



## DEVELOPMENT OF MULTI – PURPOSE CADASTRE IN SABAH

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Deputy Director  
Lands and Surveys Department  
Sabah, Malaysia



### PRESENTATION OUTLINE

1. Definition of MPC
2. LSD multi-purpose cadastre model
3. Sabah Cadastral Map – Mobile Apps
4. Pre-defined Geospatial Analysis
5. Land Parcel integrated with various land information
6. Topography & man-made Features
7. 3D city model
8. Seamless Land Parcel on 3D model
9. Parcel profile
10. 3D Cadastre for Strata Title
11. Conclusion



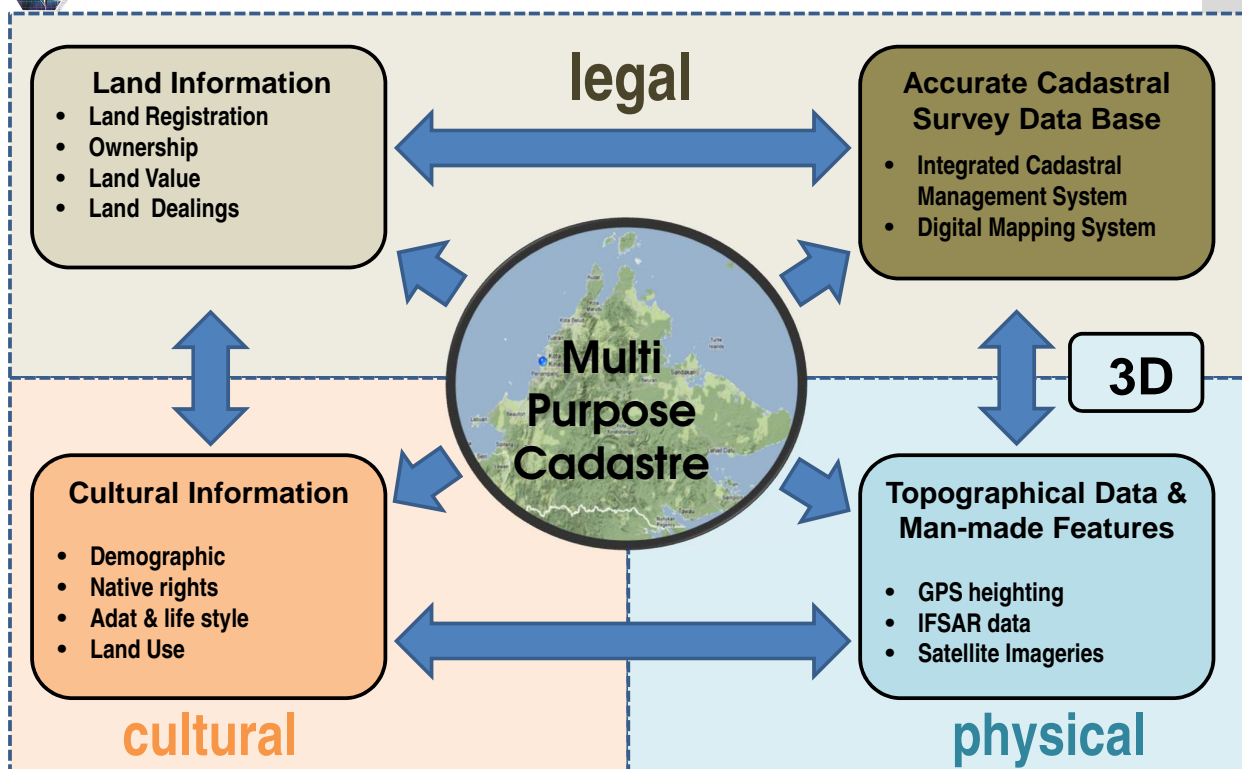
## DEFINITION OF MULTI PURPOSE CADASTRE

Multi purpose cadastre defined as an **integrated land information system** containing **legal** (e.g., property ownership or cadastre), **physical** (e.g., topography, man-made features), and **cultural** (e.g., land use, demographics) information in **a common and accurate reference framework**.

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## LSD MULTI-PURPOSE CADASTRE MODEL



3



# SABAH DIGITAL CADASTRAL DATA BASE (DCDB)

1

Access via Mobile Device (Smartphone, iPad, iPod, tab, note) - Cloud Computing Esri ArcGIS.

ArcGIS app for iOS

ArcGIS app for Android



App Store

Search for ArcGIS



Play Store



ArcGIS

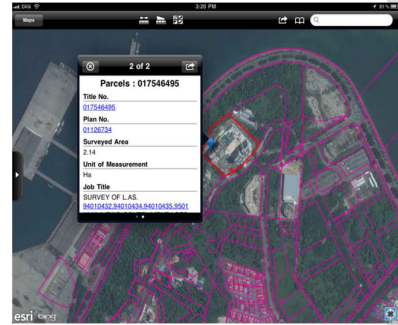
Download and Install ArcGIS



ArcGIS

- Click ArcGIS icon
- Search JTUWMA(beta)
- zoom Bing image

Register and open an Esri Global Account ( free ) with Esri ArcGIS Online at : <https://webcatalog.esri.com/CAS/index.cfm?func=Registration.ShowForm>



2

Access via **Alfresco** and **GoogleEarth**

<http://218.111.213.197:8080/share/page>



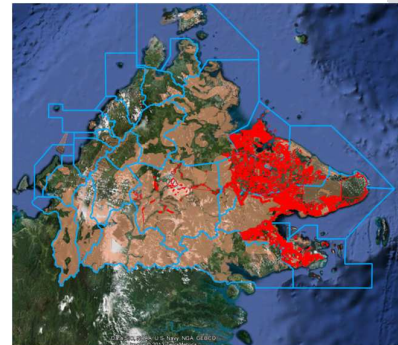
User Name:

safaruntong

Password:

[Empty password field]

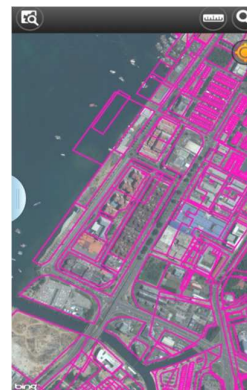
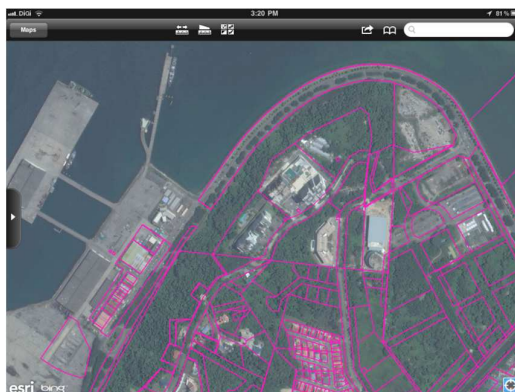
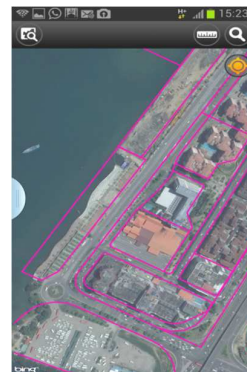
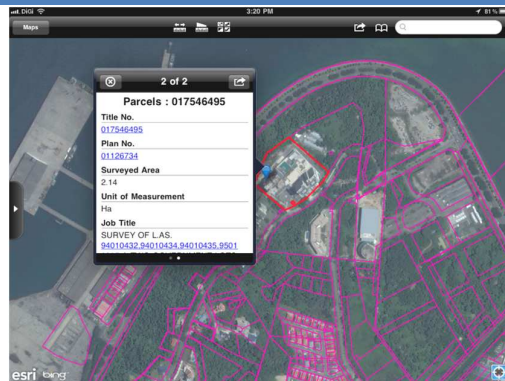
Login



4



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5

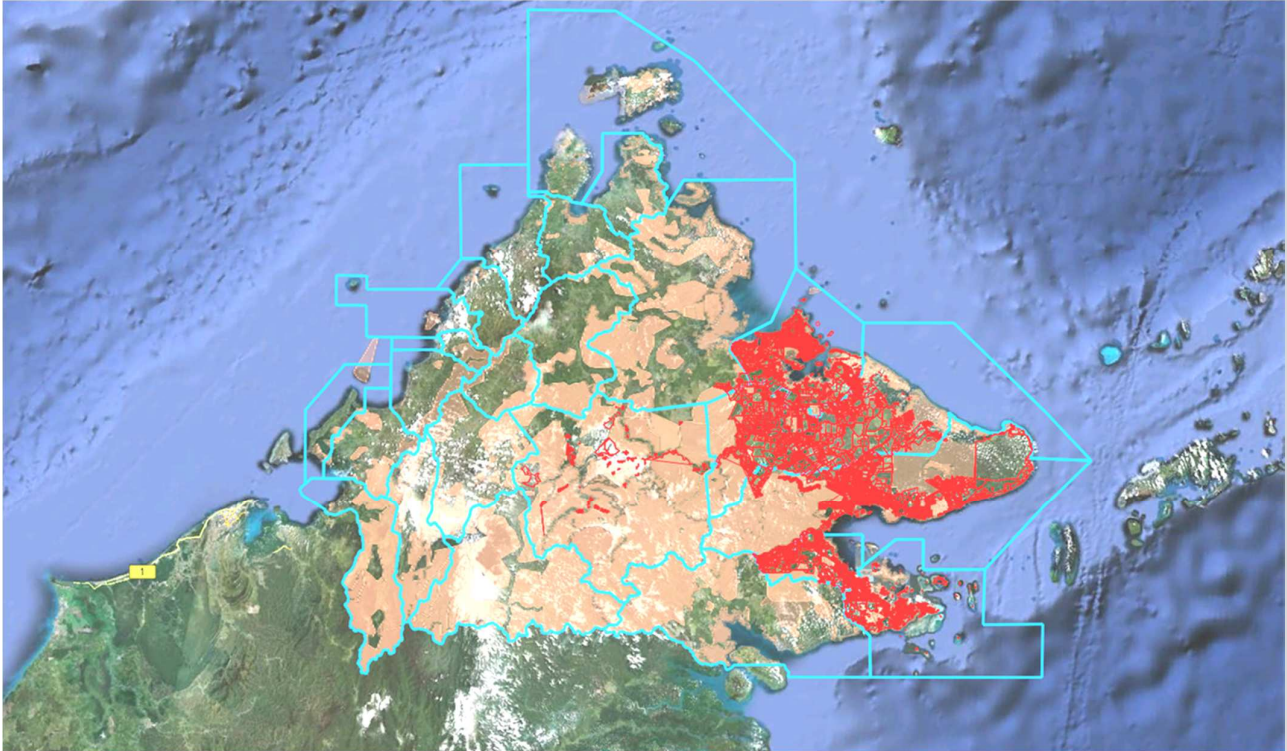


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## SEAMLESS 2D DIGITAL CADASTRAL DATA BASE



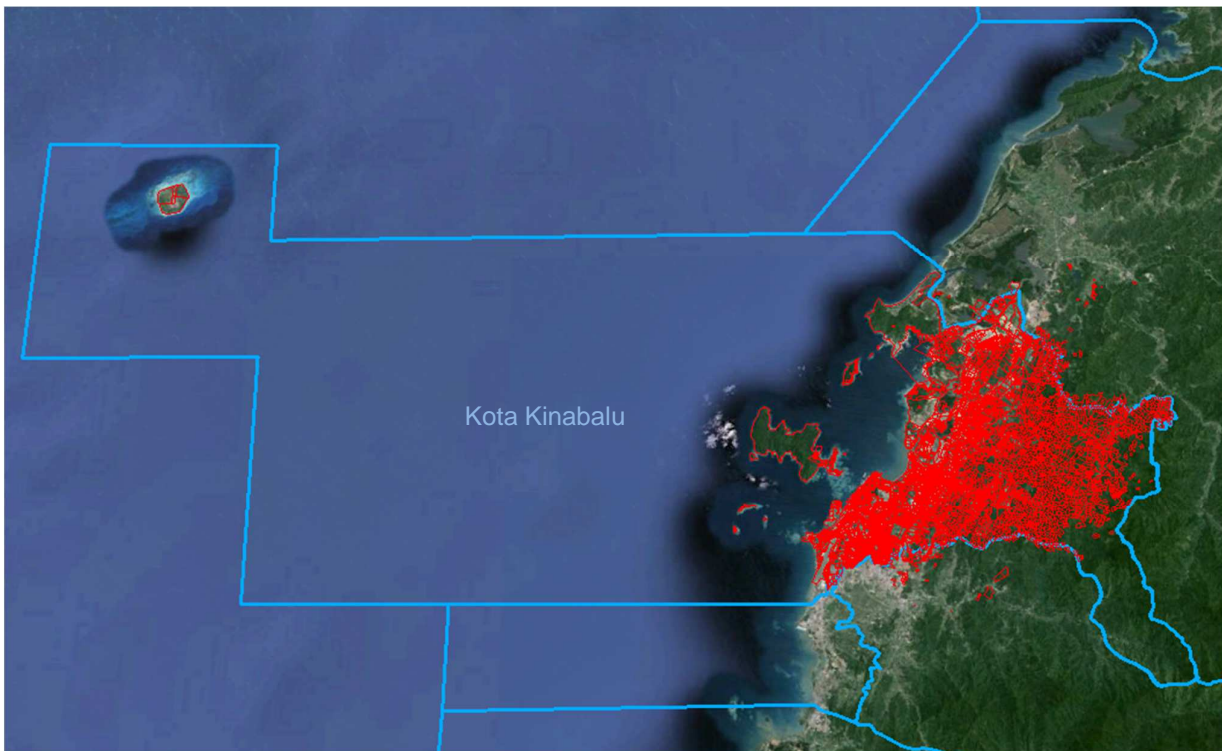
6



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## DISTRICT OF KOTA KINABALU



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# KOTA KINABALU CITY



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# Pre-defined Geospatial Analysis

The screenshot displays the GeoDiscovery SE web application interface. The main map area shows a detailed view of land parcels in Kota Kinabalu, with various colors representing different land titles and statuses. A legend on the right side of the map lists various land titles and analysis tools, including:

- Reverted Title
- Transferred Title
- Partially Acquired Title
- Canceled Title
- Full Acquired Title
- Expired Title
- Extended Title
- Surrendered Title
- Registered Title
- Draft Title
- By Term Year
- Land expiring in years
- Land Declared Value
- Current dues collectable f
- Quit Rent Defaulters
- Landparcels
- Buffer Zone
- Basemap
- Imagery
- Orthophoto
- QuickBird
- Satellite
- SPOT
- IRSAR
- Map Index

The interface also includes a scale bar (Scale 1: 25454) and a search bar. The browser address bar shows the URL: <http://www.salis.sabah.gov.my/geoDiscoverySE/franasetup.asp>. The browser title is "SALIS - GeoDiscovery SE".

9

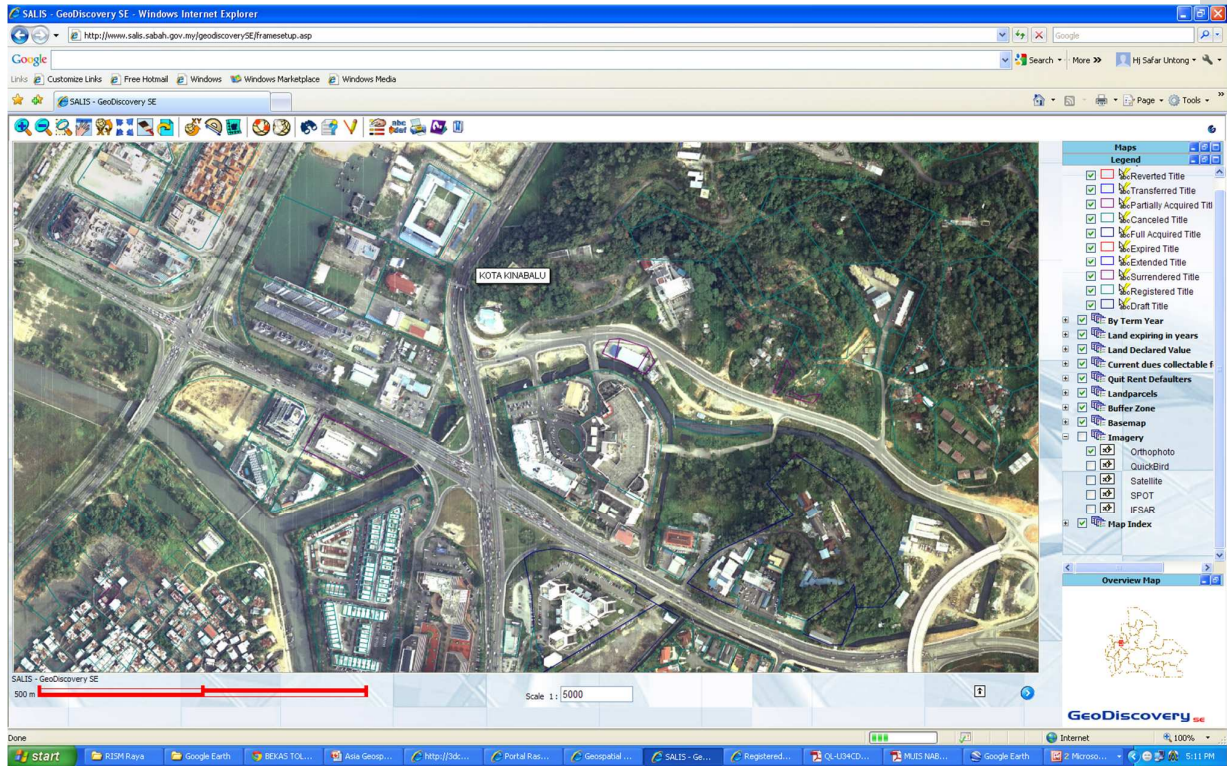


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# Pre-defined Geospatial Analysis



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# Land Parcel integrated with Owner Information

**SALIS GeoCadastre**

Home Services

Master Info Owner Info Map Survey Plan Dealings Info

**Land Title Search System**

- Title Number
- Plan Number
- Standard Sheet Number
- Location
- Identification Number
- Ownership Name

017544884 Search

Result: Total Record(s) found : 1

No	Title No.	
1	017544884	View

**Land Title Owner Information**

Land Title Number: 017544884  
Number of Owner(s): 1

**List of Owners**

No	Owners	Share
1	EASTWORTH SOURCE SDN BHD	0.99999

**EASTWORTH SOURCE SDN BHD**

1	SEQUENCE NUMBER	950240816
2	OCCUPATION	--
3	NAME	EASTWORTH SOURCE SDN BHD
4	OLD IC	--
5	NEW IC	--
6	OTHER IC	--
7	GENDER	Tiada - Untuk Persatuan / Kesatuan / Syarikat
8	DATE OF BIRTH	--
9	RACE	--
10	HOME ADDRESS (1)	--
11	HOME ADDRESS (2)	--
12	HOME ADDRESS (3)	--
13	HOME ADDRESS (4)	--
14	POST ADDRESS 1	PPHT KOTA KINABALU
15	POST ADDRESS 2	--
16	POST ADDRESS 3	--
17	POST ADDRESS 4	--
18	INDUSTRY	--
19	STATUS	Y
20	TELEPHONE	--
21	CITIZEN TYPE	--
22	TELEPHONE (2)	--
23	FAX	--
24	GIVEN TITLE	--
25	OLD SEQUENCE NUMBER	--
26	NEW SEQUENCE NUMBER	--
27	MARITAL STATUS	--

Spouse Info

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# Land Parcel integrated with Title info & Survey Info

**SALIS GeoCadastrre**

Home Services

Master Info Owner Info Map Survey Plan Dealings Info

**Land Title Search System**

- Title Number
- Plan Number
- Standard Sheet Number
- Location
- Identification Number
- Ownership Name

017544884 Search

Result. Total Record(s) found : 1

No	Title No.	View
1	017544884	<a href="#">View</a>

**Title Information**

Land Title Number	017544884
Title Code	Registered Title
Title Status	Active Titles
LS File Ref	L.S.102.1.438
MNR Ref	316/2/30/100
Standard Sheet No	67JB41
Location	SEMBULAN
Area	4.567
Unit of Measurement	Hectare
District	Kota Kinabalu
Survey Plan No	01126678

**Survey Information**

UPI Number	017544884
LA Number	93010261
Grid Type	M
Grid Number	67-JB-41
Survey Reference	
SP RSP Number	
Survey Plan Number	01126678
Surveyor Name	
Survey Date	4.567
Survey Approved Date	
District Surveyor	
PPHT Reference	
Former Title	
Remark	

Survey Information Record(s) found: 1

First previous next Last

**Premium** RM 1,980,000.00

**Rent Information**

Year	1996	1999	--	--
Rent	RM 46,900.00	RM 54,285.00	RM 0.00	0.00

**Enhance Rent Information**

Enhance Rent	Year Start	Year End	Amount
1	0	0	0.000
2	0	0	0.000
3	0	0	0.000
4	--	--	--

**Quit Rent Information**

Accumulated Quit Rent Until:31-12-2011  
 Accumulated Quit Rent: RM 847405.00  
 Current Year:2012  
 Current Quit Rent: RM 54285.00  
 Total Quit Rent: RM 901690.00  
 Payment Until:31-12-2011  
 Total Payment: RM 738835.00  
 Arrears: RM 162855.00

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# Land Parcel integrated with Title info & Survey Info

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No	Title No.	View
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**Rent Information**

Year	1996	1999	--	--
Rent	RM 46,900.00	RM 54,285.00	RM 0.00	0.00

**Enhance Rent Information**

Enhance Rent	Year Start	Year End	Amount
1	0	0	0.000
2	0	0	0.000
3	0	0	0.000
4	--	--	--

**Quit Rent Information**

Accumulated Quit Rent Until:31-12-2011  
 Accumulated Quit Rent: RM 847405.00  
 Current Year:2012  
 Current Quit Rent: RM 54285.00  
 Total Quit Rent: RM 901690.00  
 Payment Until:31-12-2011  
 Total Payment: RM 738835.00  
 Arrears: RM 162855.00

1. Receipt Number:14598563  
Receipt Date:02-12-1995  
Receipt Amount:1000.00

2. Receipt Number:14738551  
Receipt Date:14-06-1996  
Receipt Amount:46900.00

3. Receipt Number:14948133  
Receipt Date:20-05-1997  
Receipt Amount:46900.00

4. Receipt Number:15133760  
Receipt Date:28-05-1998  
Receipt Amount:46900.00

5. Receipt Number:15362993  
Receipt Date:27-07-1999  
Receipt Amount:54285.00

6. Receipt Number:01200202000826  
Receipt Date:06-02-2002  
Receipt Amount:162855.00

7. Receipt Number:01200311000757  
Receipt Date:10-11-2003  
Receipt Amount:54285.00

8. Receipt Number:01200603500357  
Receipt Date:10-03-2006  
Receipt Amount:54285.00

9. Receipt Number:01200605000912  
Receipt Date:10-05-2006  
Receipt Amount:54285.00

10. Receipt Number:01200608002618  
Receipt Date:30-08-2006  
Receipt Amount:54285.00

11. Receipt Number:01200705001410  
Receipt Date:16-05-2007  
Receipt Amount:54285.00

12. Receipt Number:01200908000617  
Receipt Date:07-08-2009  
Receipt Amount:54285.00

13. Receipt Number:01201101000506  
Receipt Date:05-01-2011  
Receipt Amount:54285.00

Total Receipts: 13  
Total Receipt Amount: RM 738835.00

\* Source:  
<http://www.quitrent.jtu.sabah.gov.my>

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# Land Parcel integrated with Title info & Survey Info

**SALIS GeoCadastrre**

Home | Services

Master Info | Owner Info | Map | Survey Plan | Dealings Info

**Land Title Search System**

- Title Number
- Plan Number
- Standard Sheet Number
- Location
- Identification Number
- Ownership Name

017544884 Search

Result: Total Record(s) found : 1

No	Title No.	View
1	017544884	View

Memo Number	Date Made	Date Registered	Memo Description
10366244	1999/10/06	1999/11/11	CAVEAT
10424397	2003/03/24	2004/01/14	MEMORANDUM OF AMENDMENT
10401051	2002/03/06	2002/05/06	WITHDRAWAL OF CAVEAT OR COLLECTORS CAVEAT
10320897	1996/05/10	1996/05/11	SATISFACTION OF CHARGE OR DISCHARGE OF CHARGE
10349613	1998/05/22	1998/06/02	SATISFACTION OF CHARGE OR DISCHARGE OF CHARGE
10399527	2002/02/08	2002/04/02	SATISFACTION OF CHARGE OR DISCHARGE OF CHARGE
10293903	1994/04/08	1994/04/23	MEMORANDUM OF CHARGE
10330126	1996/12/19	1996/12/31	MEMORANDUM OF CHARGE
10328915	1996/11/27	1996/11/30	MEMORANDUM OF CHARGE
10397687	2002/01/28	2002/02/09	MEMORANDUM OF CHARGE
10397688	2002/01/02	2002/02/09	MEMORANDUM OF CHARGE
10397689	2002/01/28	2002/02/09	MEMORANDUM OF CHARGE

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# Land Parcel showing Quit Rent Defaulters

SALIS - GeoDiscovery SE - Windows Internet Explorer

http://www.salis.sabah.gov.my/geodiscoverySE/fr/amesetup.asp

SALIS - GeoDiscovery SE

Standard Sheet No. 67-JB

Scale 1:12788

GeoDiscovery SE

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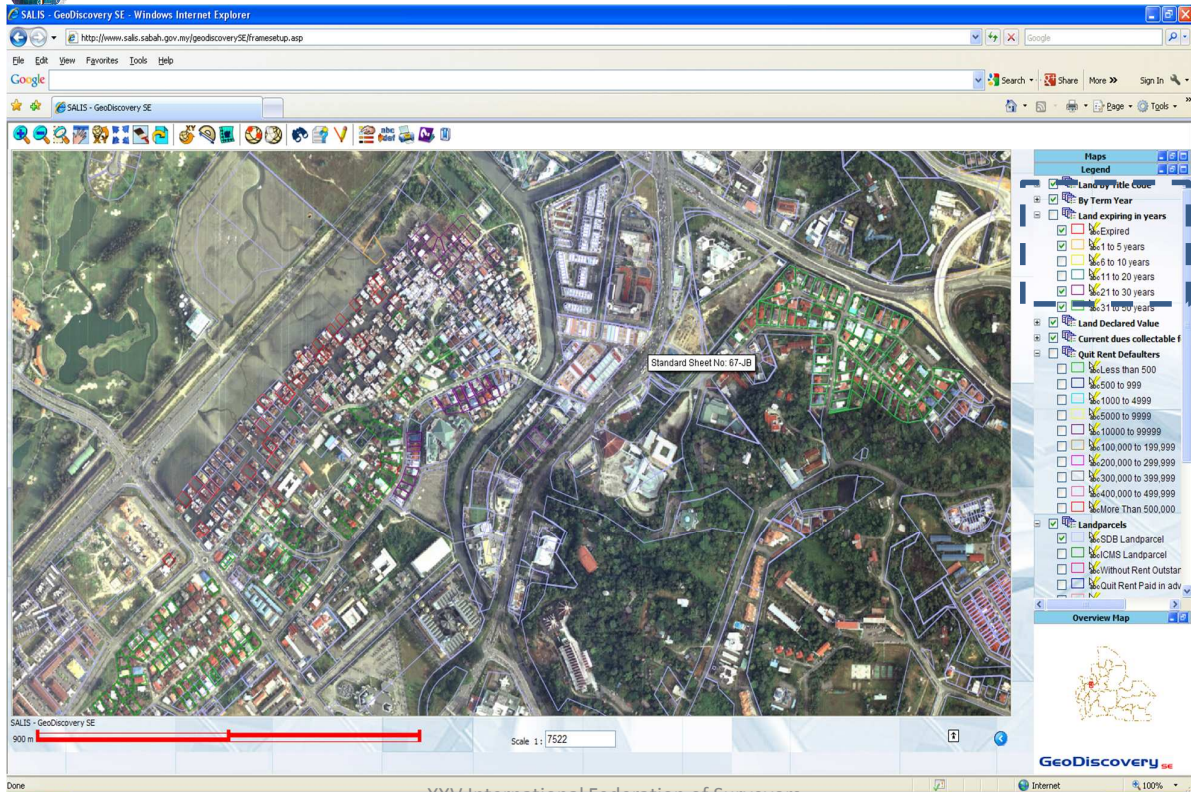


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# Land Parcel showing Lease Expiring in years



16



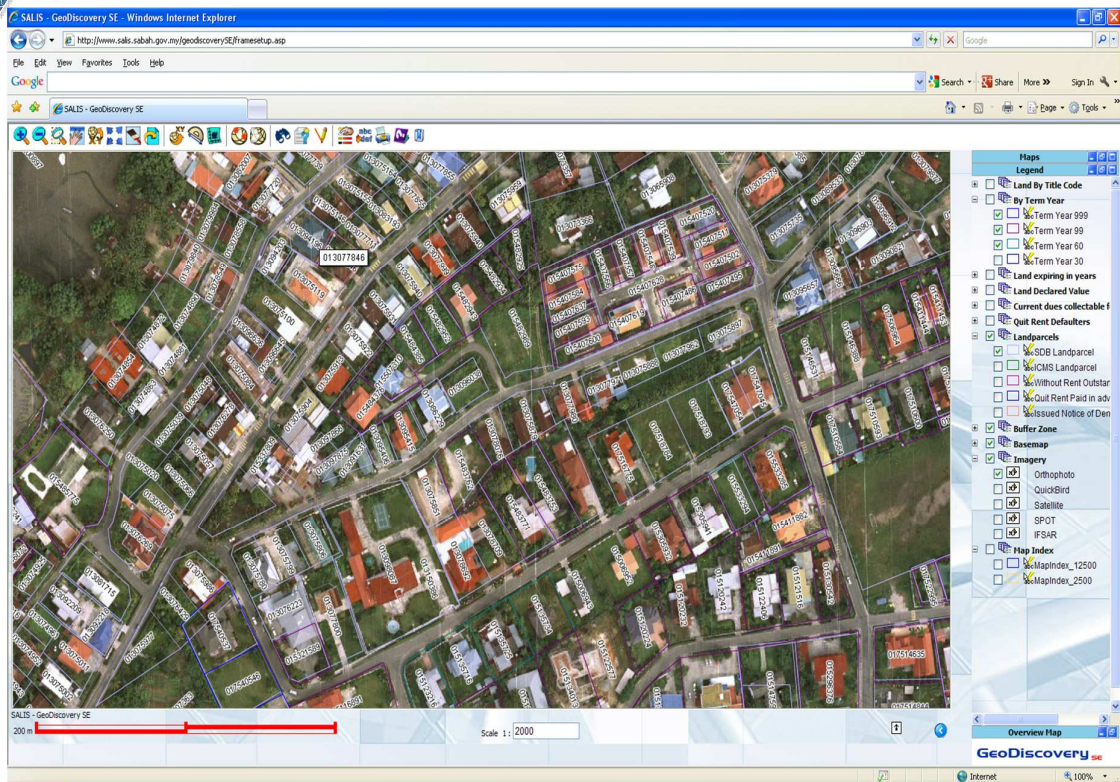
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# Land Parcel showing Lease Period in years



17



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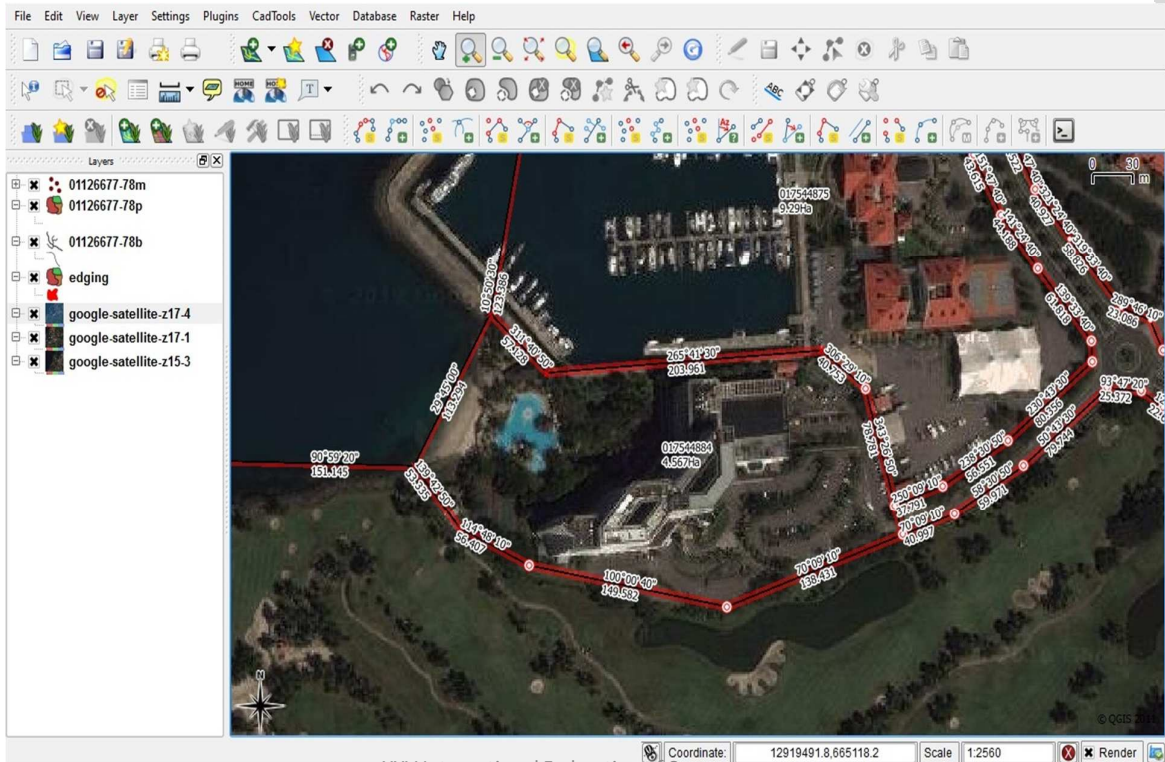


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# Retrieving Bearings & Distances of the Parcel Boundary Lines



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# Integration with Land Value



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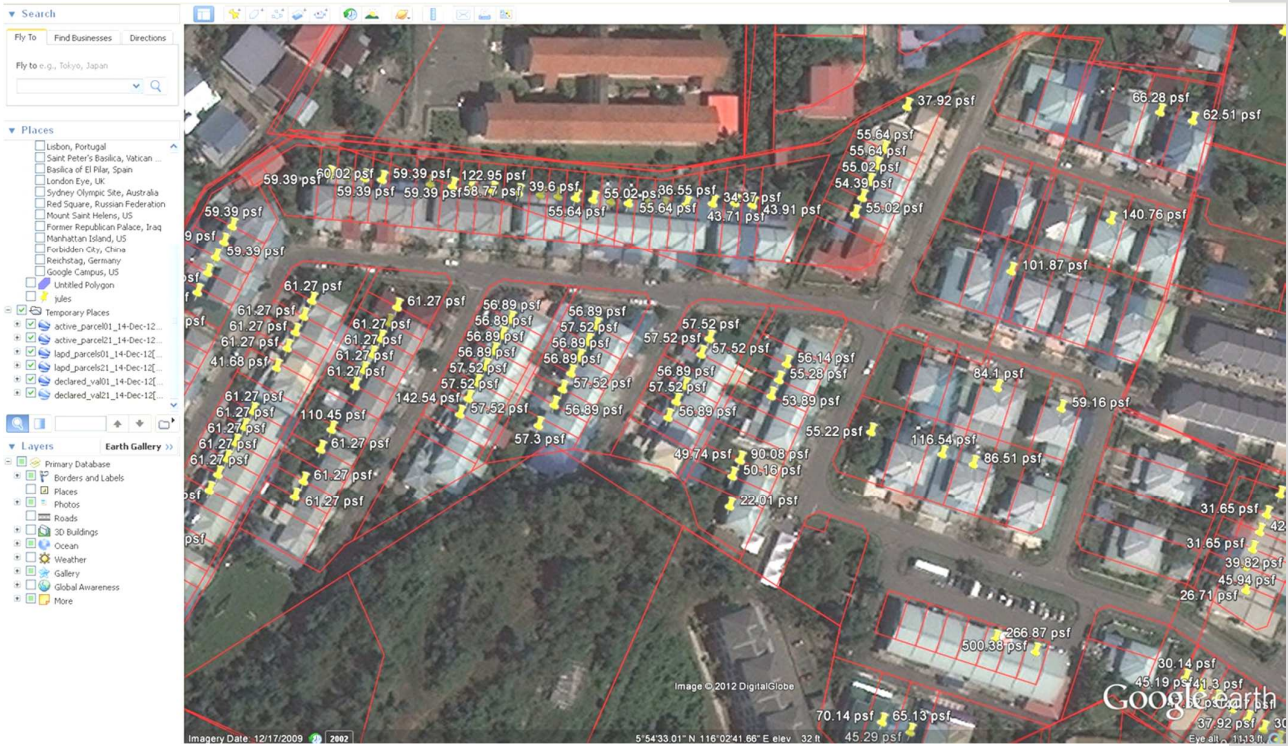


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# Integration with Land Value



20



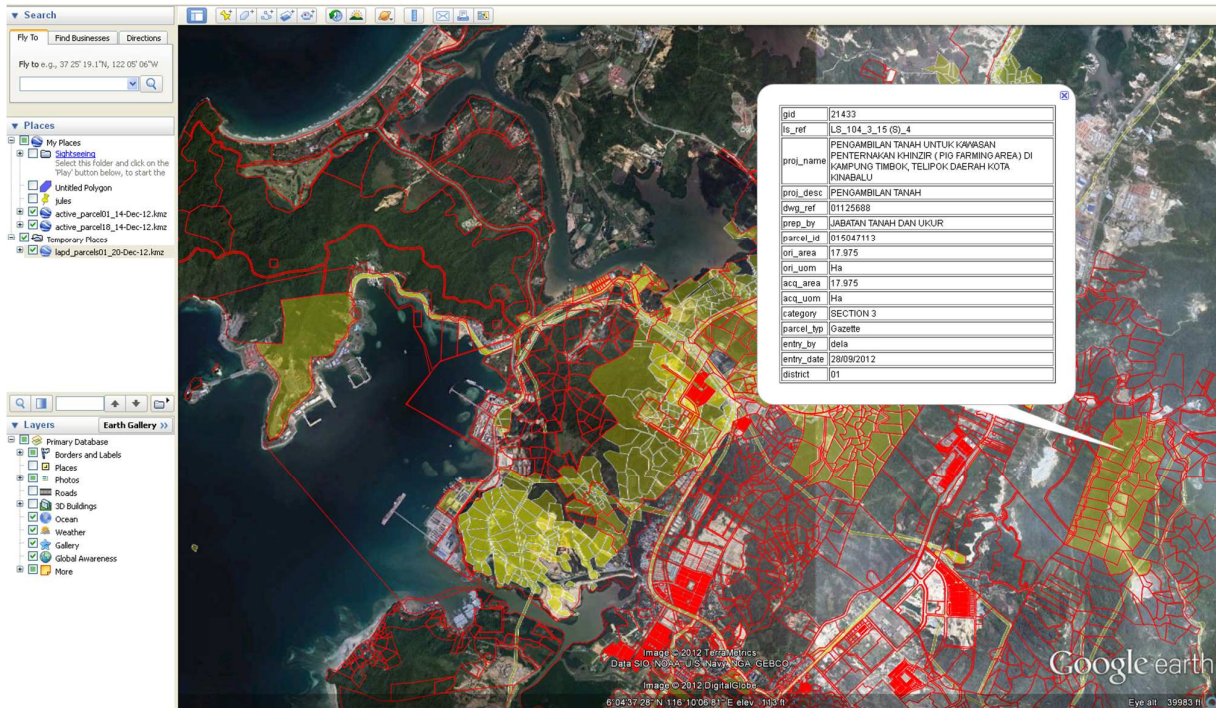
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# Integration with Acquired Land



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# Integration with Road Acquisition

Search: Fly To: Find Businesses Directions  
Fly to e.g., 37°25'19.17N, 122°05'06"W

Places: My Places  
Subsenses  
Unfilled Polygon  
Jules  
active\_parcel01\_14-Dec-12.kmz  
active\_parcel18\_14-Dec-12.kmz  
Temporary Places  
lapd\_parcel01\_20-Dec-12.kmz  
lapd\_parcel01\_20-Dec-12.kmz  
active\_parcel21\_20-Dec-12.kmz

Layers: Earth Gallery  
Primary Database  
Borders and Labels  
Places  
Photos  
Roads  
3D Buildings  
Ocean  
Weather  
Gallery  
Global Awareness  
More

gid	5835
ls_ref	LS_2113_1_27
proi_name	LAND ACQUISITION FOR ROAD BETWEEN KAMPONG NOSOBAND LUNGAB
dwg_ref	21123928
prep_by	JABATAN TANAH DAN UKUR
parcel_id	213078678
onl_area	2.75
act_area	0.27
act_uom	Ac
category	SECTION 4 & 5
parcel_hyp	Gazette
entry_by	hairul
entry_date	06/08/2012
district	21

Image © 2012 DigitalGlobe  
5°56'26.43" N 116°05'21.71" E elev 29 ft  
Google Earth  
Eye alt: 15035 ft

24



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# Integration with Land Acquisition Parcels

Search: Fly To: Find Businesses Directions  
Fly to e.g., 37°40'22.9N, -122°10'16.2W

Places: My Places  
Subsenses  
Unfilled Polygon  
Jules  
active\_parcel01\_14-Dec-12.kmz  
active\_parcel18\_14-Dec-12.kmz  
Temporary Places  
lapd\_parcel01\_20-Dec-12.kmz  
lapd\_parcel01\_11-Jan-13(1).k...

Layers: Earth Gallery  
Primary Database  
Borders and Labels  
Places  
Photos  
Roads  
3D Buildings  
Ocean  
Weather  
Gallery  
Global Awareness  
More

ls_ref	LS_0119_1_28
proi_name	CADANGAN LALUAN TALIAN 132 KV DARI KG. MELAWA (POWERTRON) KE CADANGAN PMU UMS
proi_desc	PLAN CADANGAN PENAJAARAN DARI P11 KE P119
custodian	SABAH ELECTRICITY SDN. BHD.
agency	SABAH ELECTRICITY SDN. BHD.
dwg_ref	J-9919-H3C-UMS
ls_plan_no	J-9919-H3C-UMS
parcel_id	101
act_area	12.892
act_uom	Ac
category	STATE LAND
remarks	B4CAU
parcel_hyp	Proposed
entry_by	haiurul
entry_date	28/09/2012
district	01
gid	16773

Image © 2013 DigitalGlobe  
0°33'32.46" N 116°06'45.62" E elev 0 ft  
Google Earth  
Eye alt: 18092 ft

25



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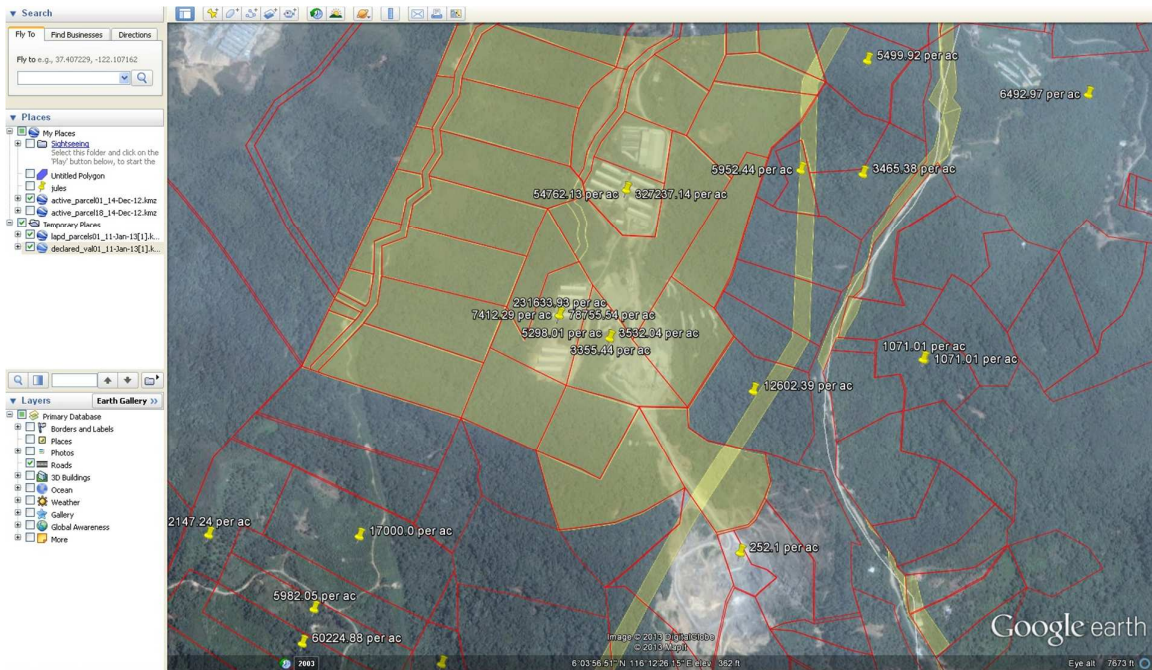


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# Integration with Land Acquisition Parcels



26



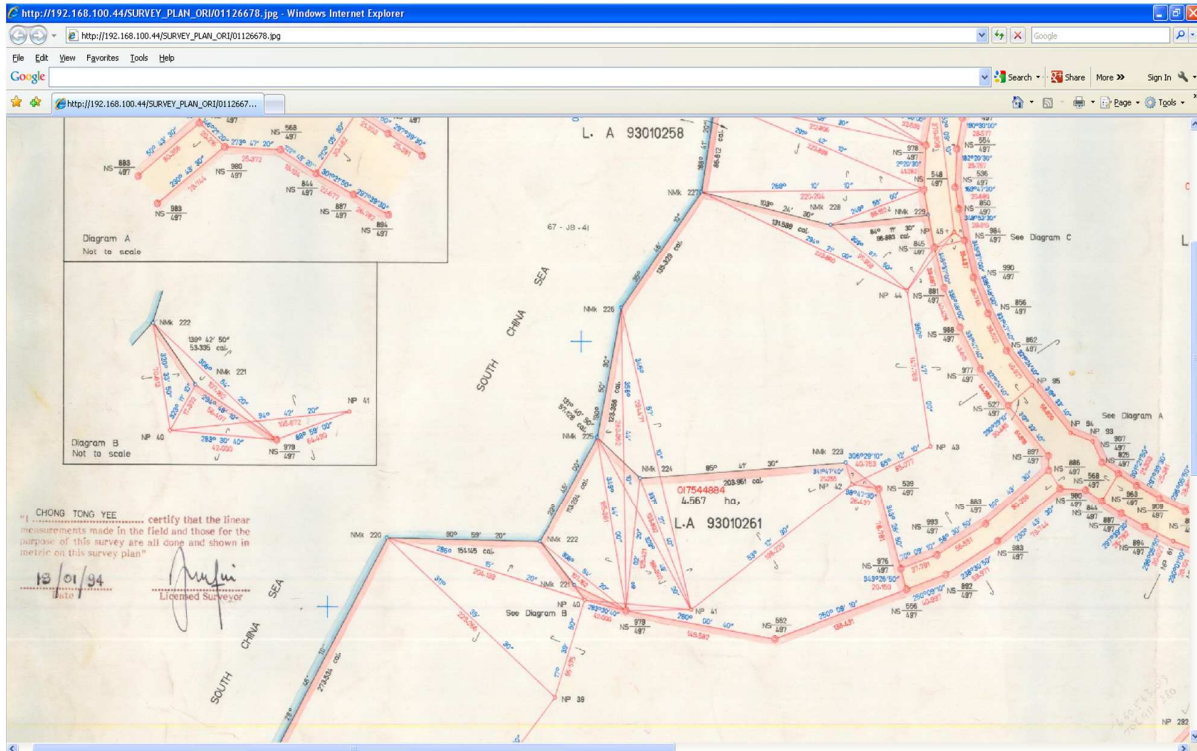
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# Retrieving Scan Image of The Survey Plans



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# Sources of Data for Topography & Man Made Features



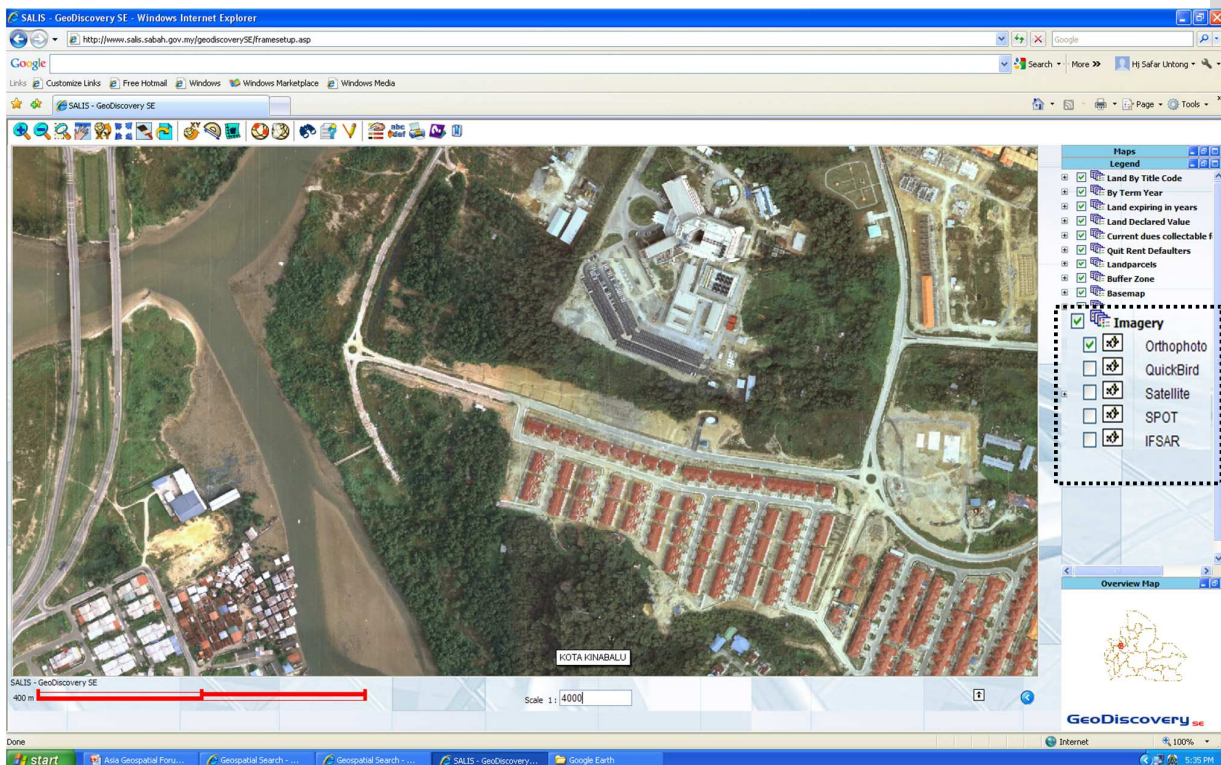
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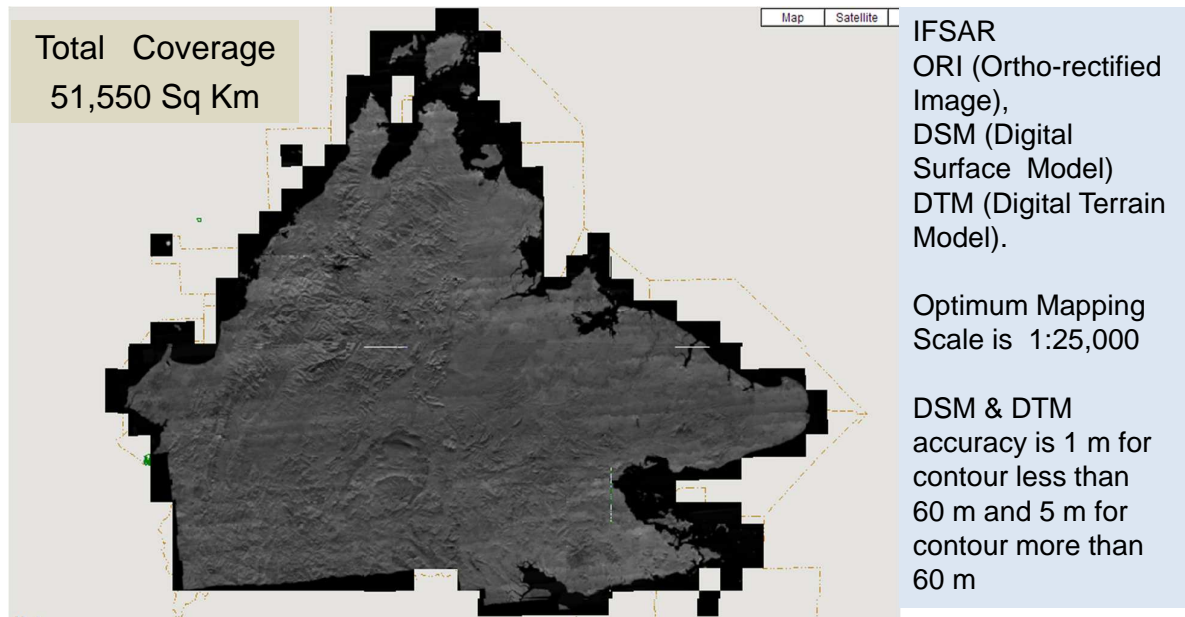
# Orthophoto







# DIGITAL SABAH PROJECT - IFSAR



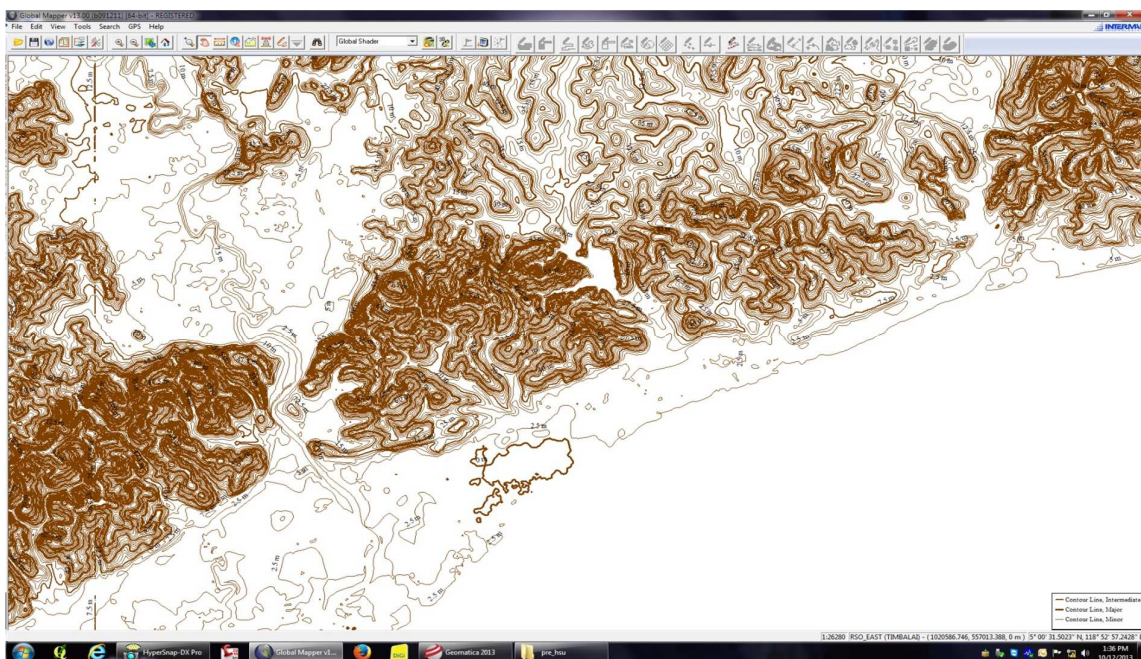
29



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# Contour generated from IFSAR data



30



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## Contour generated from IFSAR data



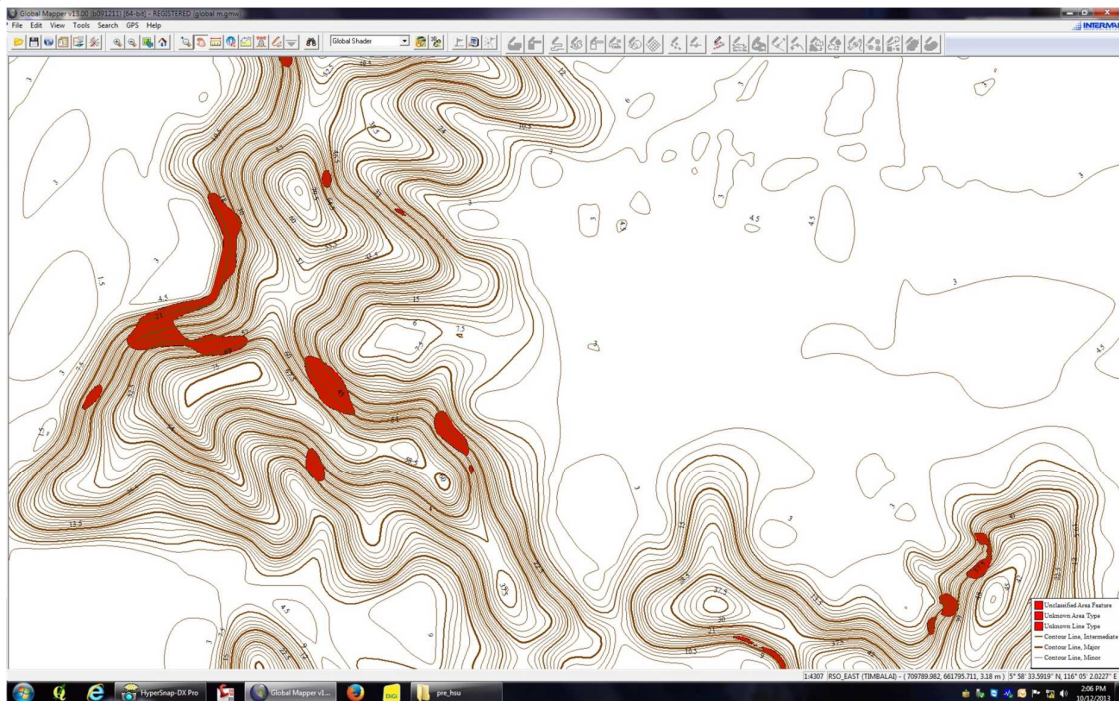
31



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## Slope Analysis from IFSAR data



25° degree slope

32

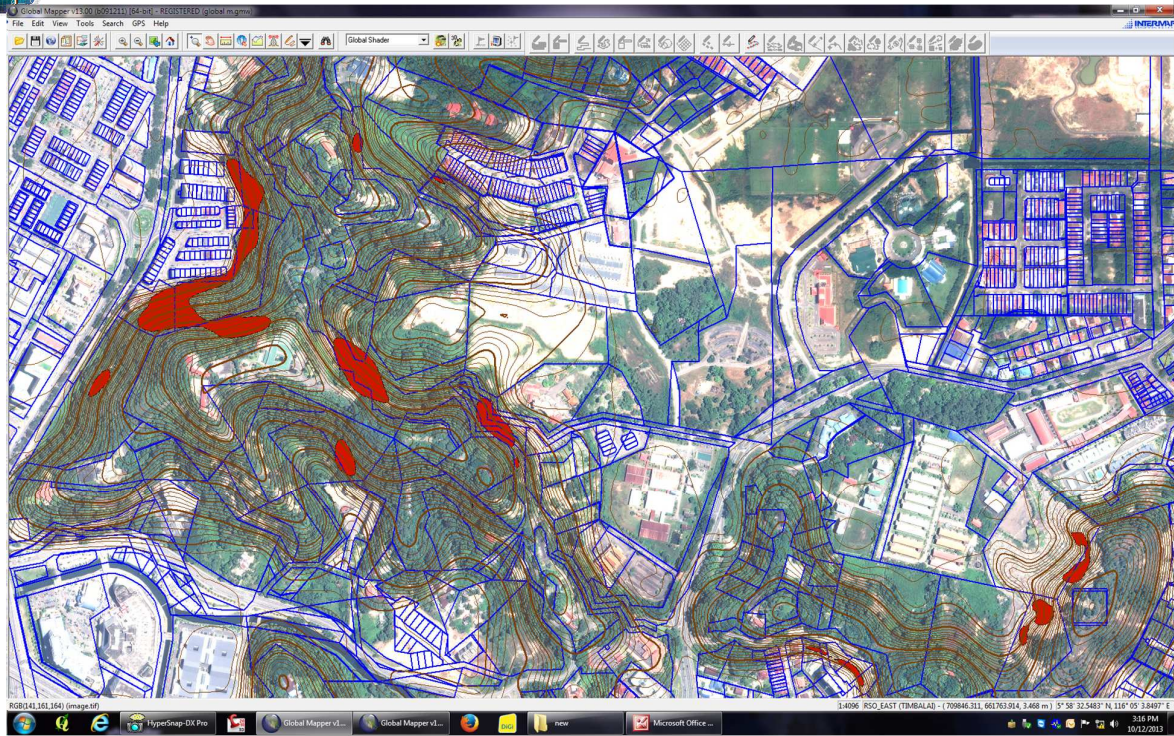



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# Slope Analysis from IFSAR data



 25° degree slope

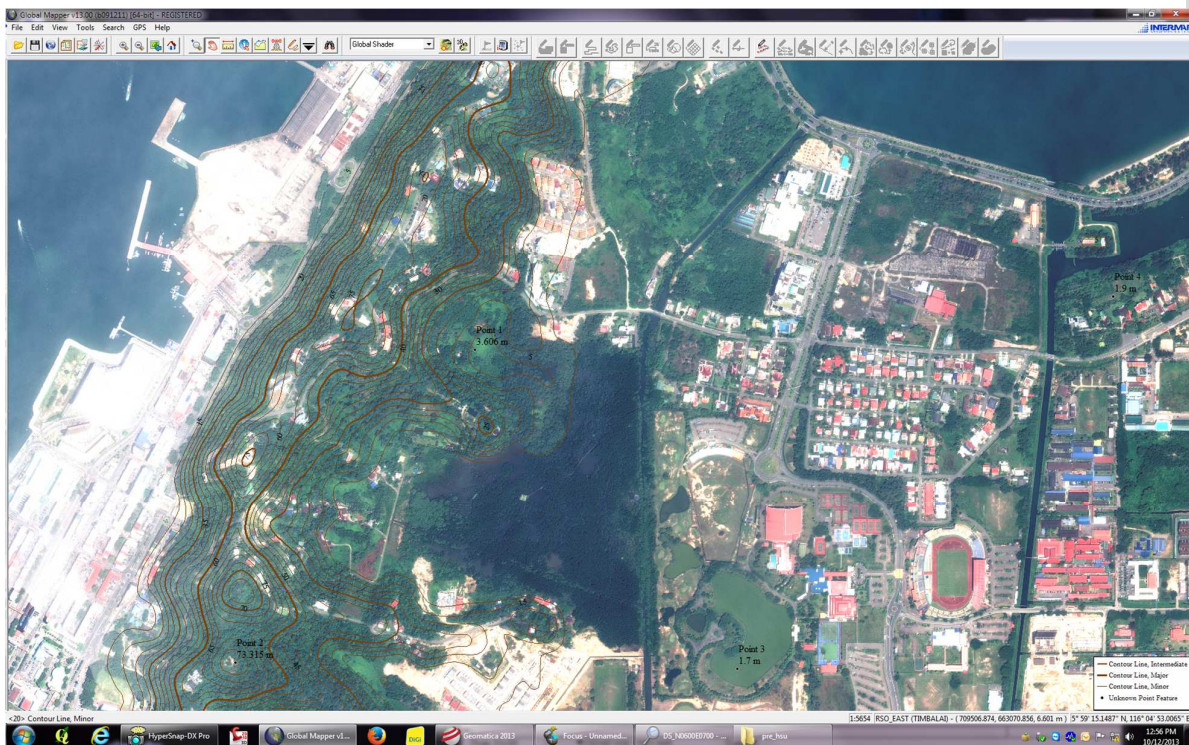
33



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# Spot Height from IFSAR data



34

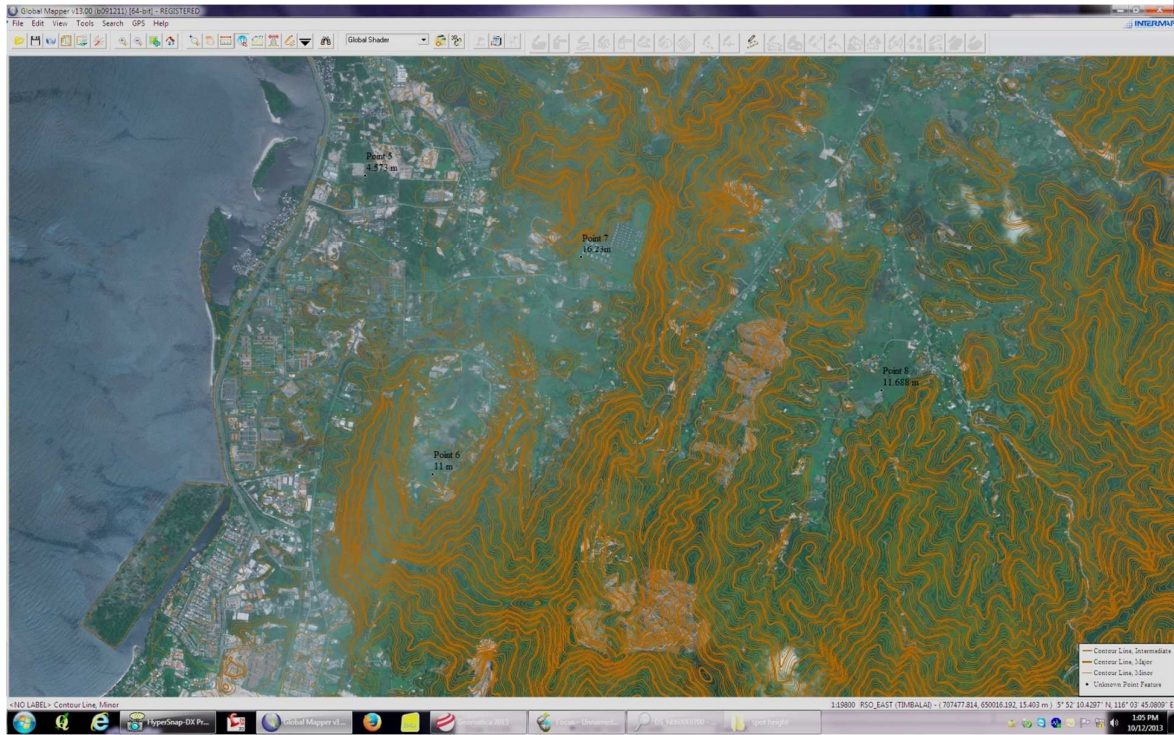


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# Spot Height from IFSAR data



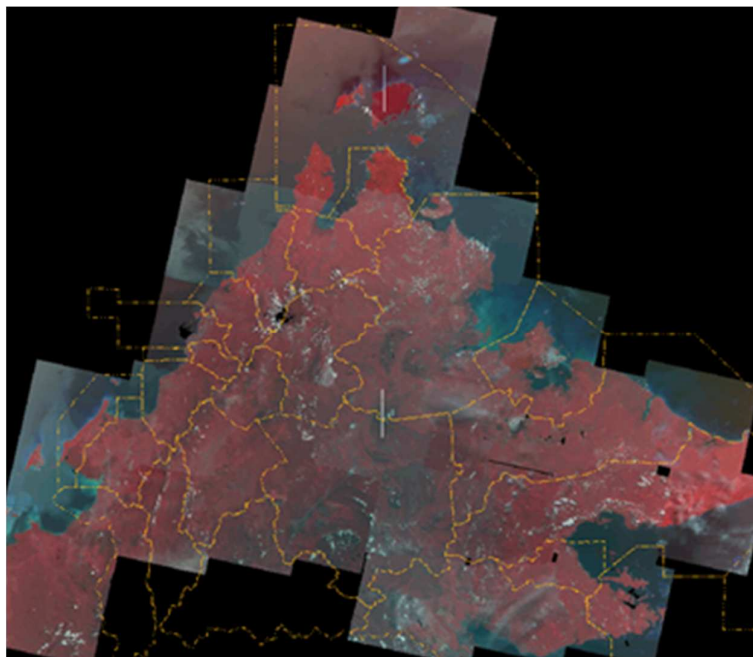
35



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# SPOT 5: Orthorectified & mosaicked



resolution 2.5m

36

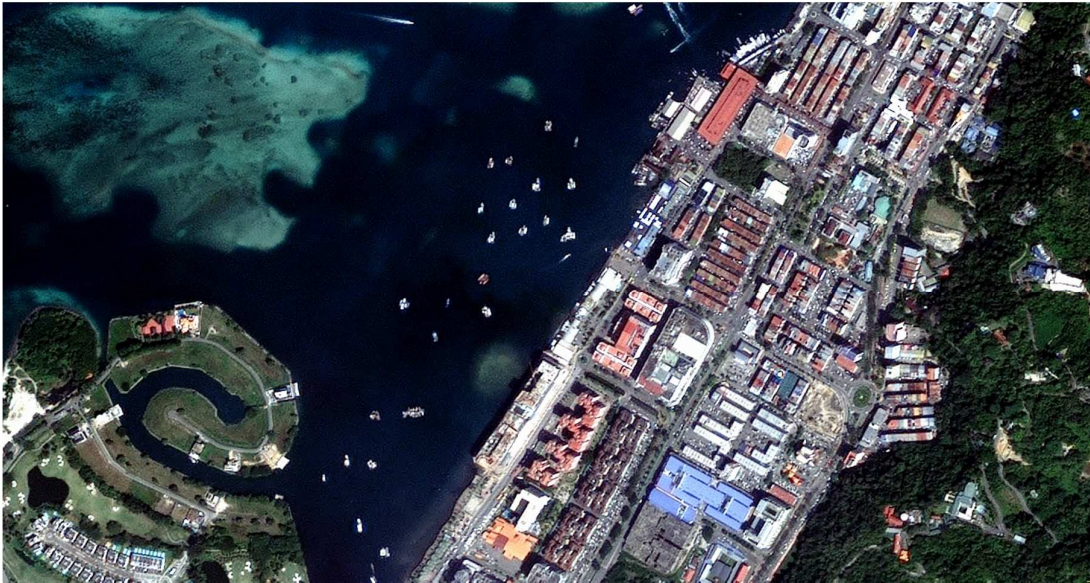


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## Orthorectified & mosaicked SPOT 6



The SPOT 6 resolution is 1.5m. It has the Blue Band making it very easy to generate the natural color. The other good news is that the price of SPOT6 is the same as SPOT5 i.e about RM4800/ scene (60km x 60km)

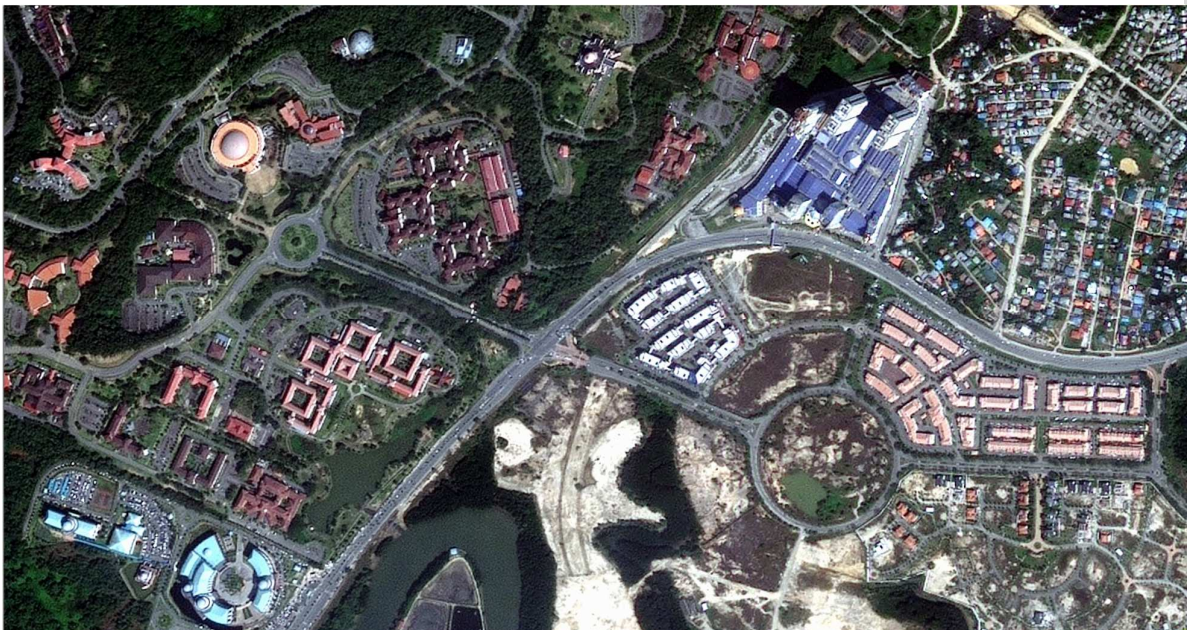
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## Orthorectified & mosaicked SPOT 6



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## Orthorectified & mosaicked SPOT 6



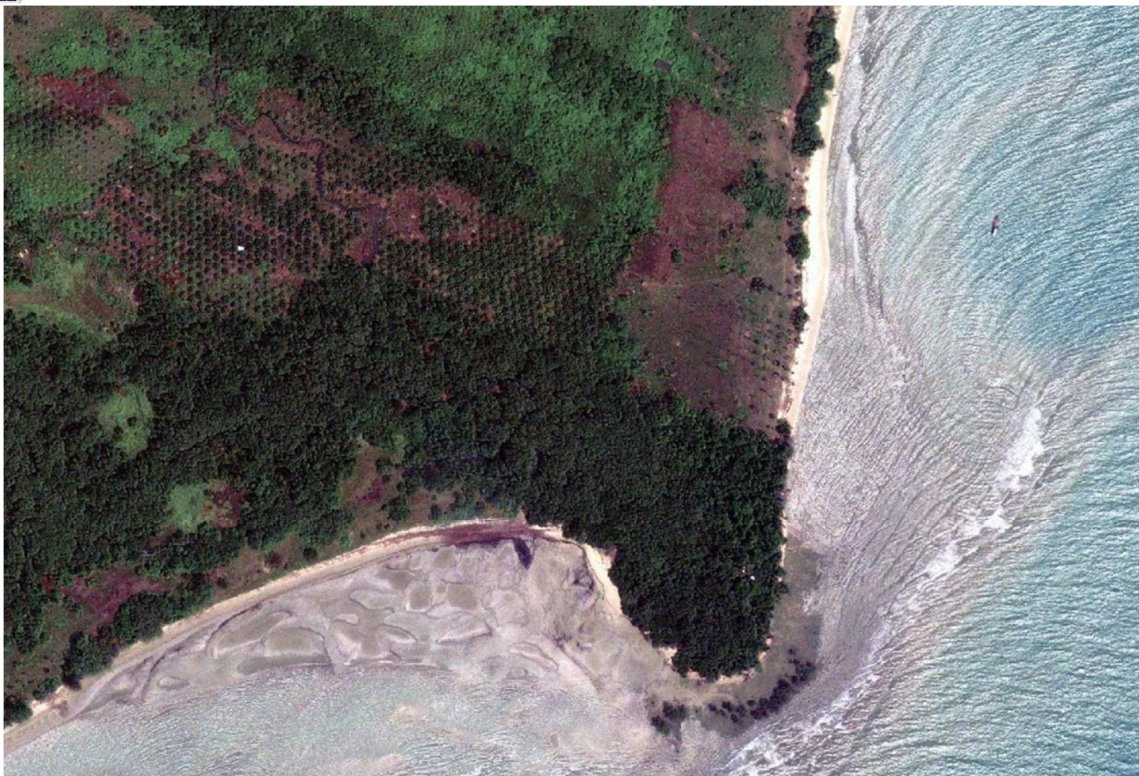
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## Worldview 2 High Resolution Image



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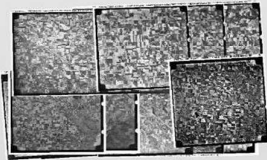
# HISTORICAL AERIAL PHOTO SYSTEM (HAP)

## 1 Scan/Ingest Airphotos



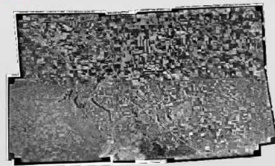
## 2 Coarse Alignment

- Camera calibration information (focal length, flight line information)
- Available image coordinates (typically center coordinate)
- Fiducial marks (automated methods once a few are collected)
- Automated GCP / TP collection for relative positioning



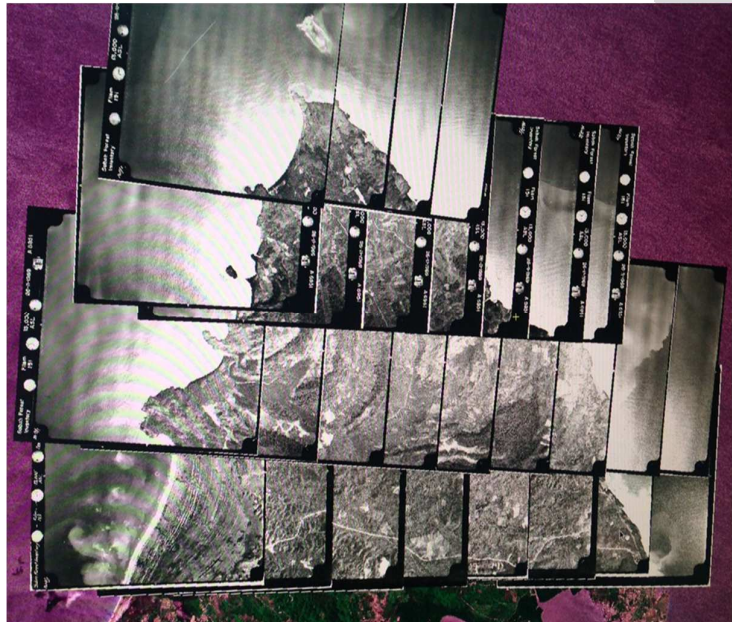
## 3 Fine Alignment/Mosaic

- Inspect automated GCP & TPs / remove blunders
- Refine search radius to refine accuracy of automated GCPs
- Generate seamlines and color balancing information automatically



### General Workflow of HAP

Orthorectified 1969 aerial photographs after coarse adjustment in HAP. Overlaid with SPOT5 images for accuracy checking



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# DIGITAL ARCHIVE FOR AERIAL PHOTO FROM 1950 - NOW



**HAP System is a customized system jointly develop by PCI & Lands & Surveys Department Sabah**

- Real-time Photo Mosaic
- Historical time series

**Orthorectified & mosaicked 2010 aerial photographs after FINE adjustment in HAP**

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# Development of Multi Purpose Cadastre



11-12 March 2014  
Sutera Harbour Resort, Kota Kinabalu, Sabah



XXV International Federation of Surveyors  
Congress, Kuala Lumpur, Malaysia, 16 – 21  
June 2014



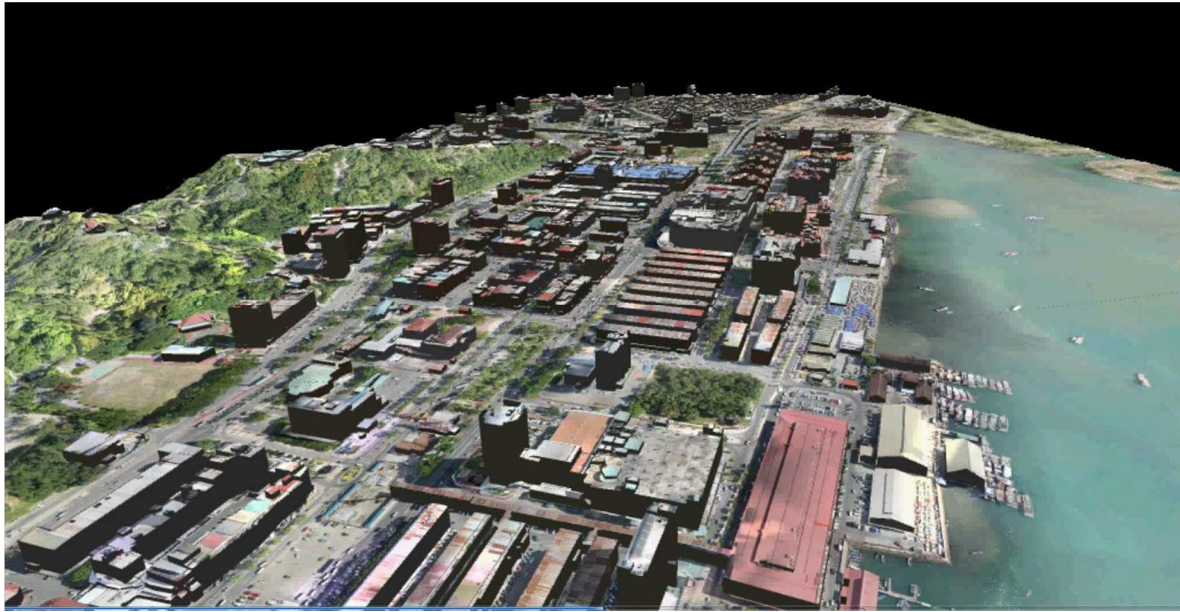
## 3D City Model Kota Kinabalu







# Kota Kinabalu City 3D Fly Through



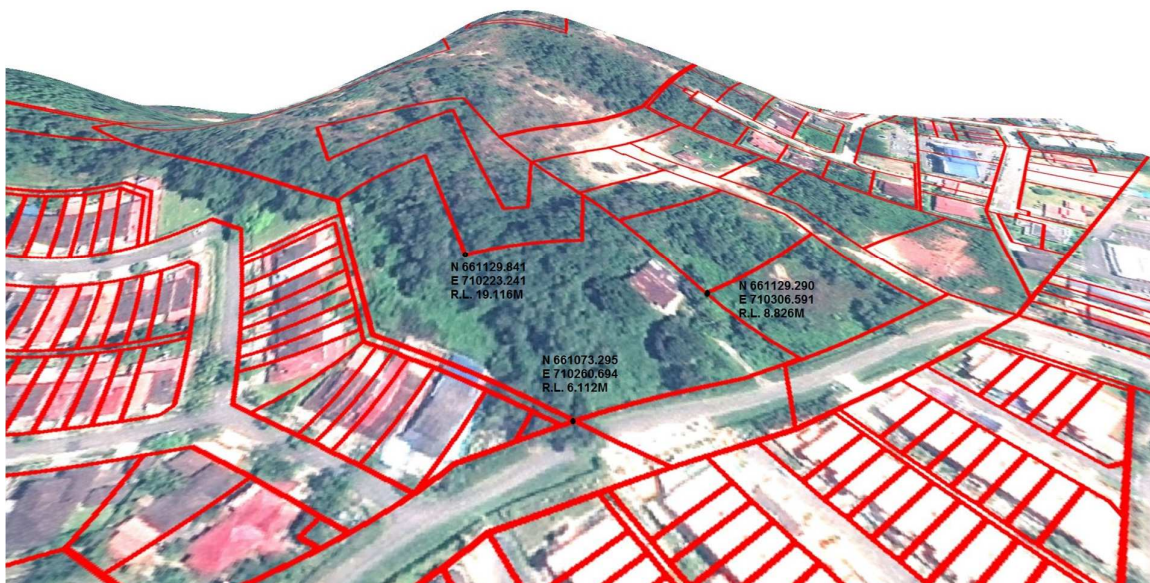
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# Seamless 3D model



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## Land Parcel on 3D model



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## Land Parcel on 3D model



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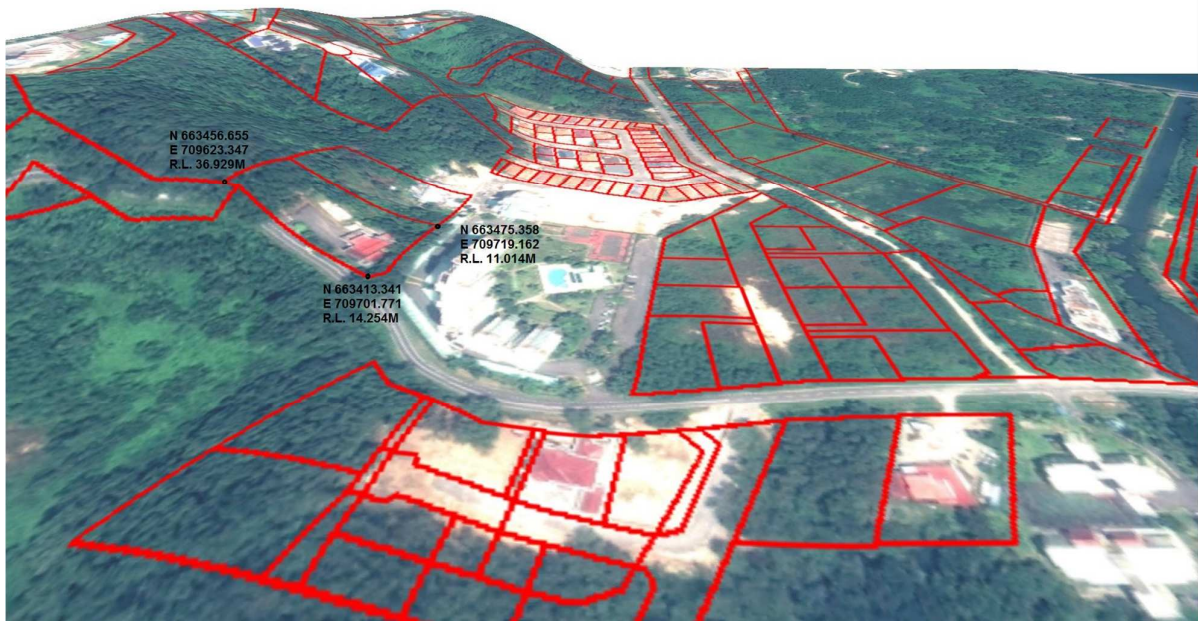


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# Land Parcel on 3D model



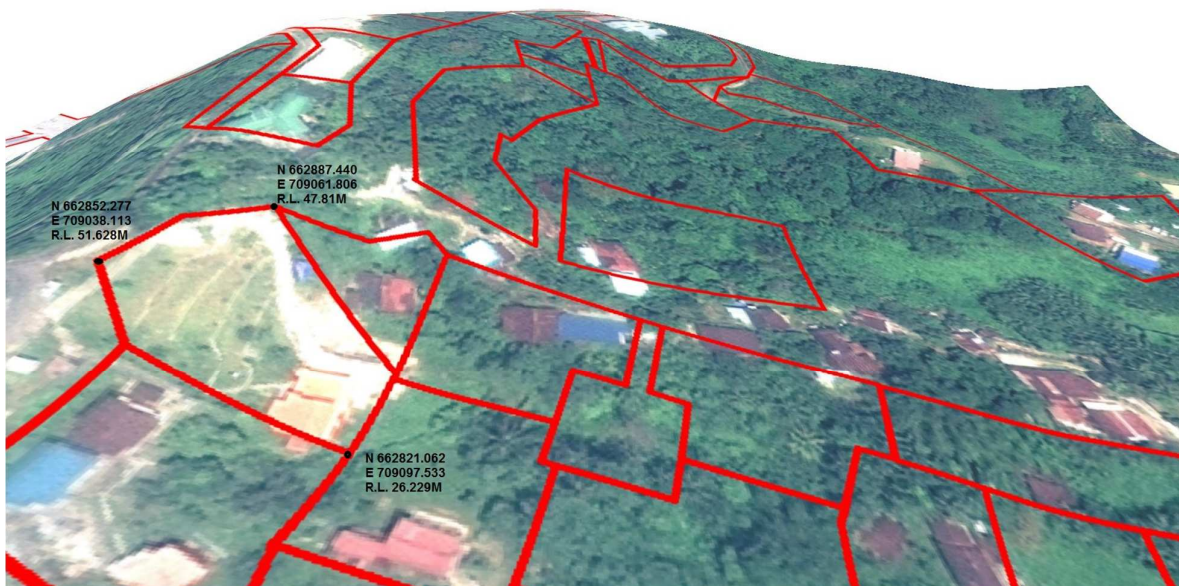
48



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# Land Parcel on 3D model



49

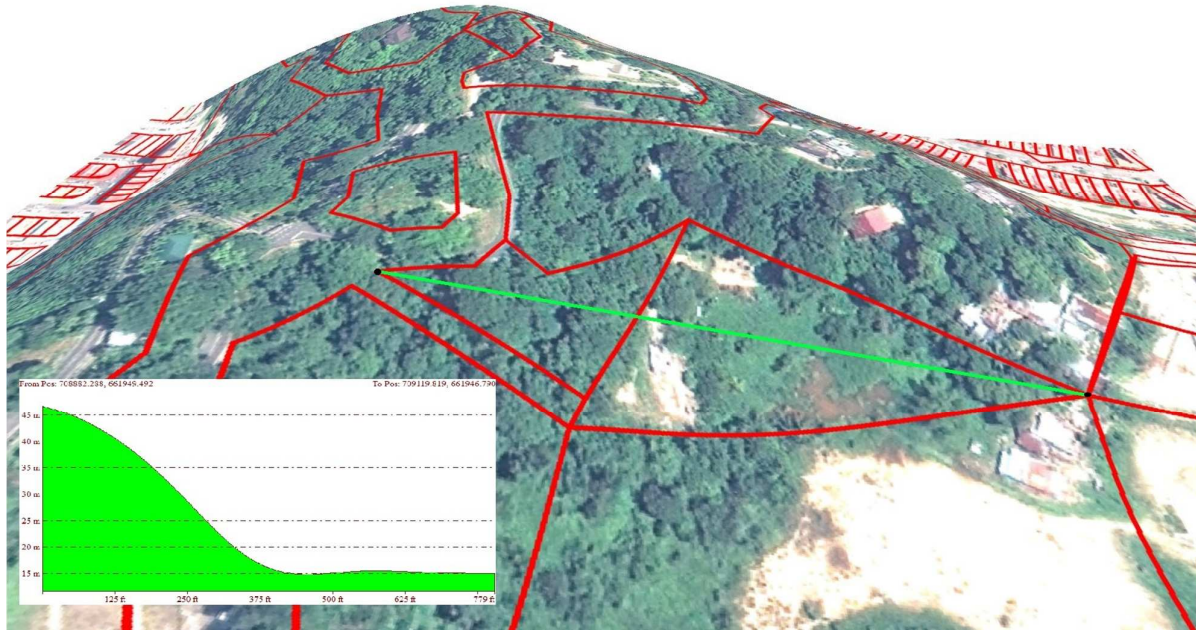


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# Cross Section - Parcel Profile



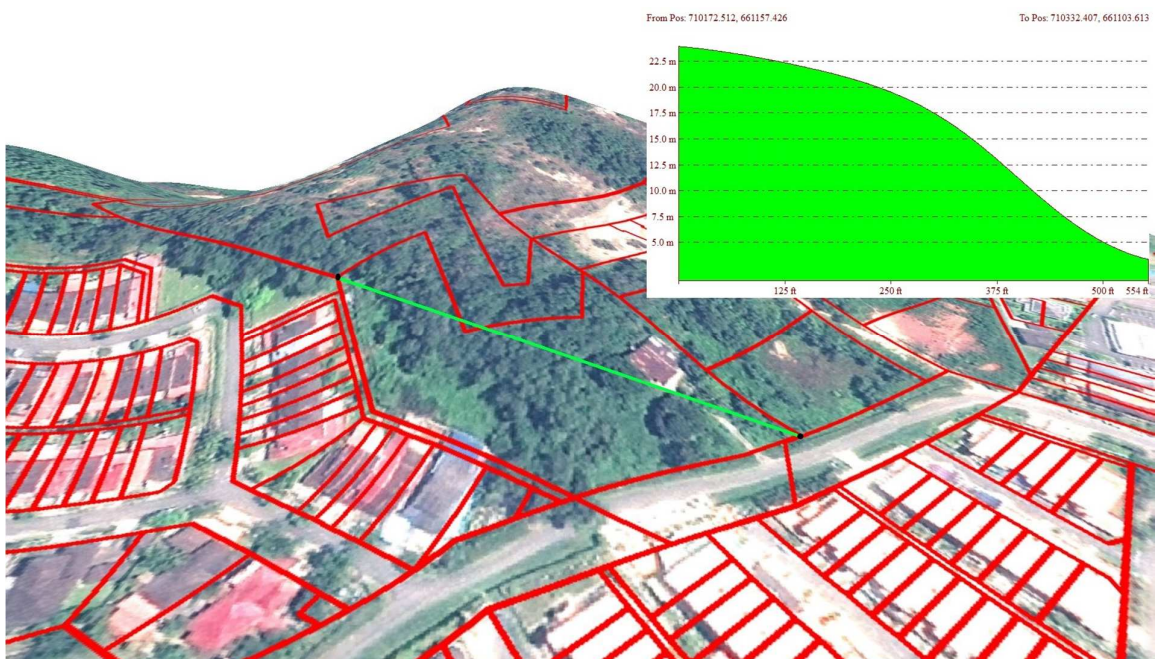
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# Cross Section - Parcel Profile



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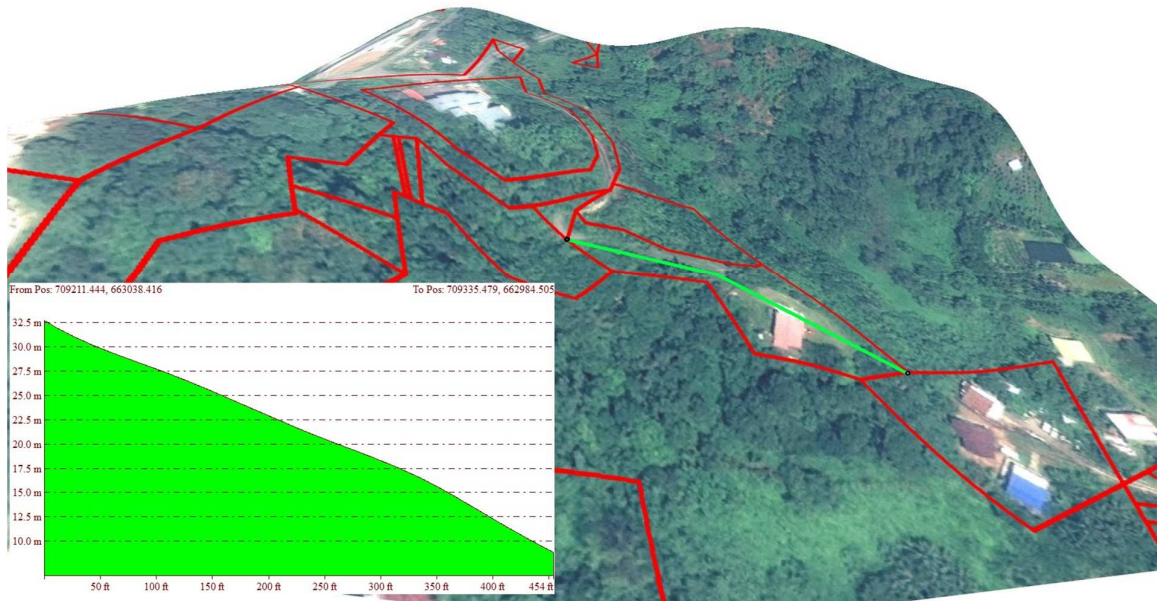


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# Cross Section - Parcel Profile



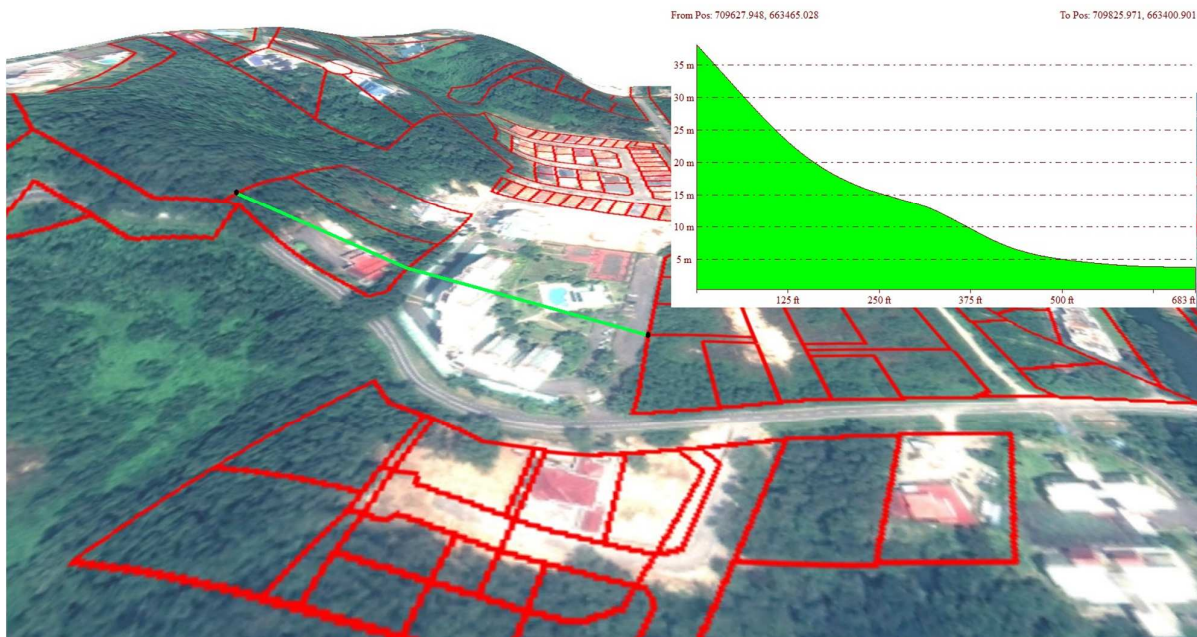
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# Cross Section - Parcel Profile



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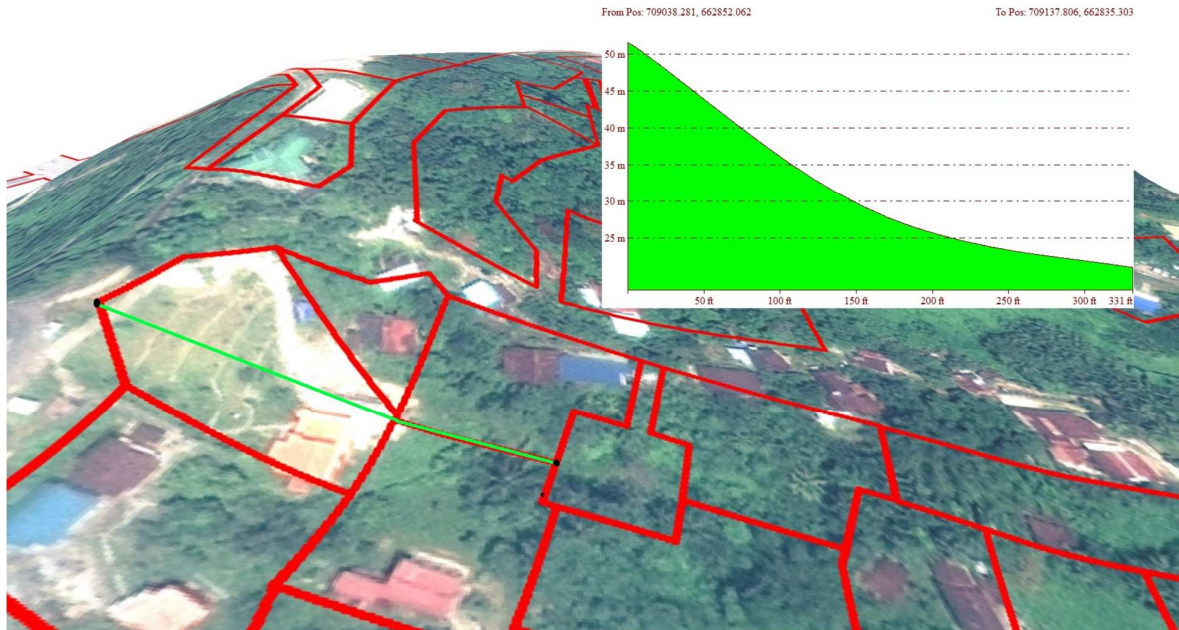


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## Cross Section - Parcel Profile



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## Artist Impression – Northern & Southern Facade



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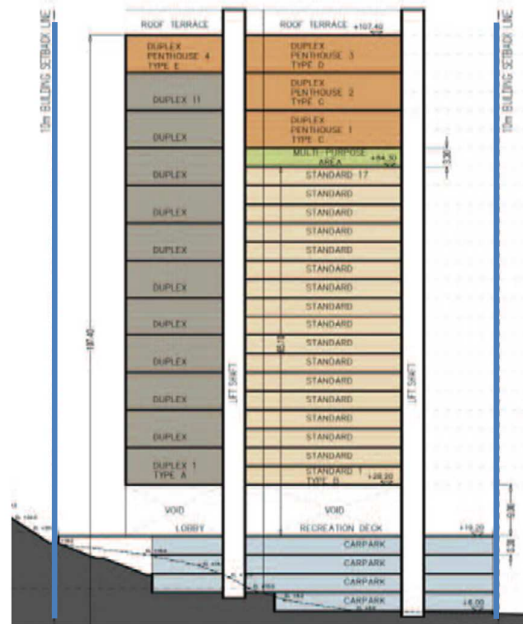


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# Building Cross Section



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# Building Floor Plan

Type A	Living	Balcony
Level 1	1,756ft <sup>2</sup>	421ft <sup>2</sup>
Level 2	1,256ft <sup>2</sup>	139ft <sup>2</sup>
Total	3,012ft <sup>2</sup>	560ft <sup>2</sup>
<b>TOTAL GFA</b>		<b>3,572ft<sup>2</sup></b>



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# Building Floor Plan

**Type B Living Balcony**  
 Level 1 2,450ft<sup>2</sup> 900ft<sup>2</sup>  
**TOTAL GFA 3,350ft<sup>2</sup>**



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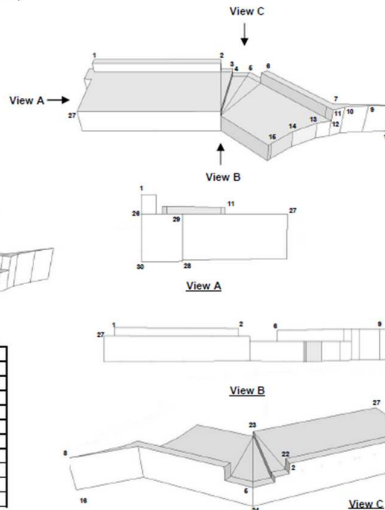
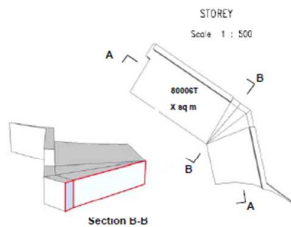
# Proposed Survey Plan for Strata Titles

## Survey Plan

Lot No.	Or Plan	Remarks
60007		Marked For Subdivision Lot

Building No.	Or Lot	Storey	Area (sq m)	Volume (cubic m)
00007		Floorplate Underpass	1033.8	XYZ



Ground Information

R	RL
100	Z
101	Z
102	Z
103	Z
104	Z
105	Z
106	Z
107	Z
108	Z
109	Z

Station	Ending	RL
1	X	2.2
2	Y	2.2
3	X	2.2
4	Y	2.2
5	X	2.2
6	Y	2.2
7	X	2.2
8	Y	2.2
9	X	2.2
10	Y	2.2
11	X	2.2
12	Y	2.2
13	X	2.2
14	Y	2.2
15	X	2.2
16	Y	2.2
17	X	2.2
18	Y	2.2
19	X	2.2
20	Y	2.2
21	X	2.2
22	Y	2.2
23	X	2.2
24	Y	2.2
25	X	2.2
26	Y	2.2
27	X	2.2
28	Y	2.2
29	X	2.2
30	Y	2.2
31	X	2.2
32	Y	2.2
33	X	2.2
34	Y	2.2
35	X	2.2
36	Y	2.2
37	X	2.2
38	Y	2.2
39	X	2.2
40	Y	2.2
41	X	2.2
42	Y	2.2
43	X	2.2
44	Y	2.2
45	X	2.2
46	Y	2.2
47	X	2.2
48	Y	2.2
49	X	2.2
50	Y	2.2
51	X	2.2
52	Y	2.2
53	X	2.2
54	Y	2.2
55	X	2.2
56	Y	2.2
57	X	2.2
58	Y	2.2
59	X	2.2
60	Y	2.2

RL is based on Survey Department Height Datum

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## Concluding Remarks

- We are almost done with 2D & Moving forward to 3D
- Our Limitation -
  - Lack of facilities and funding
  - Constraint in generating information (expertise, technologies, hardware & software)
  - High integrity & accurate data is still beyond reach for many of us.
  - Data currency
- Upgrading the 2.5m SPOT5 images to at least 1m or sub meter images by obtaining digital aerial photos, UAV Data & SPOT6 images.

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? & A

THANK YOU

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