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# LANDS AND SURVEYS DEPARTMENT SABAH, MALAYSIA



## GEO-CADASTRE IN LAND ADMINISTRATION: SABAH'S EXPERIENCE

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Sabah, Malaysia

1 October, 2015



# contents

1. Introduction

2. Building Geospatial Data

3. Cadastre – Land Title Information

4. Mobile GIS

5. Way Forward: 3D Cadastre

6. Conclusion



# INTRODUCTION

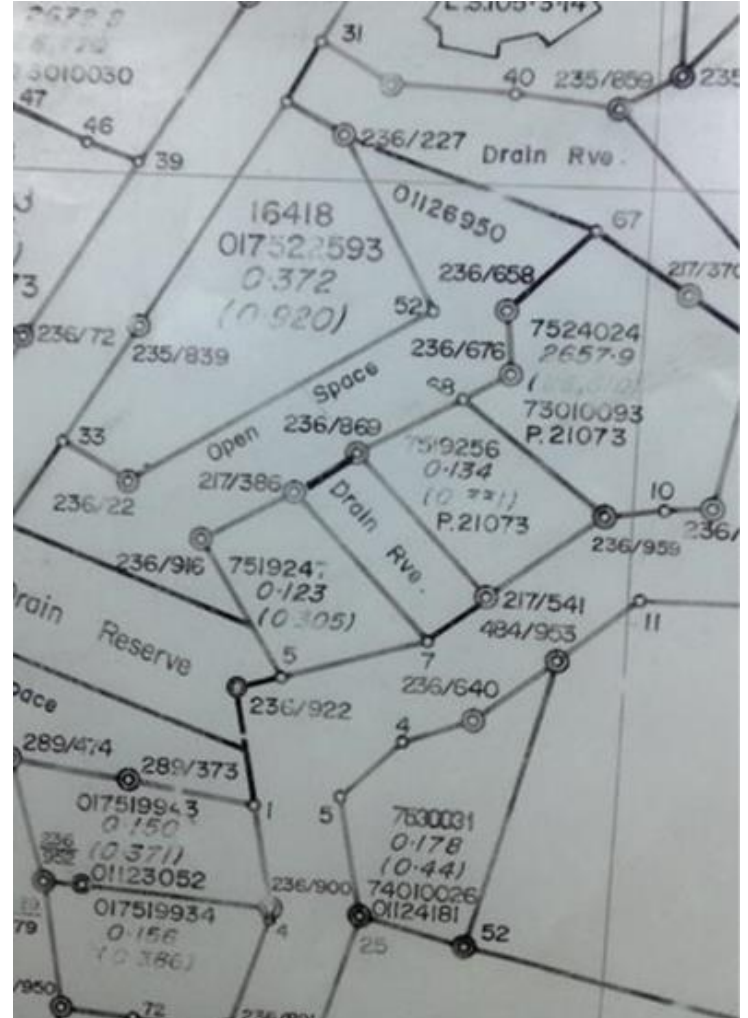
- Land is the basic source to sustain life and provide food and shelter.
- High integrity of geospatial data integrated with land information data is key to develop solid strategies for achieving world-class land resources management.
- The development of digital geo-cadastre data has been rewarding in achieving 4 A's of *Access at **A**n anywhere by **A**n anyone at **A**n any time and on **A**n any device*



# Map Sheet Scale 1: 12,500 (1,285 sheets, A0 size )



# Map Sheet Scale 1: 2,500 (13,285 sheets, A0 size)





# GEO-CADASTRE JOURNEY

1970~1980

**Sabah Land Data Bank**

- Land Title Information System
- Land Revenue System

1981 ~ 1990

- Coradi Digitisation System
- Cadastre Processing System
- PDMS

1991~2000

**Sabah Land Information System**

2001~2010

- Land use information system
- e-Kadester
- LaDESS

2011~2015

- Mobile GIS
- 3D Cadastre



# GEO-CADASTRE JOURNEY

| <b>1970 - 1980</b>                   | <b>The Beginning into ICT Technology in Land Administration</b>  |
|--------------------------------------|--|
| Land Title Information system (LTIS) | <ul style="list-style-type: none"><li>✓ Started in 1977. Regarded as the first Sabah Digital Information system.</li><li>✓ To capture &amp; store Land Titles &amp; Land Dealings TEXTUAL information into Database.</li><li>✓ The beginning of using Systematic Coding System for in Sabah Land Administration system = Land Title numbering, Survey plans numbering, district codes, Land Application numbering etc.</li></ul> |
| Land Revenue System (LRS)            | <ul style="list-style-type: none"><li>✓ A system to collect land revenue (Quit Rent) &amp; printing receipts using information of LTIS.</li></ul>  |





# GEO-CADASTRE JOURNEY

| <b>1981 - 1990</b>                            | <b>The Beginning of Digital Graphic MIS</b>  |
|---|--|
| Coradi Digitization System                    | <ul style="list-style-type: none"><li>✓ Started in 1982 - A system for digitizing of hardcopy maps/plans into digital format. Primary project is to digitize the boundaries of gazetted Forest forests from maps scale of 1:250,000. Low accuracy output.</li></ul>  |
| Cadastral Processing System (CPS)             | <ul style="list-style-type: none"><li>✓ A customized Survey processing software using HP computers.</li><li>✓ It's a stand-alone desktop system for survey computations &amp; production of Survey Plan. No database. Job by job basis.</li><li>✓ Later in 1990, this system was replaced by a Window-based CPS using Auto-Cad platform.</li></ul> |
| Photogrammetric Digital Mapping System (PDMS) | <ul style="list-style-type: none"><li>✓ A semi-digital Photogrammetric system for production of large scale ( 1:2,500 – 1:12,500) land development map.</li></ul>  |



# GEO-CADASTRE JOURNEY

| 1991- 2000                            | Entering the Era of GIS   |
|---------------------------------------|---|
| Sabah land Information System (SALIS) | <ul style="list-style-type: none"><li>✓ Started in 1997.</li><li>✓ A web-based system to integrate all JTU digital textual, graphical &amp; images unto a common platform.</li><li>✓ Among the early digital data integrated are – Land titles textual information, Land dealings info, land revenue info, graphical cadatral parcel , orthophotos.</li><li>✓ Later includes – High Resolution remotely sensed images Land acquisition info, land value information, cadastral boundaries info etc.</li></ul> |



# GEO-CADASTRE JOURNEY

| <b>2001- 2010</b>                                  | <b>Towards Digital Sabah</b>   |
|--|--|
| Land use info system(LUIS)                         | <ul style="list-style-type: none"><li>✓ Production of Digital Land cover maps from orthophoto, ortho- images.</li><li>✓ Mapping of Sabah under IFSAR Project</li></ul>   |
| e-Kadester Sabah                                   | <ul style="list-style-type: none"><li>✓ 2009 - Beginning of Field to Finish Surveying System</li><li>✓ 2011 - Creation of high accuracy Digital Cadastral Database (DCDB) by entering of bearings &amp; distances from Survey Plans.</li></ul> |
| Land Dealing Electronic Submission System (LaDess) | <ul style="list-style-type: none"><li>✓ Started 2010 - Can be consider as the first ever On-Line Digital Submission Land Dealing system in Malaysia.</li></ul>   |



# GEO-CADASTRE JOURNEY

| <b>2011-2015</b> | <b>Going Mobile</b>   |
|------------------|---|
| Mobile GIS       | <ul style="list-style-type: none"><li>✓ Enable Android &amp; IOS mobile users accessing Land parcel textual &amp; graphical information using Esri's ArcGis mobile apps.</li><li>✓ A cloud technology which allow access to Sabah land information Anywhere, Any One, Anytime &amp; Any Device.</li></ul> |
| 3D Cadestre      | <ul style="list-style-type: none"><li>✓ Production of 3D cadastral maps and DTM from IFSAR Digital Sabah Images.</li></ul>  |



# SABAH MOBILE GIS PROJECT

## 1 Defining the Problems & the Needs

Cadastral maps in hard copy at scale 1:2,500 & 1:12,500 (Total = 14,570 Sheets at A0 size). It's a public document – purchase by our clients. The problems: Bulky, difficult to search, decentralize & not seamless. *The Question: How to compile and pack so that we can keep in our pocket/hand bags?*

## 2 Discover

*Requirements: Accessible by Anyone, at Anytime, Any Where & by Any Device*





# How do we start this project?

3

## Develop

Sabah Digital Cadastral Data Base (DCDB) consist of more than 560,000 land parcels was develop and completed in 2011. These huge graphical cannot ride on Sabah.Net. *The Solution: We purchase Esri ArcGis Server and upload/store our DCDB at Amazon Cloud.*

4

## Implement

We implement the solution and ArcGis mobile meet our needs and requirements. *Cadastral lots/land parcels now in our pockets/hand bags and can be access by Anyone, at Any Time, Any Where & by Any Mobile Device.*

# SABAH DIGITAL CADASTRAL DATA BASE (DCDB)

1

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

ArcGIS app for iOS

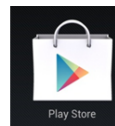


App Store



ArcGIS

Search for ArcGIS



Play Store



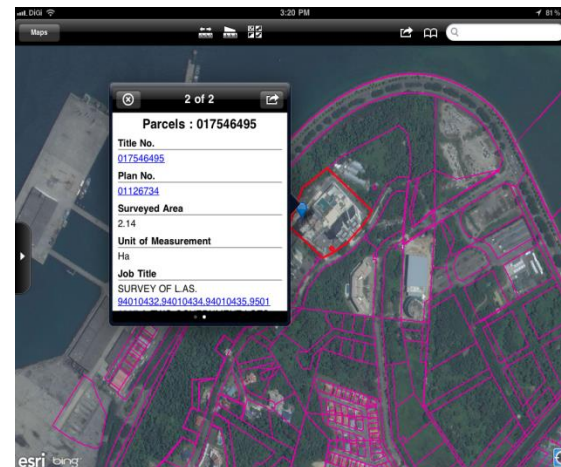
ArcGIS

Download and Install ArcGIS

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

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

ArcGIS app for Android



2

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

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

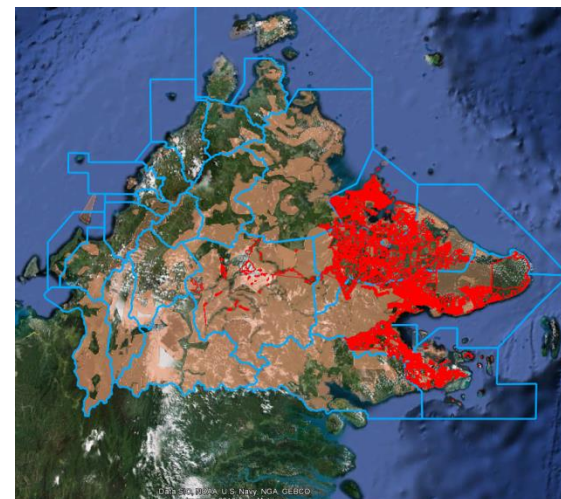


User Name:

safaruntong

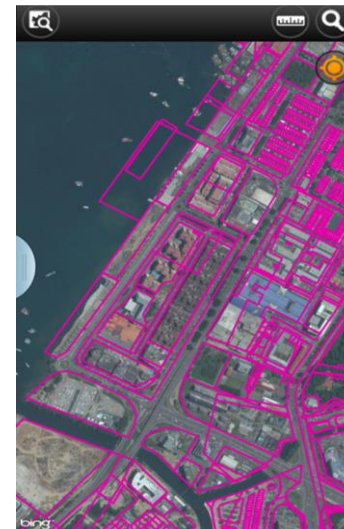
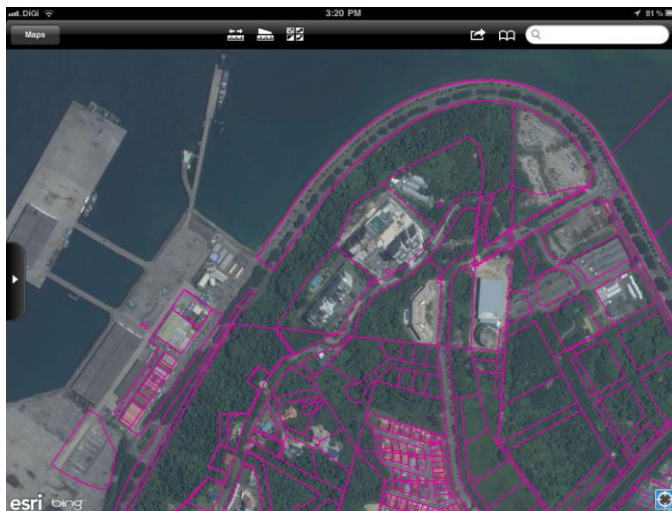
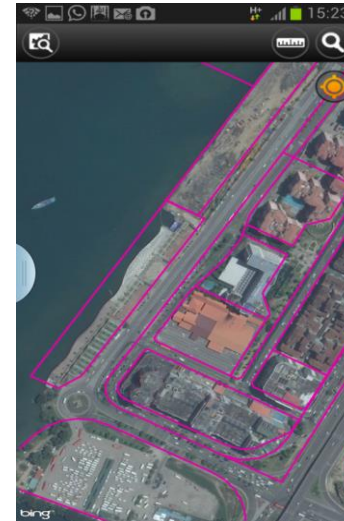
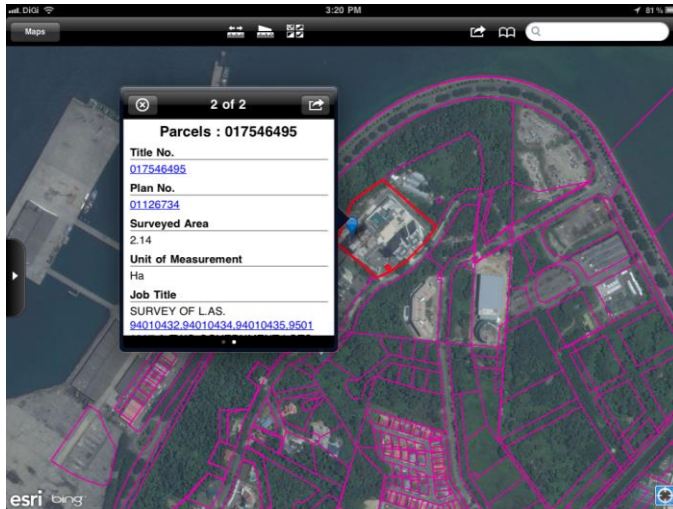
Password:

Login





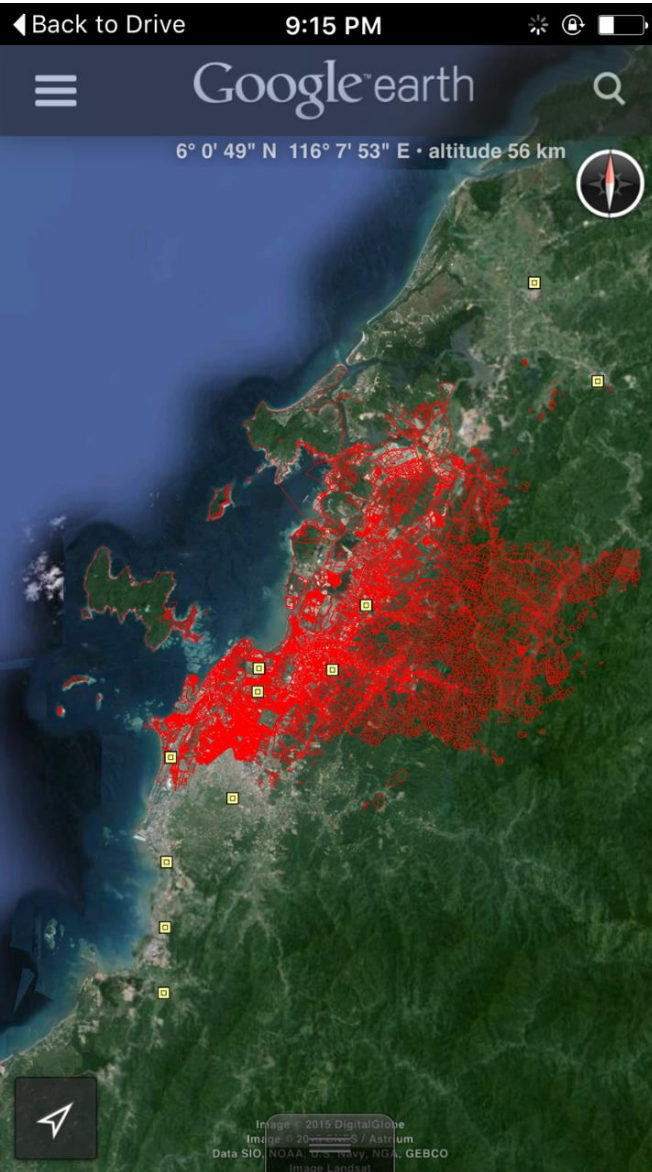
# Screen Capture of ArcGis Mobile







# Cadastre information (kmz Files) on mobile Phone



## Details Done

|           |                           |
|-----------|---------------------------|
| Name      | <a href="#">017510968</a> |
| land_cat  | Registered                |
| plan_num  | 9908                      |
| surv_area | 0.2                       |
| area_uom  | Ac                        |
| grid_num  | 67-JB-42                  |
| data_src  | DCDB2010_CDE_P3           |





# INTEGRATED SABAH GEO-CADASTRE DATA

The screenshot displays a GIS application window with the following components:

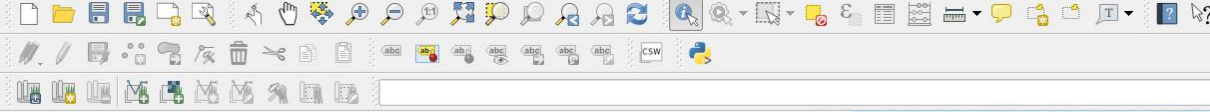
- Menu Bar:** Project, Edit, View, Layer, Settings, Plugins, Vector, Raster, Database, Web, Processing, Help.
- Toolbars:** Standard GIS toolbars for navigation and editing.
- Layers Panel:**
  - Layers: LAPD, lapd\_parcel, LAPD Drainage Acq, dec\_value\_geo (Before 2000, 2000-2005, 2006-2010, 2011-Current), lapd\_acq\_values, GAZMIS 2.0, active\_gaz\_parcel, CDE, topoparcel, Itis\_owners.
  - Identify Results: Empty.
  - Feature List (for active\_gaz\_parcel): feature id, (Derived), (Actions), rcv\_date, reg\_date, parcel\_desc, custodian, parcel\_area, area\_uom, gazetted\_use, la\_number, status, comp\_area, remarks, gaz\_num, ordinance, gaz\_type, pub\_date\_1, pub\_date\_2, plan\_number.
- Main Map View:** Aerial satellite imagery with overlaid cadastral boundaries in red, yellow, and green. Numerous parcel numbers are visible, such as 107.67, 19.74, 13.65, 11.86, 10.63, 95.63, 10.63, 10.63, 13.59, 13.1, 14.46, 12.36, 24.8, 11.86, 1131, 129.02, 107.57, 37.02, 161.5, 107.62, 11.86, 18.53, 1112, 11.86, 37.11, 75.06, 37.14, 12.43, 6.04, 161.5, 9.88, 6.04, 9.88, 7.99, 7.41, 9.88.
- Status Bar:** Coordinate: 12929459,671684; Scale: 1:6,426; Rotation: 0.0; Render; EPSG:3857 (OTF).





# INTEGRATED SABAH GEO-CADASTRE DATA

Project Edit View Layer Settings Plugins Vector Raster Database Web Processing Help



Layers

- LAPD
  - lapd\_parcel
  - LAPD Drainage Acq
  - dec\_value\_geo
    - Before 2000
    - 2000 - 2005
    - 2006 - 2010
    - 2011 - Current
  - lapd\_acq\_values
- GAZMIS 2.0
  - active\_gaz\_parcel
- CDE
- topoparcel
- Its owners

Identify Results

| Feature                 | Value  |
|-------------------------|--|
| topoparcel              |  |
| feature id              | 407136   |
| (Derived)               |  |
| (Actions)               |  |
| Title Number            | 015392257  |
| Land Application Number | 76010067   |
| Previous Title Number   |  |
| Land Category           | Registered   |
| Parcel Description      |  |
| Plan Number             | 01124219   |
| Computed Area (sqm)     | 31049.9285888672   |
| Surveyed Area           | 7.67   |
| Unit Area               | Ac   |
| Std Sht Ref             | 674C-53  |
| RSP Number              | 76018032   |
| Reference Plans         | 01124093,01128819  |
| Surveyor                | ALEXIUS CHIN   |
| Date of Survey          | 19/09/1977   |
| Date Approved           | 09/04/1979   |
| District Surveyor       | NEIL M. GRAHAM   |
| Data Source             | 3  |
| Remarks                 |  |
| Plan Key                | 01124219p  |
| Survey Description      | PENYUKATAN PERMOHONAN PERMOHONAN TANAH DI KG. DARAU RAMPAYAN MENGGATAL |
| Gen Use                 | Agriculture  |
| Detailed Use            | Coconut  |

Mode Layer selection

Auto open form

View Tree

Help



Coordinate: 12928809,672029 Scale 1:6,426 Rotation: 0.0 Render EPSG:3857 (OTF)



# INTEGRATED SABAH GEO-CADASTRE DATA

Actions

Title Details

|                    |  |
|--------------------|--|
| Title Number       | 015392257  |
| Land Category      | Registered   |
| Plan Number        | 01124219   |
| Parcel Description |  |
| Surveyed Area      | 7.67   |
| Unit Area          | Ac   |
| Survey Description | PENYUKATAN PERMOHONAN PERMOHONAN TANAH DI KG. DARAU RAMPAYAN MENGGATAL |
| Gen Use            | Agriculture  |
| Detailed Use       | Coconut  |

Owners

▼ Itis\_owners

✎ 📄 + ✕ ⏪ ⏩

Expression

373023

|             |                              |
|-------------|------------------------------|
| OGC_FID     | 373023                       |
| title_num   | 015392257                    |
| owner_name  | SINAR PEMBANGUNAN SDN BHD    |
| owner_share | .99999                       |
| address     | PB 10827 88809 KOTA KINABALU |
| old_ic      | 1H640206                     |

OK Cancel





# INTEGRATED SABAH GEO-CADASTRE DATA

Project Edit View Layer Settings Plugins Vector Raster Database Web Processing Help



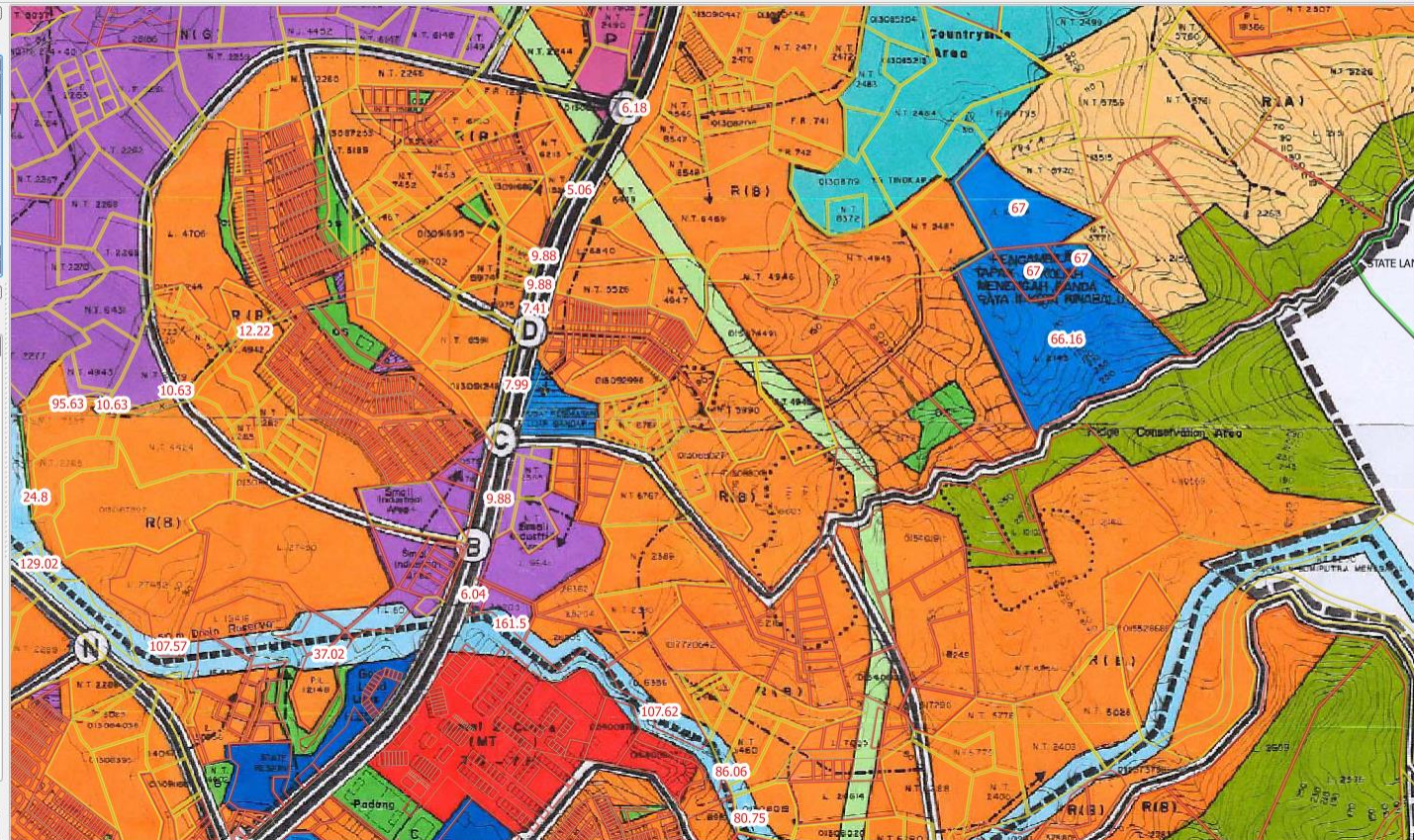
**Layers**

- [-] LAPD
  - [-] lapd\_parcel
  - [-] LAPD Drainage Acq
    - [-] Before 2000
    - [-] 2000 - 2005
    - [-] 2006 - 2010
    - [-] 2011 - Current
  - [-] lapd\_acq\_values
  - [-] GAZMIS 2.0
  - [-] active\_gaz\_parcel
  - [-] CDE
  - [-] topoparcels
  - [-] Itis\_owners

**Identify Results**

| Feature | Value |
|---------|-------|
|         |       |

Mode: Layer selection  Auto open form  
View: Tree



No features at this position found.

Coordinate: 12929719,672253 Scale: 1:6,426 Rotation: 0.0  Render  EPSG:3857 (OTF)





# CADASTRE LOT, ZONING MAP & LAND VALUE

Project Edit View Layer Settings Plugins Vector Raster Database Web Processing Help

Layers

- LAPD
- lapd\_parcels
- LAPD Drainage Acq
- dec\_value\_geo
  - Before 2000
  - 2000 - 2005
  - 2006 - 2010
  - 2011 - Current
- lapd\_acq\_values
- GAZMIS 2.0
- active\_gaz\_parcels
- CDE
- topoparcels
- Its owners

Identify Results

| Feature                 | Value                    |
|-------------------------|--------------------------|
| topoparcels             |                          |
| feature id              | 102145                   |
| (Derived)               |                          |
| (Actions)               |                          |
| Title Number            | 015063368                |
| Land Application Number |                          |
| Previous Title Number   |                          |
| Land Category           | Registered               |
| Parcel Description      |                          |
| Plan Number             | 5181                     |
| Computed Area (sqm)     | 13453.9545593262         |
| Surveyed Area           | 3.33                     |
| Unit Area               |                          |
| Std Sht Ref             | 67-KC-45                 |
| RSP Number              | 33018017                 |
| Reference Plans         | 2510,2645,283,1542,3503  |
| Surveyor                |                          |
| Date of Survey          |                          |
| Date Approved           | 16/11/1934               |
| District Surveyor       | T.J.H. SPEEDY            |
| Data Source             | 2                        |
| Remarks                 |                          |
| Plan Key                | 5181_01p                 |
| Survey Description      | PLAN OF INSPECTION SU... |
| Gen Use                 | NULL                     |
| Detailed Use            | NULL                     |

Mode: Layer selection  Auto open form

View: Tree

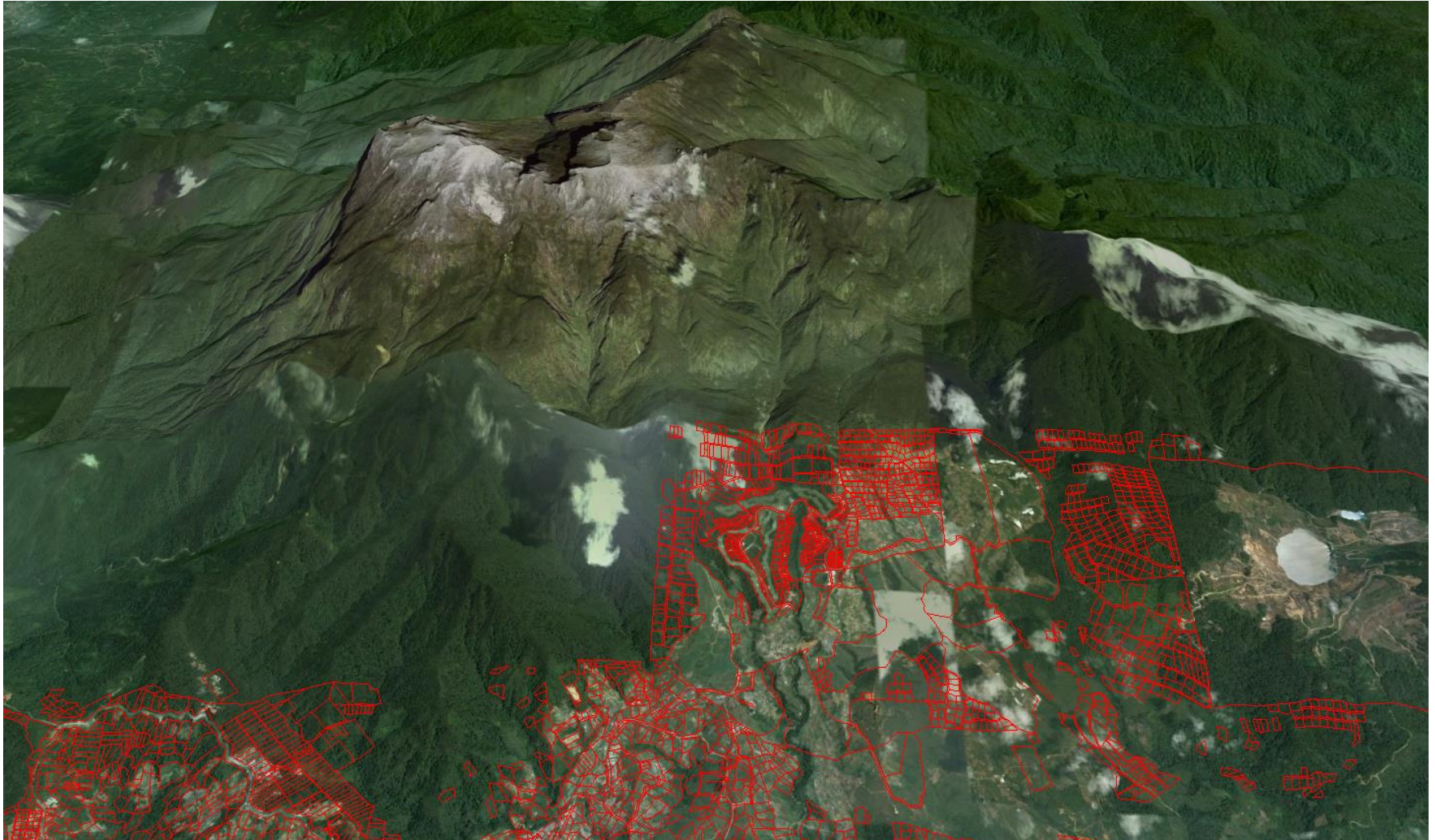
No features at this position found.

Coordinate: 12930013,673110 Scale: 1:6,426 Rotation: 0.0 Render EPSG:3857 (OTF)





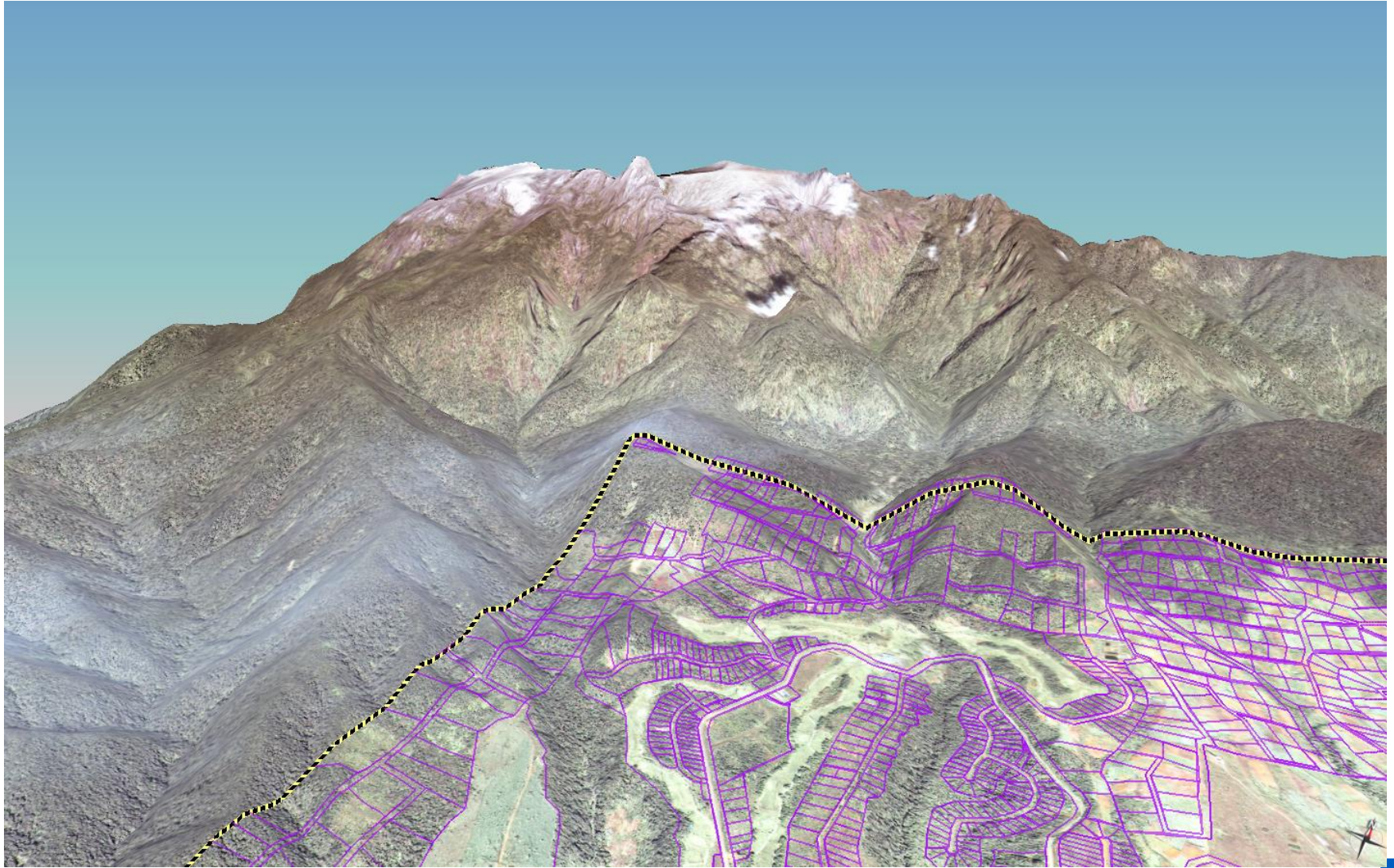
## 3D CADASTRE PROJECT – cadastre lots with google earth





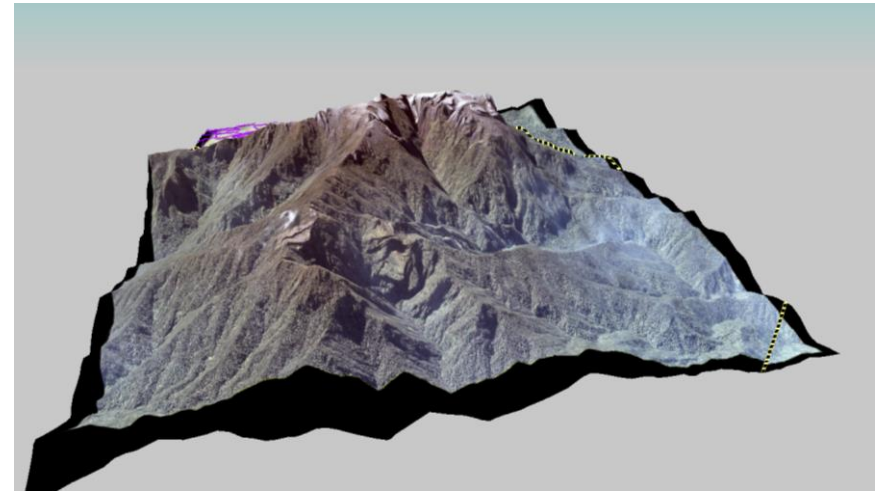
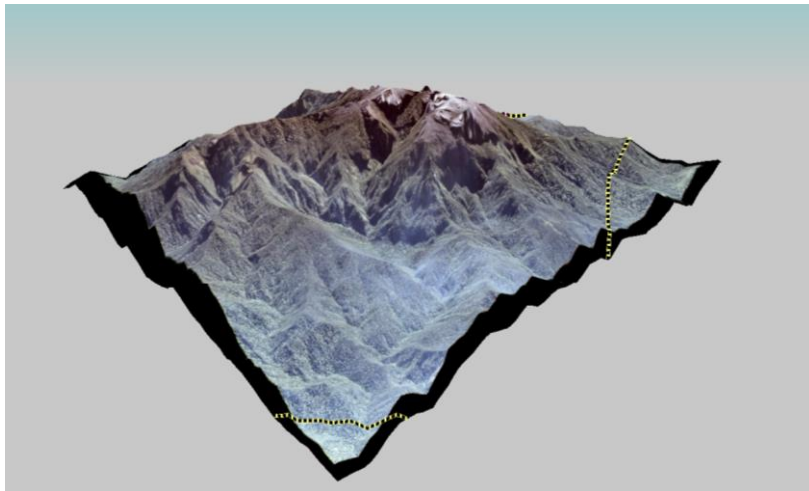
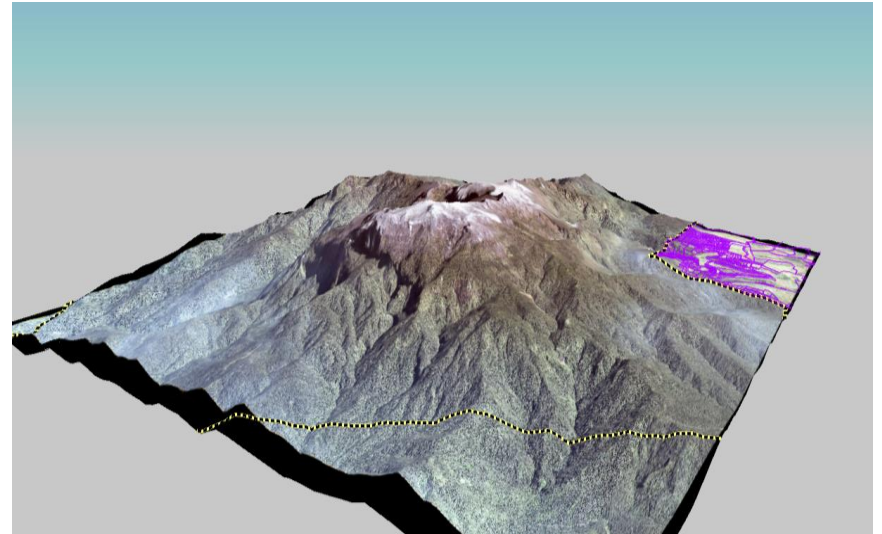
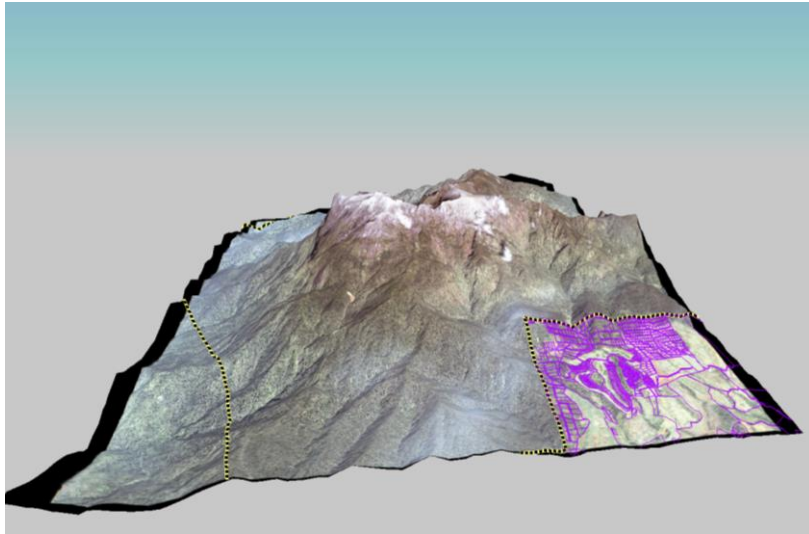


# CADASTRE DATA OVERLAY WITH 3D MODEL





# CADASTRE DATA OVERLAY WITH 3D MODEL



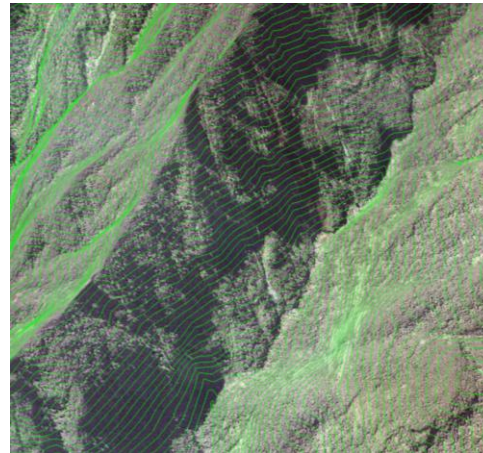




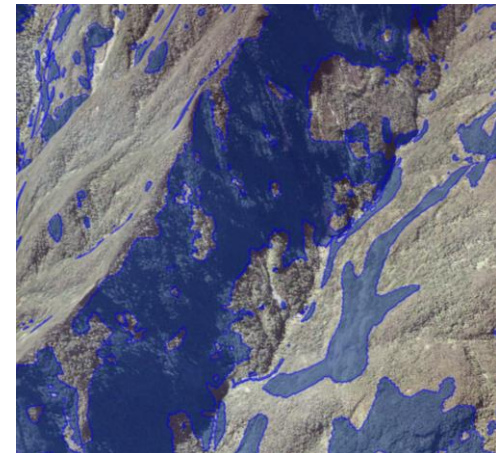
# CONTOUR ANALYSIS & SLOPE ANALYSIS



DTM +  
Orthophoto



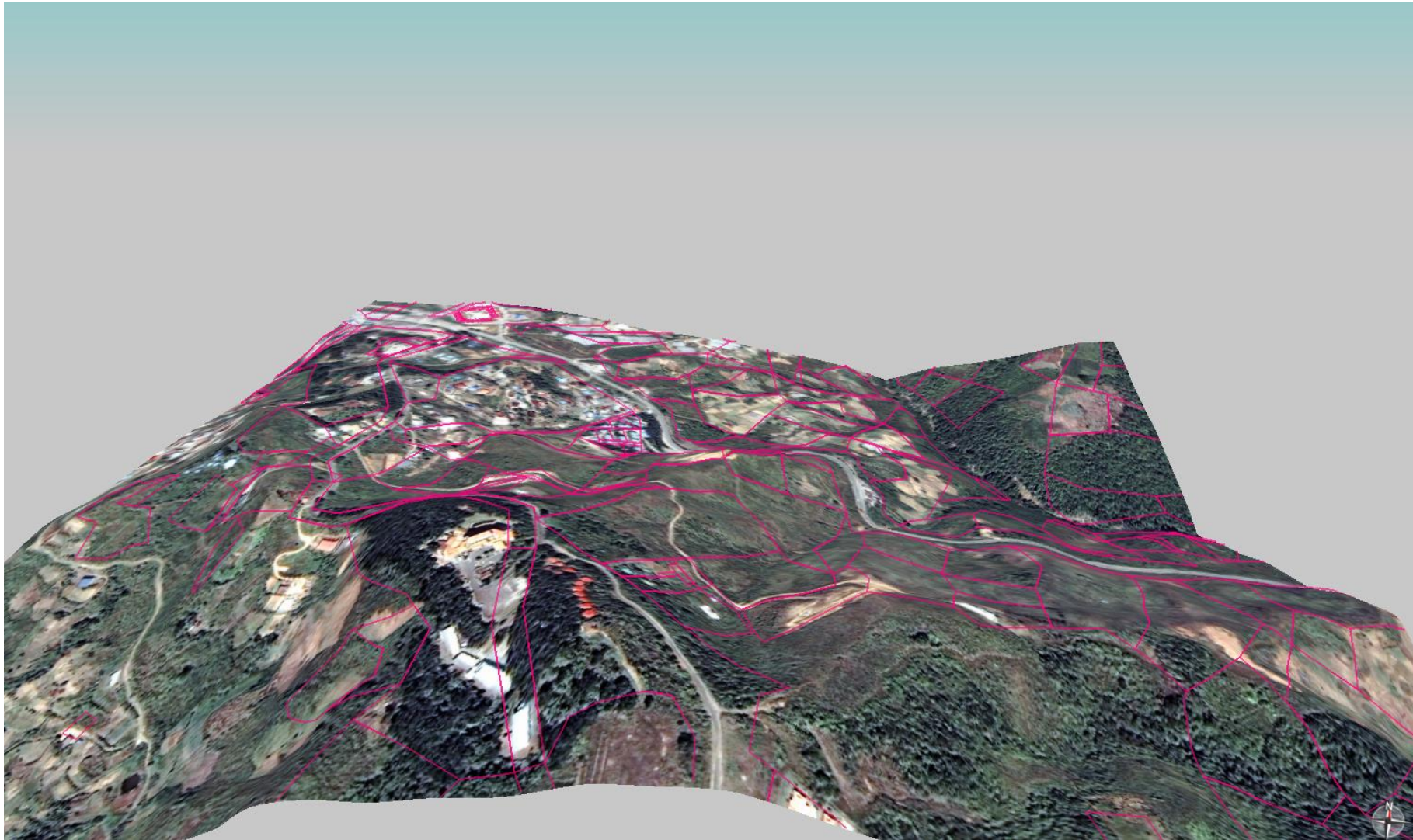
Contour  
Analysis



Slope Analysis -  
45 deg



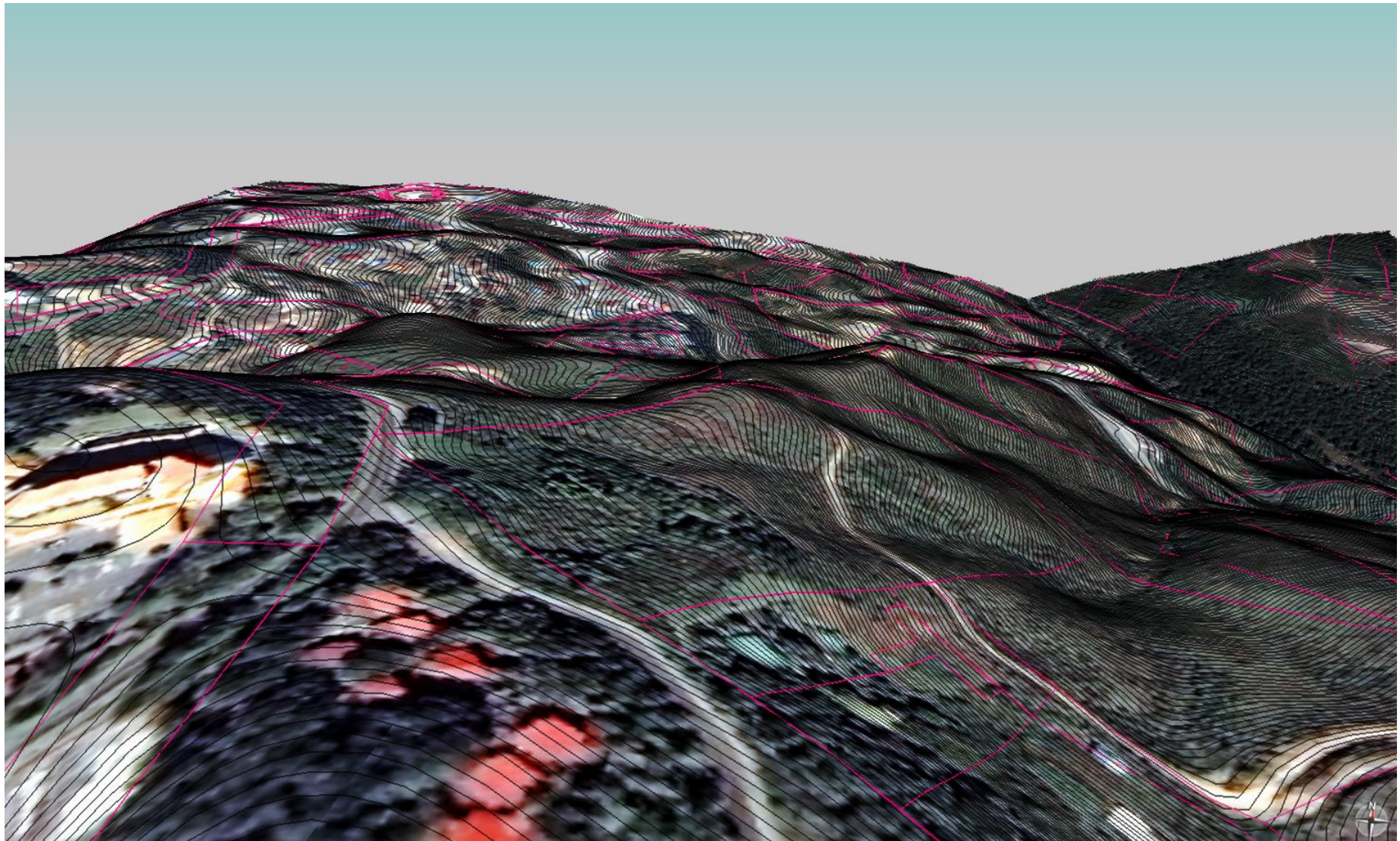
# CADASTRE LOTS OVERLAY WITH 3D MODEL





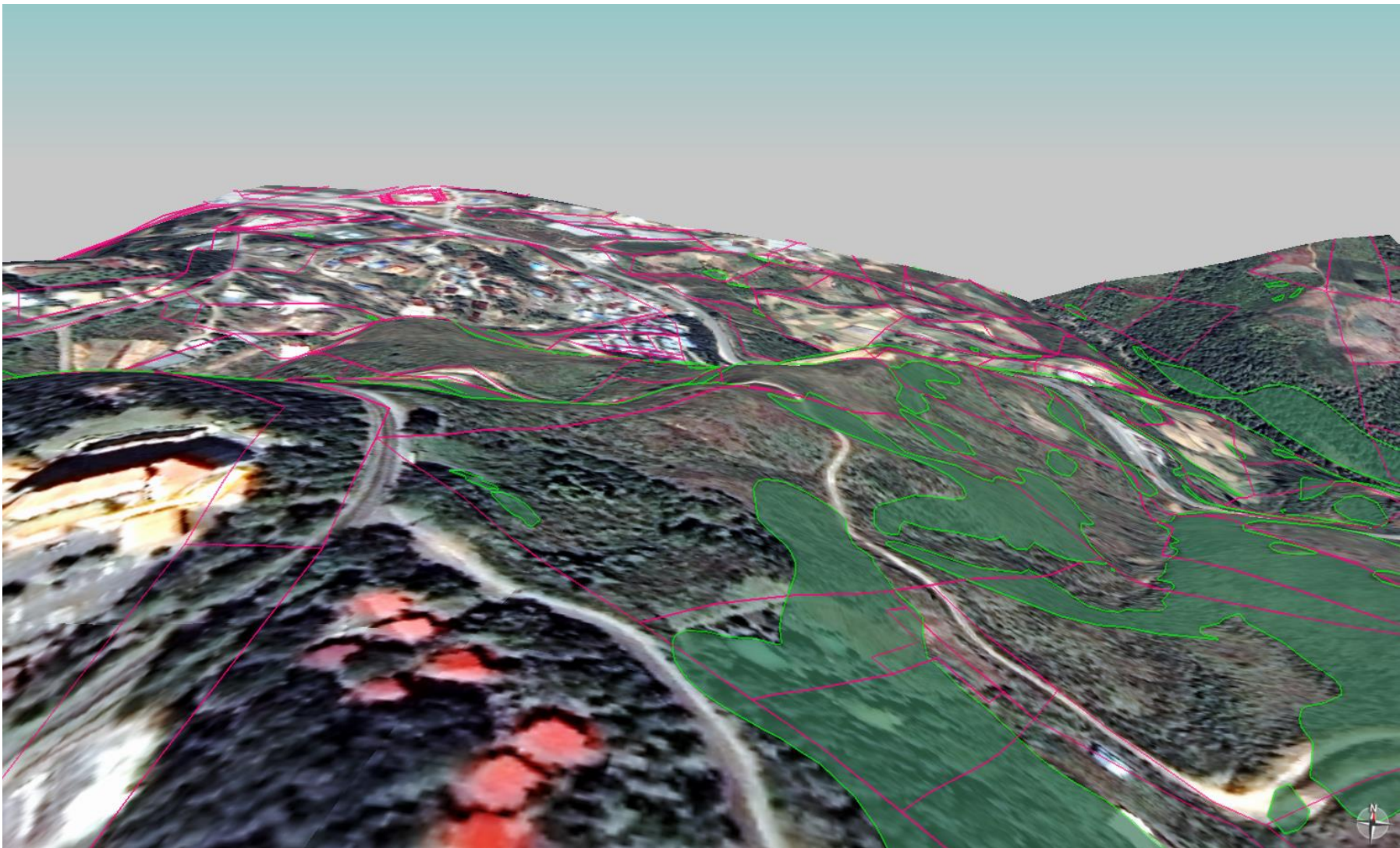


# CADASTRE LOTS, CONTOUR OVERLAY WITH 3D MODEL





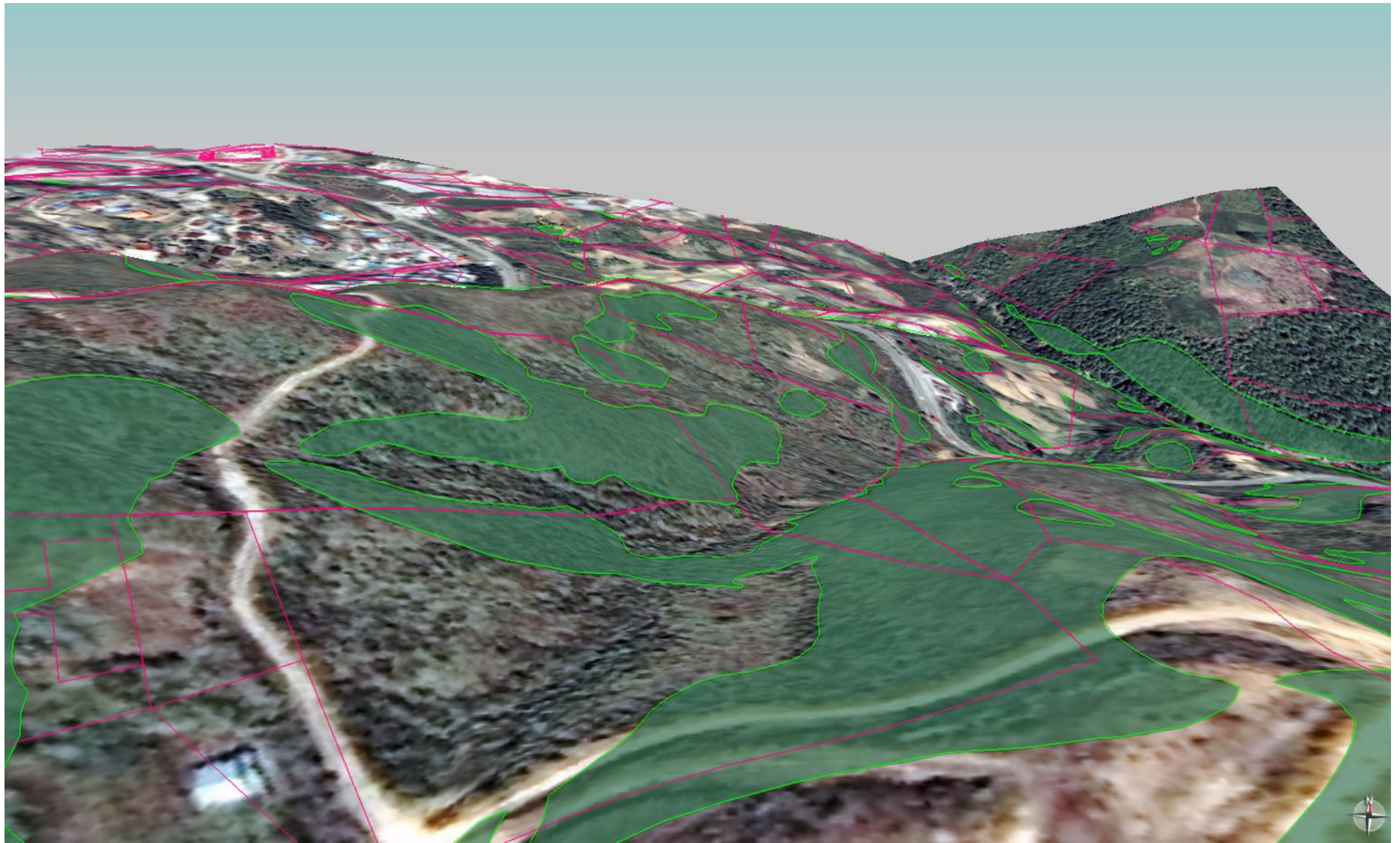
# CADASTRE LOTS & 25 deg SLOPE ON 3D MODEL







# CADASTRE LOTS & 25 deg SLOPE ON 3D MODEL





## CONCLUSION

- ❖ Mobile GIS application is just one of many innovations that are being implemented in the Department of Lands and Surveys to provide fast and efficient service to customers.
- ❖ Now public can access to know the status of their land without having to go to Lands and Surveys Department. It saves time and costs. Therefore the objective Mobile GIS project is achieved, namely **“Access by Any One, At Any Time, At Any Where, By Any Device”**.
- ❖ Integrated Sabah Geo-Cadastre Data is currently being used as a management tool by our Land Administrators



**? & a**

**THANK YOU**