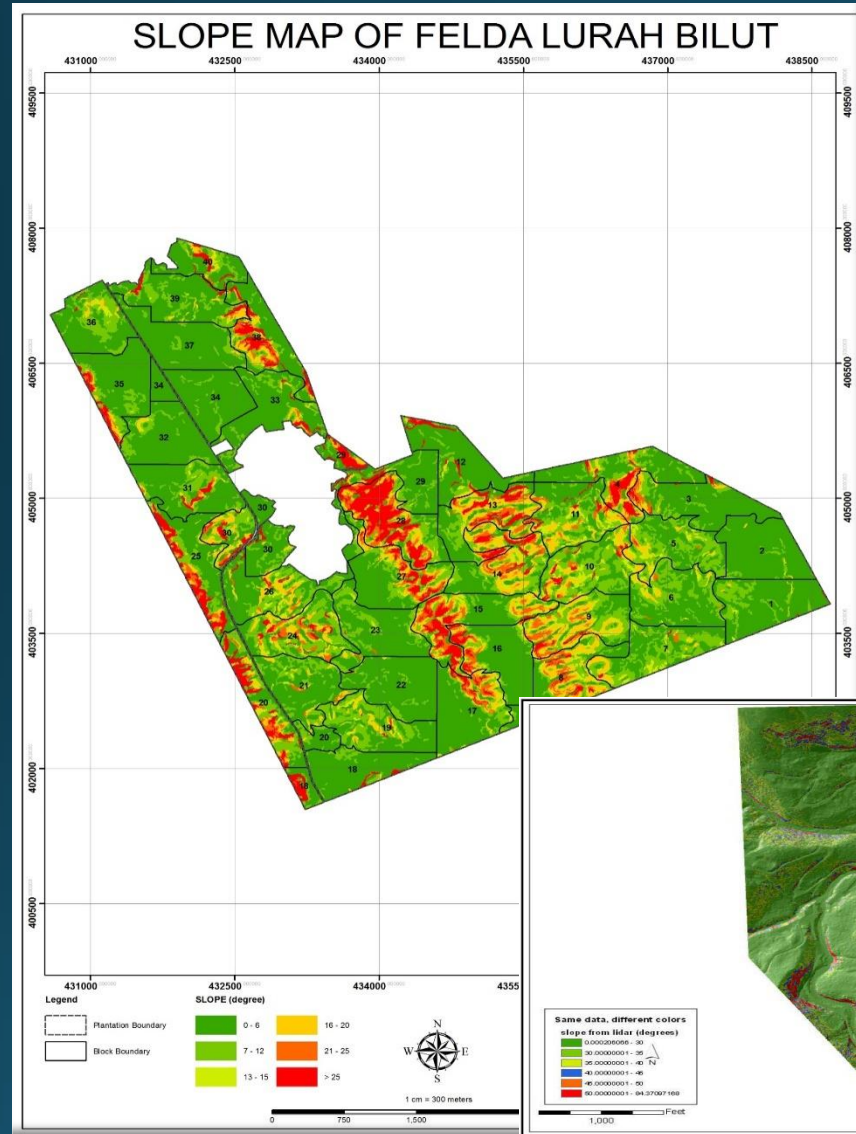
- Based on statistical analysis, it was found that the actual area planted is **1,878.17 ha** after deducting the unplanted area. The **biggest block** with net plantable area is **Block 6 with 53.94 ha** while the lowest block with net plantable area is Block 40 with 24.06 ha
- The biggest portion of these unplanted area is occupied terrain area over than **25 degree (132.71 ha)**, road network buffer (**101.58 ha**), river (18.67 ha), pond (**3.86 ha**), swamp (**0.35ha**).

Table of Block Analysis for FELDA Lurah Bilut

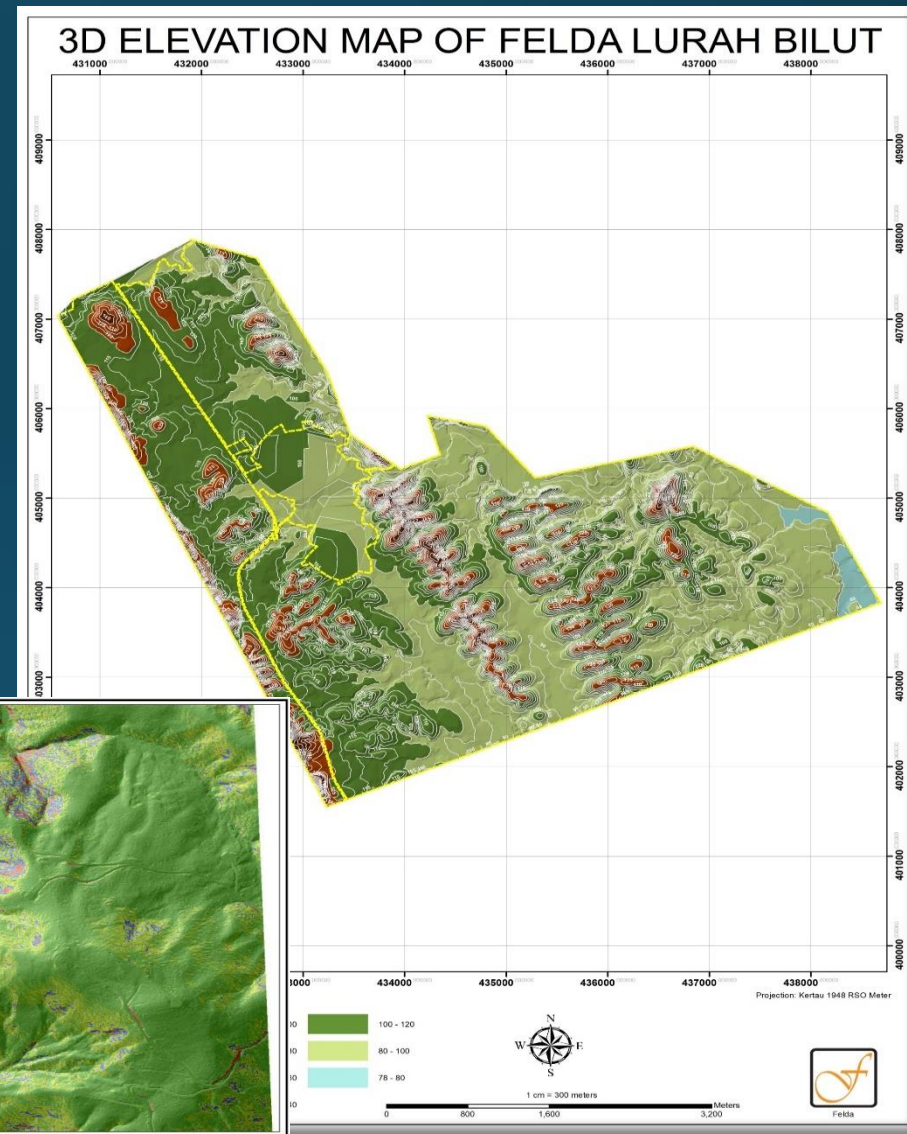
BLOCK	TOTAL AREA (ha)	UNPLANTABLE AREA (ha)						PLANTABLE AREA (ha)
		SLOPE >25 DEGREE	ROAD (MAIN ROAD AND FIELD ROAD)	SWAMP	POND	RIVER	TOTAL	
1	56.24	0.20	1.65	0.35	-	0.82	3.02	53.22
2	54.07	-	1.65	-	-	1.96	3.61	50.46
3	54.97	1.19	2.08	-	-	0.94	4.21	50.76
4	55.68	6.28	1.88	-	-	2.78	10.94	44.74
5	51.62	0.07	2.78	-	-	-	2.85	48.77
6	56.76	-	2.82	-	-	-	2.82	53.94
7	54.30	0.36	2.46	-	-	-	2.82	51.48
8	55.25	2.05	3.60	-	-	-	5.65	49.60
9	53.39	1.59	4.34	-	-	-	5.93	47.46
10	56.62	2.23	4.11	-	-	-	6.34	50.28
11	55.32	1.86	2.96	-	-	1.00	5.82	49.50
12	52.30	2.97	2.05	-	-	2.69	7.71	44.59
13	54.71	8.57	2.78	-	-	-	11.35	43.36
14	58.51	4.35	4.01	-	-	-	8.36	50.15
15	59.01	9.43	2.54	-	-	-	11.97	47.04
16	51.92	3.05	2.23	-	-	-	5.28	46.64
17	57.36	2.23	3.43	-	-	-	5.66	51.70
18	54.22	4.21	1.67	-	-	-	5.88	48.34
19	51.87	0.32	3.48	-	-	-	3.80	48.07
20	51.35	8.79	1.69	-	-	-	10.48	40.87

BLOCK	TOTAL AREA (ha)	UNPLANTABLE AREA (ha)						PLANTABLE AREA (ha)
		SLOPE >25 DEGREE	ROAD (MAIN ROAD AND FIELD ROAD)	SWAMP	POND	RIVER	TOTAL	
21	49.99	-	2.85	-	1.45	-	4.30	45.69
22	54.42	-	1.75	-	-	-	1.75	52.67
23	54.21	0.05	2.67	-	-	-	2.72	51.49
24	54.50	2.72	4.08	-	-	-	6.80	47.70
25	51.37	9.89	1.79	-	-	-	11.68	39.69
26	53.72	1.03	3.96	-	-	-	4.99	48.73
27	56.95	5.09	2.53	-	2.41	-	10.03	46.92
28	61.84	25.59	1.06	-	-	-	26.65	35.19
29	52.19	6.05	1.44	-	-	1.99	9.48	42.71
30	50.57	3.08	3.31	-	-	0.17	6.56	44.01
31	53.16	1.75	2.59	-	-	0.86	5.20	47.96
32	50.41	0.09	2.54	-	-	-	2.63	47.78
33	53.95	1.27	2.04	-	-	1.44	4.75	49.20
34	53.18	-	1.94	-	-	-	1.94	51.24
35	54.60	3.73	2.98	-	-	-	6.71	47.89
36	46.95	0.21	2.70	-	-	-	2.91	44.04
37	54.56	-	1.99	-	-	-	1.99	52.57
38	49.12	7.89	2.23	-	-	1.73	11.85	37.27
39	54.77	2.50	1.88	-	-	-	4.38	50.39
40	29.41	2.02	1.04	-	-	2.29	5.35	24.06
TOTAL	2,135.34	132.71	101.58	0.35	3.86	18.67	257.17	1,878.17

Slope and Terrain Analysis (Map)



Slope Map of FELDA Lurah Bilut



Elevation Map of FELDA Lurah Bilut

Slope and Terrain Analysis (Attribute Table 1)

- **Slope and Terrain Mapping**

- The whole area is consisting of slope range between **0** degree to **84** degree.
- Plantable slope area were classified from **0 to 25** degree .
- About **132.71 ha** or **6.21%** of the total area is unplantable area which is slope greater than **25** degree.
- About **2,002.63 ha** or **93.79%** of the area is plantable area which is slope less than **25** degree.

Table of Slope Analysis in FELDA Lurah Bilut (0 to 25 Degree)

SLOPE CLASS (degree)	TOTAL AREA (ha)	PERCENTAGE (%)
0 - 6	1,236.49	57.91
7 - 12	442.74	20.73
13 - 15	71.53	3.35
16 - 20	167.79	7.86
21 - 25	84.07	3.94
> 25	132.71	6.21
TOTAL	2,135.34	100

Slope and Terrain Analysis (Attribute Table 2)

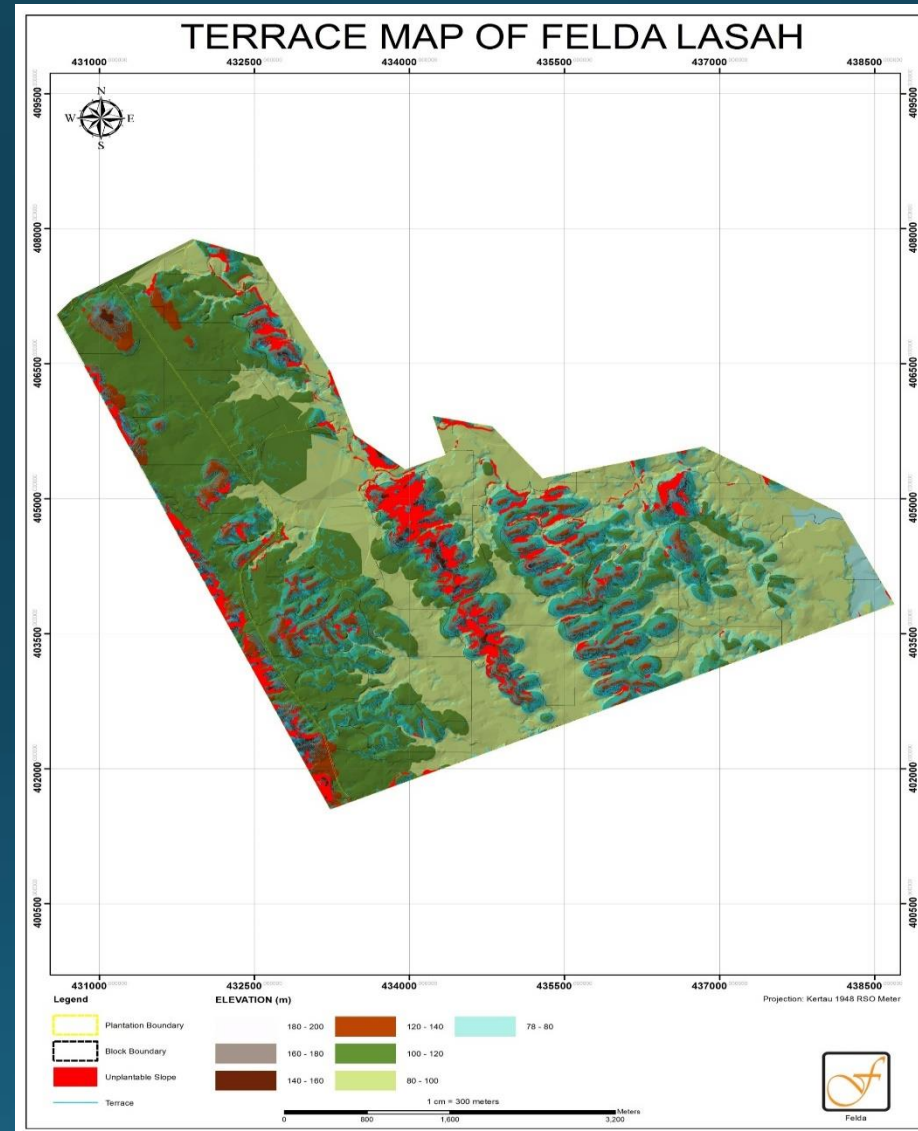
BLOCK	SLOPE (degree)						TOTAL
	0 - 6	7 - 12	13 - 15	16 - 20	21 - 25	> 25	
1	44.68	10.52	0.29	0.48	0.04	0.20	56.21
2	51.04	2.70	0.06	0.26	-	-	54.07
3	40.90	7.57	0.38	2.73	2.18	1.19	54.96
4	30.81	10.28	0.91	4.92	2.49	6.28	55.68
5	20.92	22.72	3.98	3.44	0.49	0.07	51.62
6	33.58	18.59	1.89	2.21	0.49	-	56.76
7	24.86	21.70	3.53	3.39	0.44	0.36	54.29
8	22.10	9.39	3.32	13.18	5.20	2.05	55.25
9	13.06	13.64	5.11	14.31	5.68	1.59	53.39
10	14.73	24.80	5.74	7.06	2.07	2.23	56.62
11	22.23	15.64	5.24	7.73	2.61	1.86	55.32
12	41.85	5.76	0.65	0.86	0.21	2.97	52.30
13	17.19	9.33	2.80	10.79	6.03	8.57	54.71
14	16.63	12.85	4.60	13.93	6.24	4.35	58.60
15	19.69	8.50	3.99	9.72	7.68	9.43	59.01
16	35.90	5.35	1.53	3.12	2.97	3.05	51.92
17	36.30	7.44	2.32	5.05	4.01	2.23	57.35
18	43.66	5.68	0.14	0.20	0.33	4.21	54.21
19	25.91	19.94	2.21	3.39	0.10	0.32	51.88
20	19.04	14.25	1.65	4.35	3.27	8.79	51.34

BLOCK	SLOPE (degree)						TOTAL
	0 - 6	7 - 12	13 - 15	16 - 20	21 - 25	> 25	
21	32.94	12.77	1.04	2.37	0.87	-	49.99
22	48.88	5.24	0.11	0.08	0.11	-	54.42
23	38.73	13.56	0.76	0.69	0.42	0.05	54.21
24	16.84	19.42	4.08	7.05	4.40	2.72	54.50
25	25.36	9.11	0.45	3.18	3.38	9.89	51.37
26	28.75	13.53	3.38	5.89	1.13	1.03	53.72
27	27.16	11.23	1.65	7.11	4.71	5.09	56.95
28	8.37	10.12	1.36	8.22	8.18	25.59	61.83
29	34.13	8.79	0.58	1.83	0.81	6.05	52.19
30	28.27	11.56	1.90	4.66	1.11	3.08	50.57
31	37.27	11.51	0.68	1.23	0.73	1.75	53.16
32	43.09	6.05	0.52	0.65	-	0.09	50.41
33	41.62	8.78	0.33	1.42	0.53	1.27	53.94
34	50.70	2.48	-	-	-	-	53.18
35	40.19	7.42	0.39	1.85	1.01	3.73	54.59
36	29.44	14.42	1.41	1.47	-	0.21	46.95
37	49.39	4.92	-	0.25	-	-	54.56
38	24.22	7.25	1.47	4.69	3.59	7.89	49.11
39	36.86	12.32	0.45	2.38	0.26	2.50	54.78
40	19.20	5.61	0.63	1.64	0.30	2.02	29.40
TOTAL	1,236.49	442.74	71.53	167.79	84.07	132.71	2,135.34

Table of Slope Analysis in FELDA Lurah Bilut by Blocks



Terrace Analysis & Design (Map)



Terrace Map of FELDA Lurah Bilut

Terrace Analysis & Design (Attribute Table)

Terrace Design Mapping

- The total length of terraces is **1,118.94 km**
- Terrace lining were generated started on **7 to 25** Degree slope value based on specification given.

Table of *Terrace Analysis in FELDA Lurah Bilut*

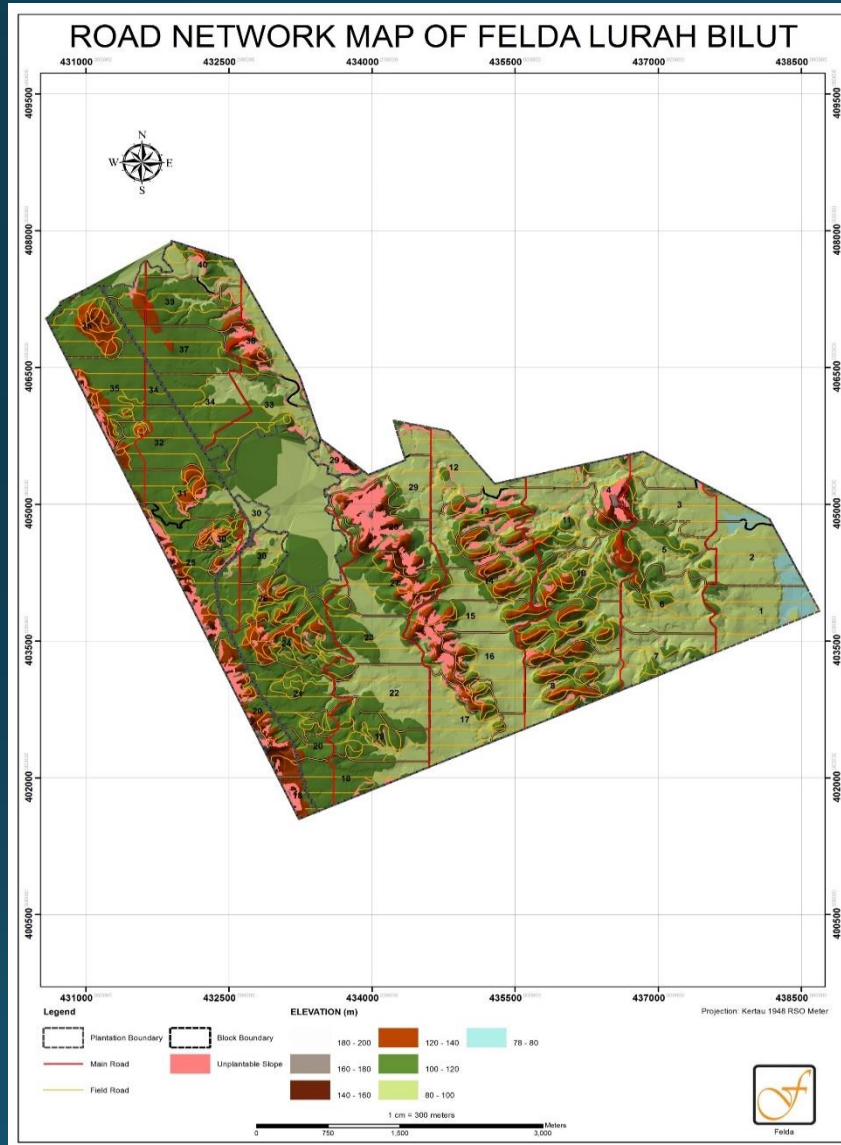
BLOCK	TOTAL AREA (ha)	PLANTABLE AREA (ha)	TERRACE LENGTH (m)	TERRACE DENSITY (m/ha)
1	56.24	53.22	12,459.03	234.10
2	54.07	50.46	3,440.59	68.18
3	54.97	50.76	18,204.15	358.63
4	55.68	44.74	27,752.69	620.31
5	51.62	48.77	39,613.08	812.24
6	56.76	53.94	28,299.44	524.65
7	54.3	51.48	38,990.93	757.40
8	55.25	49.60	54,950.38	1,107.87
9	53.39	47.46	63,475.36	1,337.45
10	56.62	50.28	58,221.44	1,157.94

BLOCK	TOTAL AREA (ha)	PLANTABLE AREA (ha)	TERRACE LENGTH (m)	TERRACE DENSITY (m/ha)
11	55.32	49.50	48,227.76	974.30
12	52.3	44.59	9,981.30	223.85
13	54.71	43.36	47,653.02	1,099.01
14	58.51	50.15	62,619.45	1,248.64
15	59.01	47.04	48,227.21	1,025.24
16	51.92	46.64	19,617.57	420.62
17	57.36	51.70	29,832.04	577.02
18	54.22	48.34	8,408.05	173.94
19	51.87	48.07	33,037.81	687.29
20	51.35	40.87	35,546.06	869.73
21	49.99	45.69	22,485.43	492.13
22	54.42	52.67	6,095.67	115.73
23	54.21	51.49	18,357.73	356.53
24	54.50	47.70	51,648.50	1,082.78
25	51.37	39.69	24,963.04	628.95
26	53.72	48.73	35,385.24	726.15
27	56.95	46.92	36,998.73	788.55
28	61.84	35.19	43,748.87	1,243.22
29	52.19	42.71	15,997.67	374.56
30	50.57	44.01	29,251.30	664.65

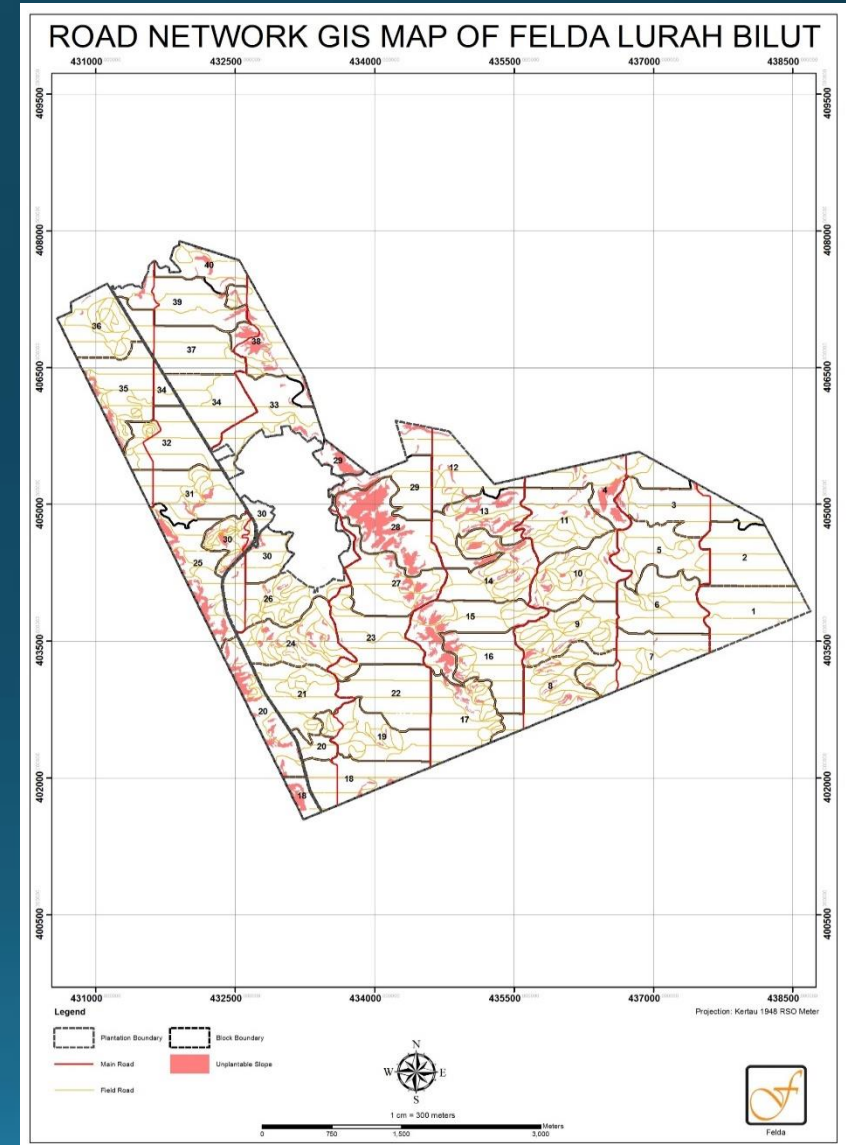
BLOCK	TOTAL AREA (ha)	PLANTABLE AREA (ha)	TERRACE LENGTH (m)	TERRACE DENSITY (m/ha)
31	53.16	47.96	19,039.76	396.99
32	50.41	47.78	8,812.01	184.43
33	53.95	49.20	13,972.83	284.00
34	53.18	51.24	2,455.54	47.92
35	54.6	47.89	15,706.59	327.97
36	46.95	44.04	20,903.55	474.65
37	54.56	52.57	5,353.77	101.84
38	49.12	37.27	27,231.68	730.66
39	54.77	50.39	20,510.87	407.04
40	29.41	24.06	11,467.14	476.61
TOTAL	2,135.34	1,878.17	1,118,943.28	595.76



Road Network Analysis (Map)



Road Network Map with Terrain View for FELDA Lurah Bilut



Road Network Map of FELDA Lurah Bilut (GIS Map)

Road Network Analysis (Attribute Table)

Table of Total Road Network Statistics of FELDA Lurah Bilut

TOTAL AREA (ha)	ROAD LENGTH			TOTAL ROAD DENSITY (m/ha)
	MAJOR ROAD (m)	FIELD ROAD (m)	TOTAL ROAD LENGTH (m)	
2,135.34	25,311.58	197,375.21	222,686.79	104.29

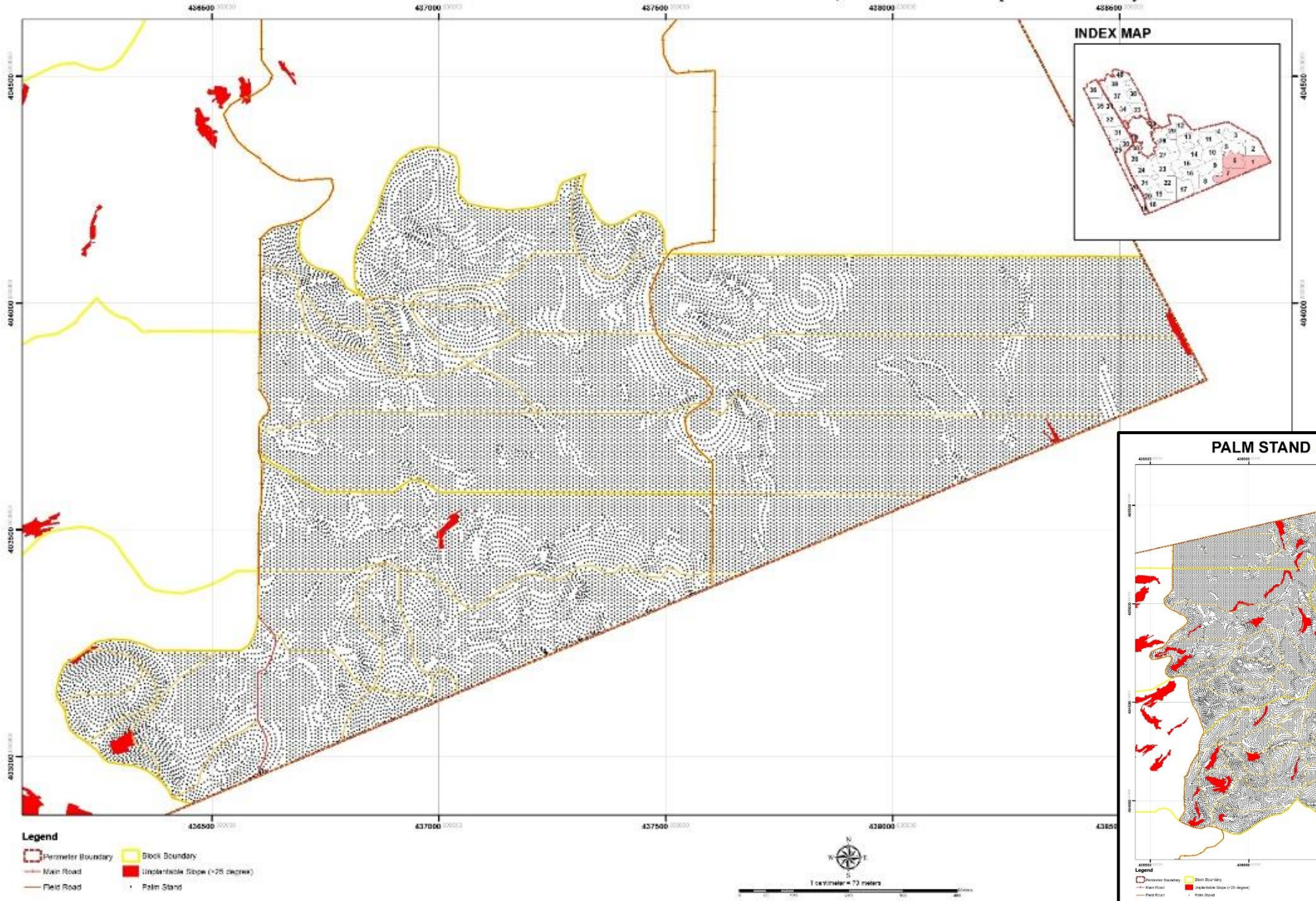
- This Estate is facilitated with main road and field road.
- Total length of this Estate roads is **222,686.79** m.
- The total road density of about **104.29** m per ha.

BLOCK	AREA (ha)	ROAD LENGTH			ROAD AS BLOCK BOUNDARY		ROAD DENSITY (m/ha)
		MAJOR ROAD (m)	FIELD ROAD (m)	TOTAL ROAD LENGTH (m)	MAJOR ROAD (m)	FIELD ROAD (m)	
1	56.24	-	2,580.71	2,580.71	18,908.58	41,708.67	45.89
2	54.07	0.73	2,424.08	2,424.81			44.85
3	54.97	510.88	2,418.27	2,929.15			53.29
4	55.68	247.51	2,380.24	2,627.75			47.19
5	51.62	1.69	3,720.53	3,722.22			72.11
6	56.76	-	4,196.27	4,196.27			73.93
7	54.30	394.12	3,662.47	4,056.59			74.71
8	55.25	165.45	6,021.19	6,186.64			111.98
9	53.39	-	7,898.15	7,898.15			147.93
10	56.62	-	7,240.08	7,240.08			127.87
11	55.32	-	4,711.15	4,711.15			85.16
12	52.30	301.82	3,190.84	3,492.66			66.78
13	54.71	-	3,700.90	3,700.90			67.65
14	58.51	-	6,604.69	6,604.69			112.88
15	59.01	-	3,124.71	3,124.71			52.95
16	51.92	-	3,088.07	3,088.07			59.48
17	57.36	-	6,106.90	6,106.90			106.47
18	54.22	491.77	2,187.27	2,679.04			49.41
19	51.87	452.96	5,227.76	5,680.72			109.52
20	51.35	-	2,860.33	2,860.33			55.70

BLOCK	AREA (ha)	ROAD LENGTH			ROAD AS BLOCK BOUNDARY		ROAD DENSITY (m/ha)
		MAJOR ROAD (m)	FIELD ROAD (m)	TOTAL ROAD LENGTH (m)	MAJOR ROAD (m)	FIELD ROAD (m)	
21	49.99	-	4,749.91	4,749.91	18,908.58	41,708.67	95.02
22	54.42	-	2,010.14	2,010.14			36.94
23	54.21	-	3,406.81	3,406.81			62.84
24	54.50	-	7,280.85	7,280.85			133.59
25	51.37	-	3,080.02	3,080.02			59.96
26	53.72	506.39	6,729.42	7,235.81			134.69
27	56.95	-	3,428.67	3,428.67			60.20
28	61.84	-	341.36	341.36			5.52
29	52.19	97.51	1,213.81	1,311.32			25.13
30	50.57	646.89	5,872.10	6,518.99			128.91
31	53.16	440.94	4,441.76	4,882.70			91.85
32	50.41	708.43	3,671.37	4,379.80			86.88
33	53.95	-	3,377.64	3,377.64			62.61
34	53.18	-	2,718.70	2,718.70			51.12
35	54.60	-	5,554.16	5,554.16			101.72
36	46.95	-	5,521.17	5,521.17			117.60
37	54.56	346.40	2,379.92	2,726.32			49.97
38	49.12	663.16	2,911.88	3,575.04			72.78
39	54.77	426.35	1,993.77	2,420.12			44.19
40	29.41	-	1,638.47	1,638.47			55.71
TOTAL	2,135.34	6,403.00	155,666.54	162,069.54	18,908.58	41,708.67	-

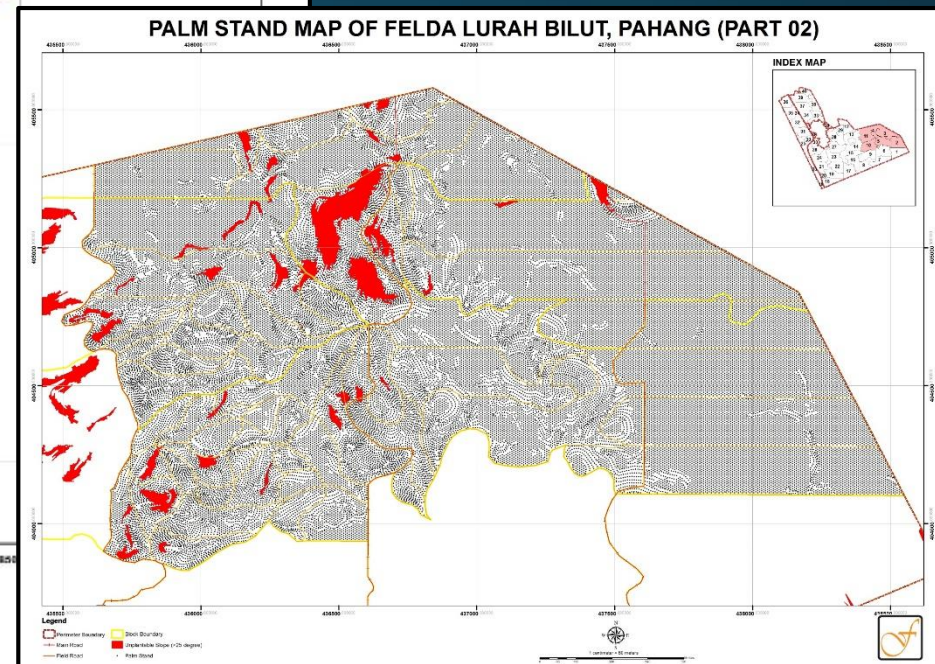
Table of Road Network Statistics of FELDA Lurah Bilut by Blocks

PALM STAND MAP OF FELDA LURAH BILUT, PAHANG (PART 01)



Replanting Point Analysis (Maps)

PALM STAND MAP OF FELDA LURAH BILUT, PAHANG (PART 02)



Example of Replanting Point Map (part 1 & 2)

Replanting Point Analysis (Attribute Table)

- The estimation planting numbers of palm trees were calculated based on total plantable area by slope class.
- Density of the oil palm tree is around **144 trees** per hectare,
- Total number of oil palm tree is **270,920**.

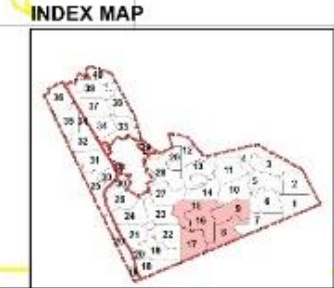
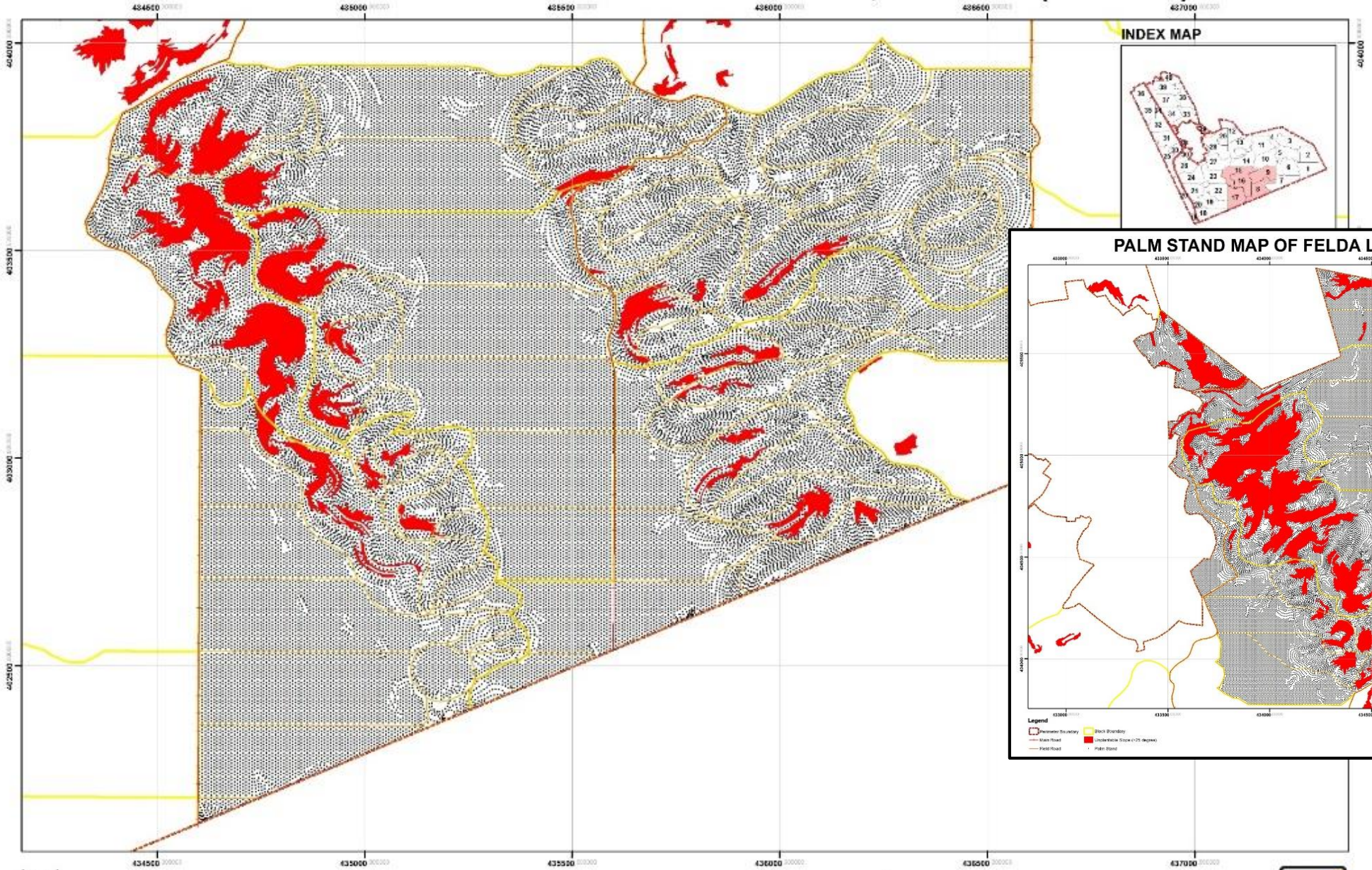
Table of Replanting Point of FELDA Lurah Bilut by Blocks

BLOCK	TOTAL AREA (ha)	PLANTABLE AREA (ha)			TOTAL NO. OF ESTIMATION			
		SLOPE (0 - 6)	SLOPE (7 - 25)	TOTAL PLANTABLE AREA (ha)	FLAT AREA	TERRACE AREA	TOTAL	PALM DENSITY (palm/ha)
1	56.24	42.17	11.04	53.21	6,241	1,523	7,764	146
2	54.07	47.66	2.84	50.49	7,053	392	7,445	147
3	54.97	38.76	12.04	50.79	5,736	1,661	7,397	146
4	55.68	27.22	17.56	44.78	4,029	2,423	6,451	144
5	51.62	19.99	28.78	48.77	2,959	3,971	6,930	142
6	56.76	32.17	21.77	53.94	4,761	3,004	7,765	144
7	54.30	23.82	27.65	51.47	3,525	3,816	7,340	143
8	55.25	20.92	28.68	49.60	3,096	3,958	7,054	142
9	53.39	11.99	35.47	47.46	1,775	4,894	6,669	141
10	56.62	13.54	36.74	50.28	2,004	5,070	7,074	141
11	55.32	20.34	29.18	49.52	3,010	4,027	7,037	142
12	52.30	37.85	6.85	44.70	5,602	945	6,547	146
13	54.71	16.41	26.94	43.35	2,429	3,718	6,147	142
14	58.51	15.84	34.31	50.14	2,344	4,735	7,078	141
15	59.01	18.92	28.12	47.04	2,800	3,881	6,681	142
16	51.92	34.67	11.98	46.64	5,131	1,653	6,783	145
17	57.36	34.72	16.97	51.69	5,139	2,341	7,480	145
18	54.22	42.23	6.11	48.34	6,250	843	7,093	147
19	51.87	24.57	23.50	48.07	3,636	3,243	6,880	143
20	51.35	18.34	22.53	40.86	2,714	3,109	5,823	142

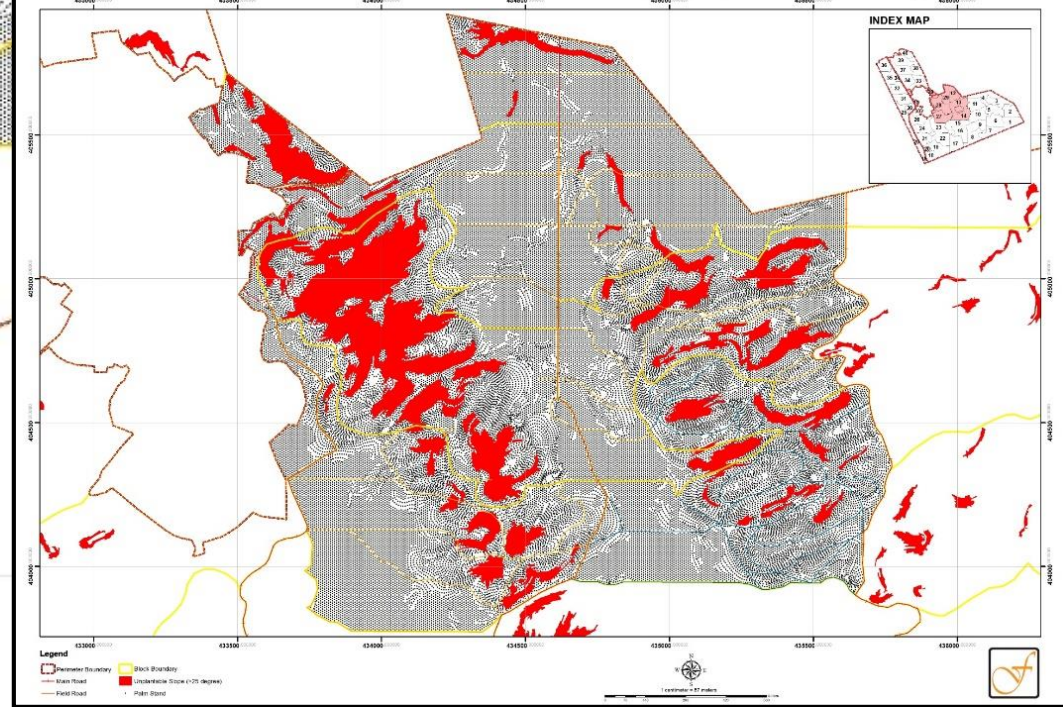
BLOCK	TOTAL AREA (ha)	UNPLANTABLE AREA (ha)			TOTAL NO. OF ESTIMATION			
		SLOPE (0 - 6)	SLOPE (7 - 25)	TOTAL PLANTABLE AREA (ha)	FLAT AREA	TERRACE AREA	TOTAL	PALM DENSITY (palm/ha)
21	49.99	30.73	14.96	45.69	4,548	2,065	6,613	145
22	54.42	47.44	5.23	52.67	7,021	722	7,743	147
23	54.21	37.17	14.33	51.49	5,501	1,977	7,478	145
24	54.50	15.66	32.04	47.70	2,318	4,421	6,740	141
25	51.37	24.41	15.28	39.69	3,613	2,108	5,721	144
26	53.72	27.13	21.59	48.73	4,016	2,980	6,996	144
27	56.95	23.66	23.26	46.92	3,502	3,209	6,712	143
28	61.84	7.97	27.21	35.19	1,180	3,755	4,935	140
29	52.19	31.44	11.45	42.89	4,653	1,580	6,233	145
30	50.57	26.77	17.25	44.02	3,952	2,380	6,332	144
31	53.16	34.99	12.99	47.98	5,178	1,792	6,971	145
32	50.41	41.42	6.36	47.78	6,130	877	7,007	147
33	53.95	38.94	10.31	49.25	5,763	1,423	7,186	146
34	53.18	48.88	2.36	51.24	7,235	326	7,561	148
35	54.60	38.41	9.48	47.89	5,685	1,308	6,992	146
36	46.95	28.07	15.98	44.05	4,154	2,206	6,360	144
37	54.56	47.71	4.86	52.57	7,061	671	7,732	147
38	49.12	21.46	15.83	37.30	3,177	2,185	5,362	144
39	54.77	35.56	14.84	50.40	5,263	2,048	7,311	145
40	29.41	16.36	7.73	24.09	2,422	1,066	3,488	145
TOTAL	2,135.34	1,166.30	712.38	1,878.67	172,612	98,308	270,920	144

*Density of palm estimation for each hectare is 148 for flat area and 138 for terrace area

PALM STAND MAP OF FELDA LURAH BILUT, PAHANG (PART 03)



PALM STAND MAP OF FELDA LURAH BILUT, PAHANG (PART 04)



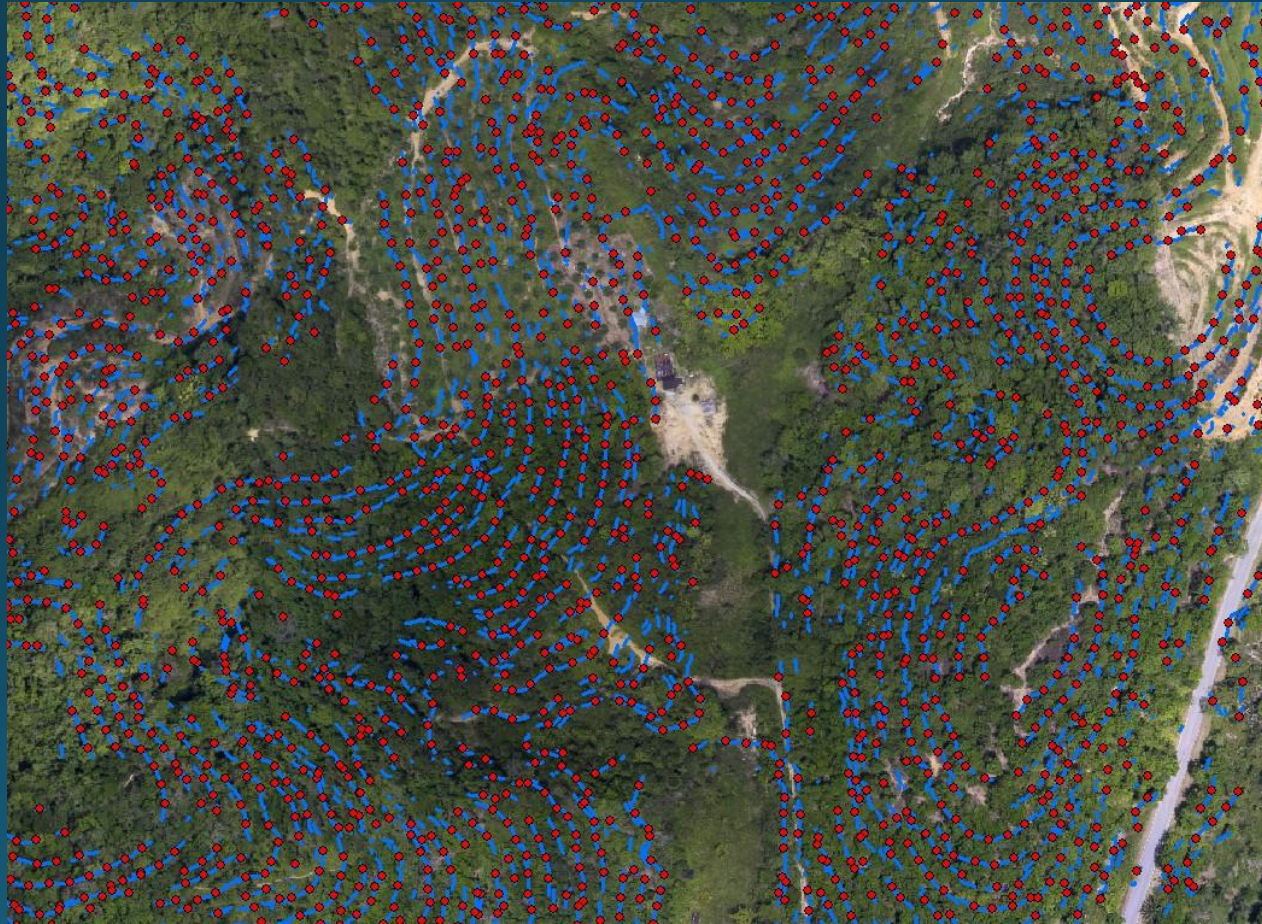
Example of Replanting Point Map (part 1 & 2)

Agriculture road design



Information from DEM and contour enable user to design agricultural road design for oil palm plantation

Designed terrace & Tree point



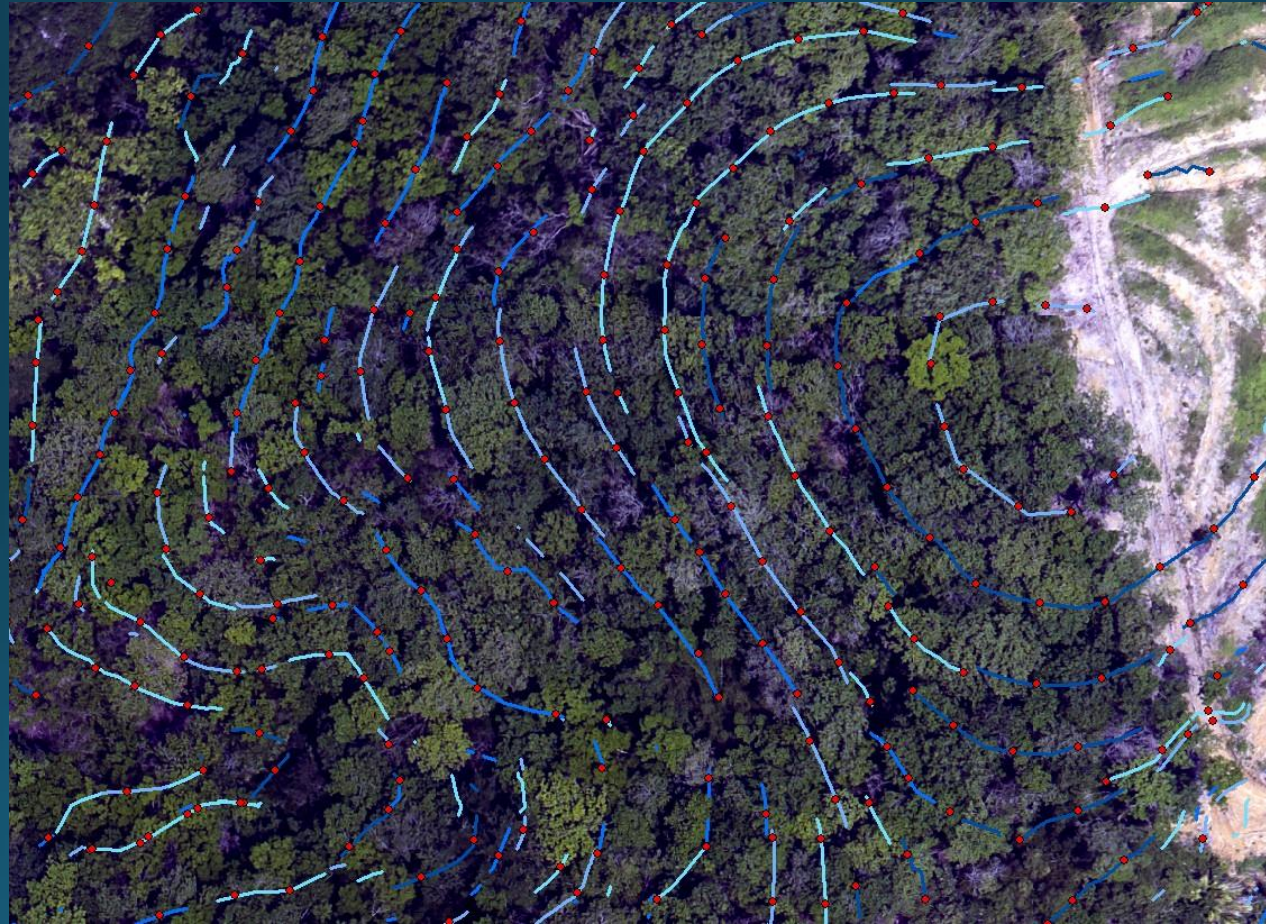
Part of Felda Gunung Bongsu – forested area

Designed terrace & Tree point



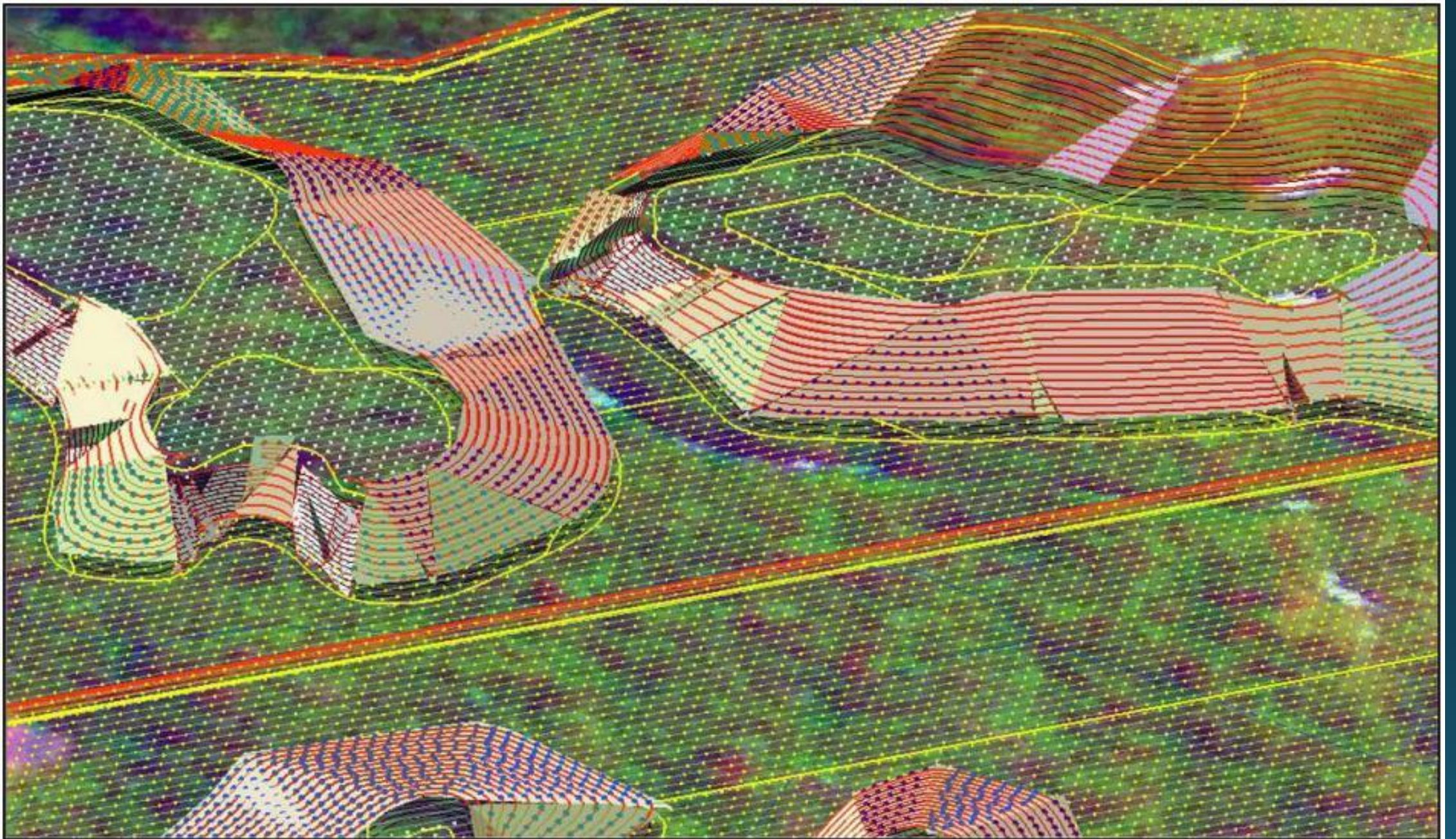
Part of Felda Gunung Bongsu – forested area

Designed terrace & Tree point



Part of Felda Gunung Bongsu – forested area

Replanting Point



Conclusion

- Replanting Program : terrace design for oil palms tree is depend on **slope degree**.
- Maximum slope degree for oil palm terrace design is **25°**
- Slope more than **25°** must be evaluate through ground verification before gazetted as plantable or unplantable area
- Each replanting points have a coordinate for replanting procedure
- Combination between **Remote Sensing & GIS software** can produce a better of replanting program and replanting point analysis.

BENEFITS:

- Estimation numbers of trees to be planted can be automatically calculated
- Location of trees to be planted can be accurately identified
- Inventory of rubber tree to be planted at the planted area will be done throughout the whole area i.e. 100% coverage
- Save time – in re-planting planning
- Save cost
- Save energy (labour)
- Accurate and reliable results



Thank You

About Us

Goal

One stop center Project in LiDAR technology.

Experiences

15 years professional in land management & consultation services

Clients

Tenaga Nasional Bhd, MMC Gamuda JV, Balfor Beatty Ansaldo JV and PETRONAS, FELDA.

Vision

To be the most advanced geomatics solutions provide in the world using technology and knowledge provided by malaysian

MISSION

To provide our clients with most advanced and cost effective geomatics solutions to increase the productivity of their industry



Our Teams



Competence and well trained staff



Platform and Equipment

PLATFORM



EQUIPMENTS



LITEMAPPER 6800-400

Activities

Joint Technical Agreement in Germany

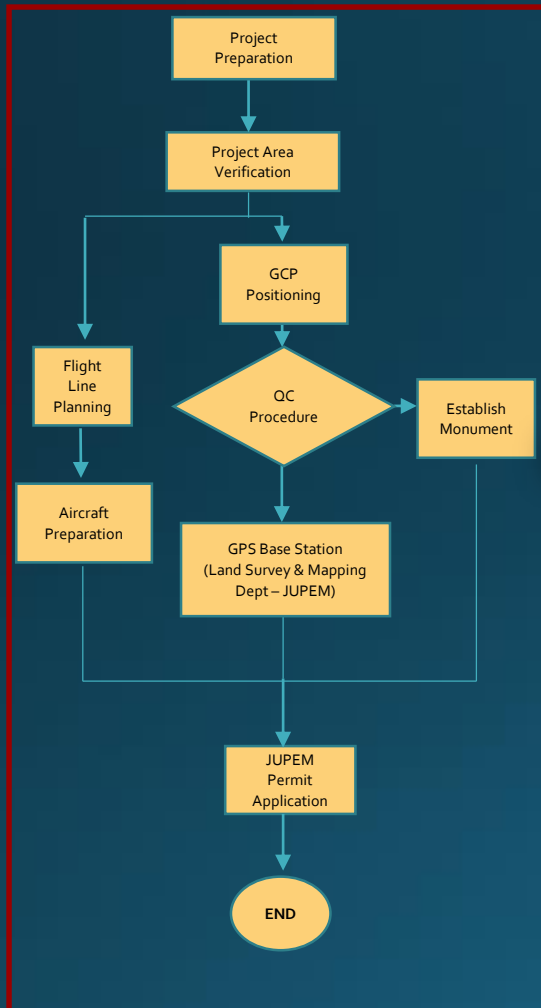


Domestic Joint Technical Programme

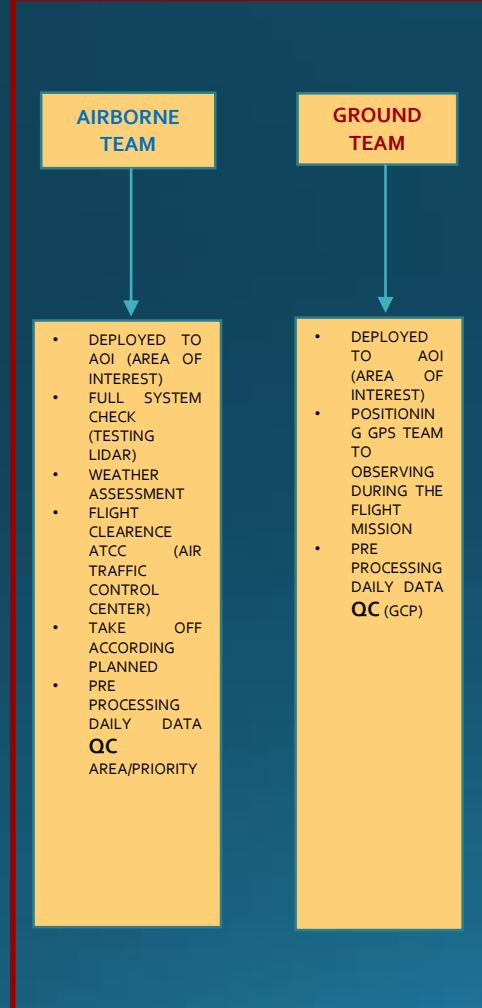


PROJECT WORKFLOW

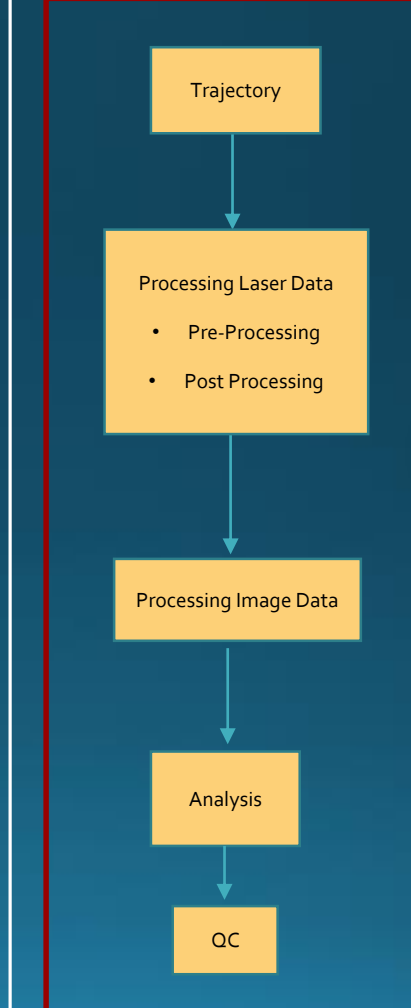
PROJECT PREPARATION



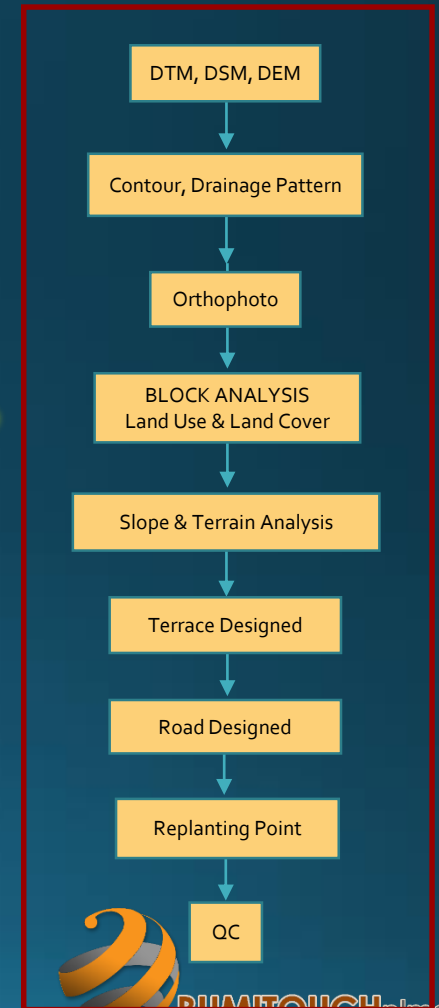
DATA ACQUISITION



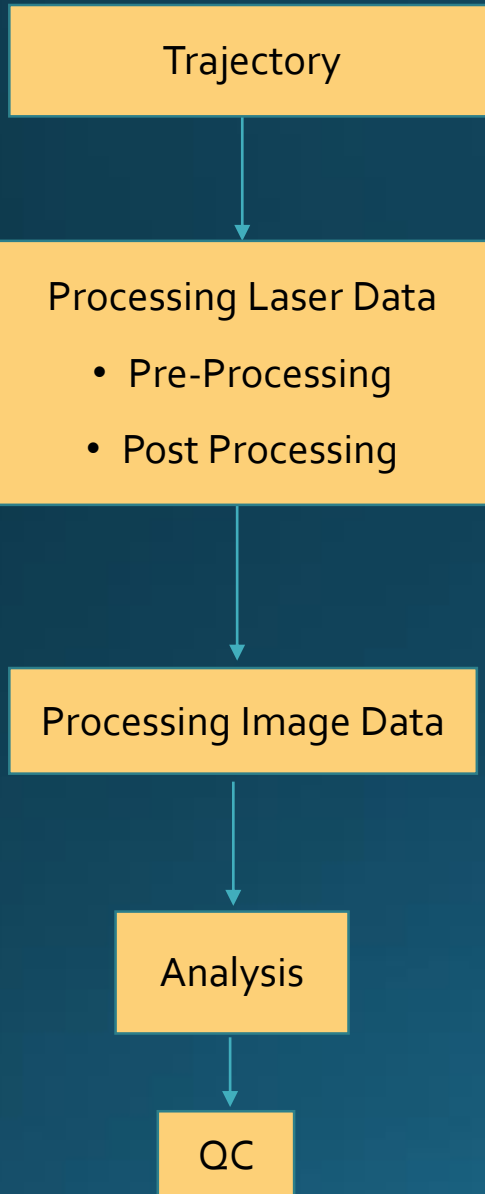
DATA PROCESSING



GEO SPATIAL DATA



DATA PROCESSING



GEO SPATIAL DATA

