



Developing exposure database



Data Needed:

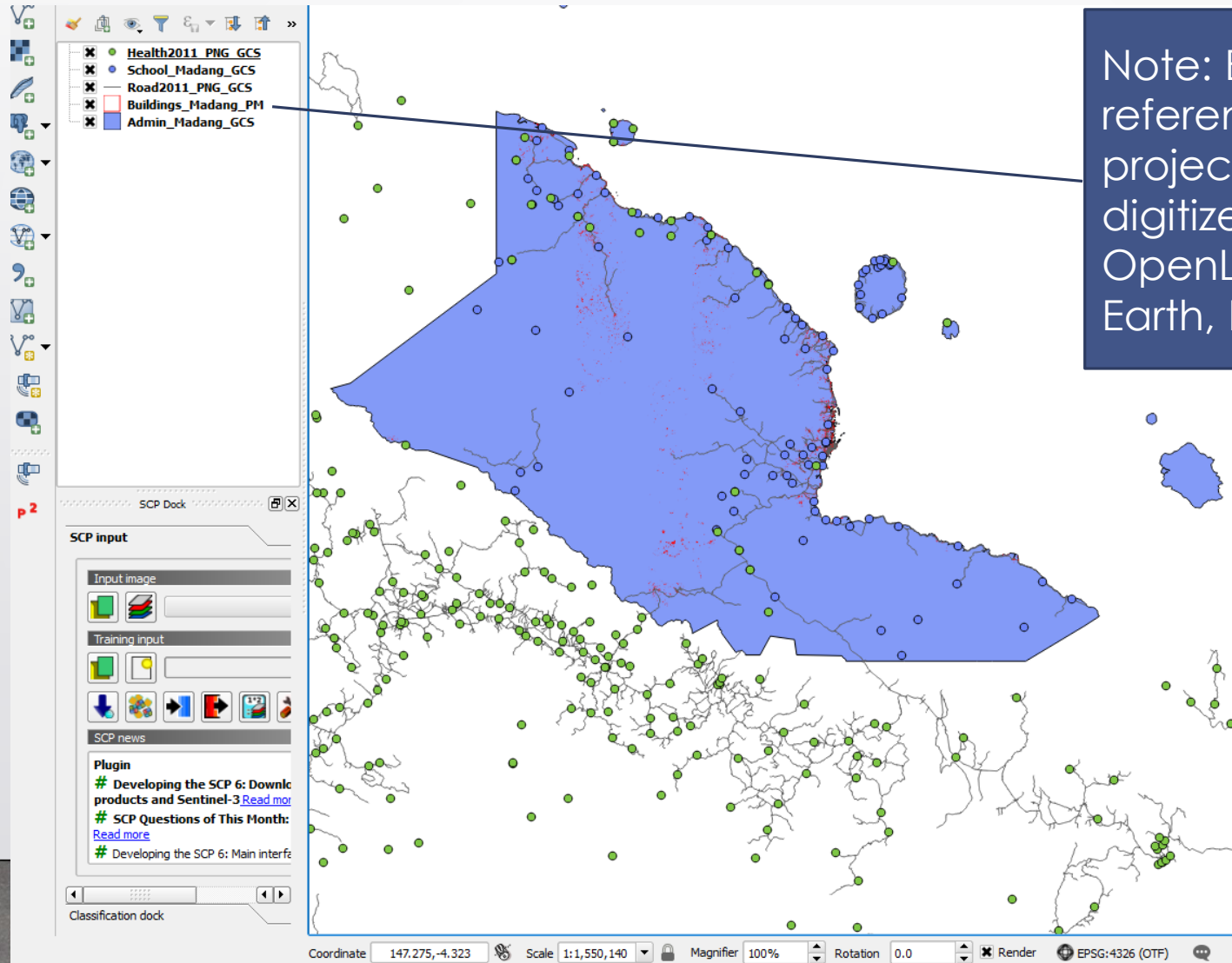
- Administrative boundary (Admin_Madang_GCS.shp)
- Buildings (Buildings_Madang_PM.shp)
- Critical facilities (Health2011_ONG_GCS.shp,
Road 2011_PNG_GCS.shp,
School_Madang_GCS.shp)



Plugin Needed:

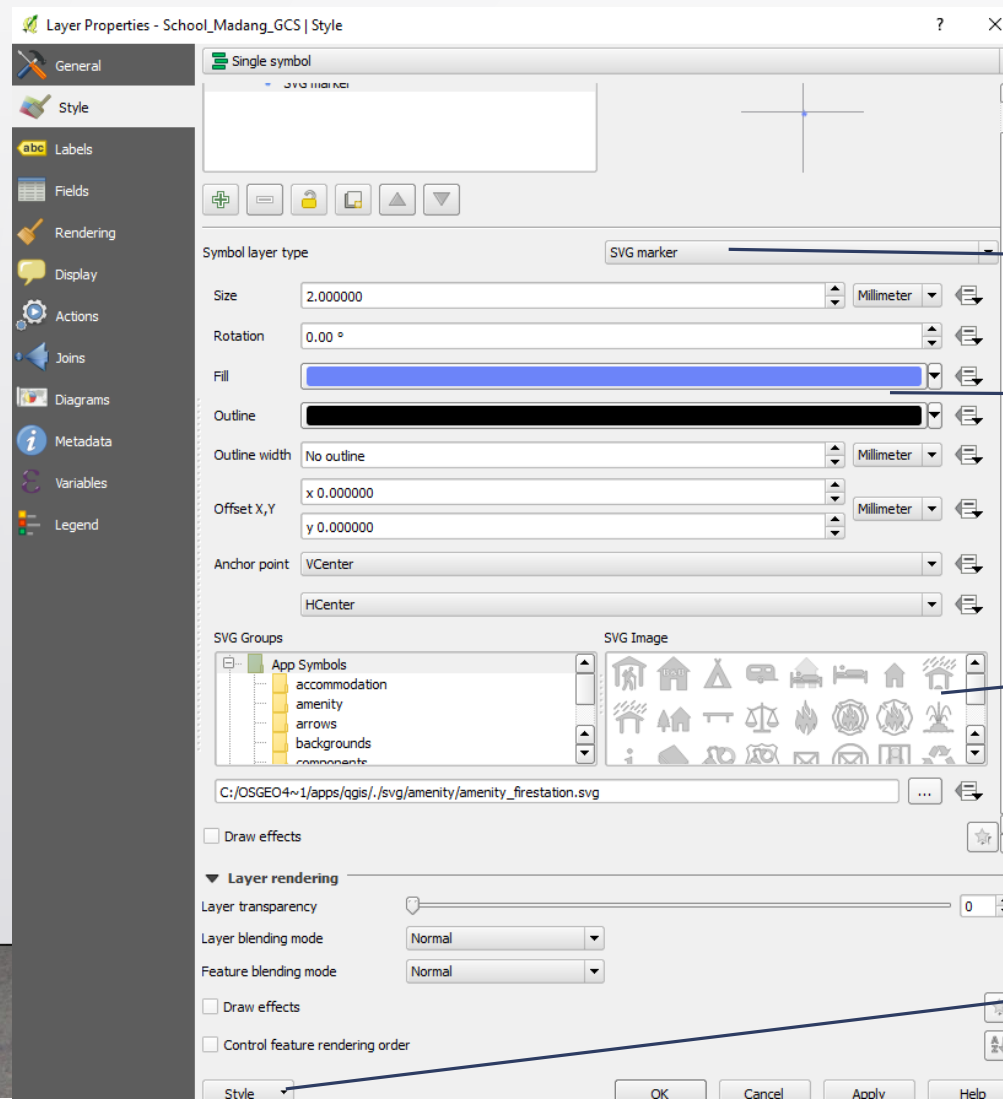
- OpenLayers

1. Load all data layers



Note: Building footprints are referenced to the Pseudo Mercator projection system (EPSG 3857) if digitized using basemaps from OpenLayers plugin e.g. Google Earth, Bing, etc.

2. Symbolizing point layers



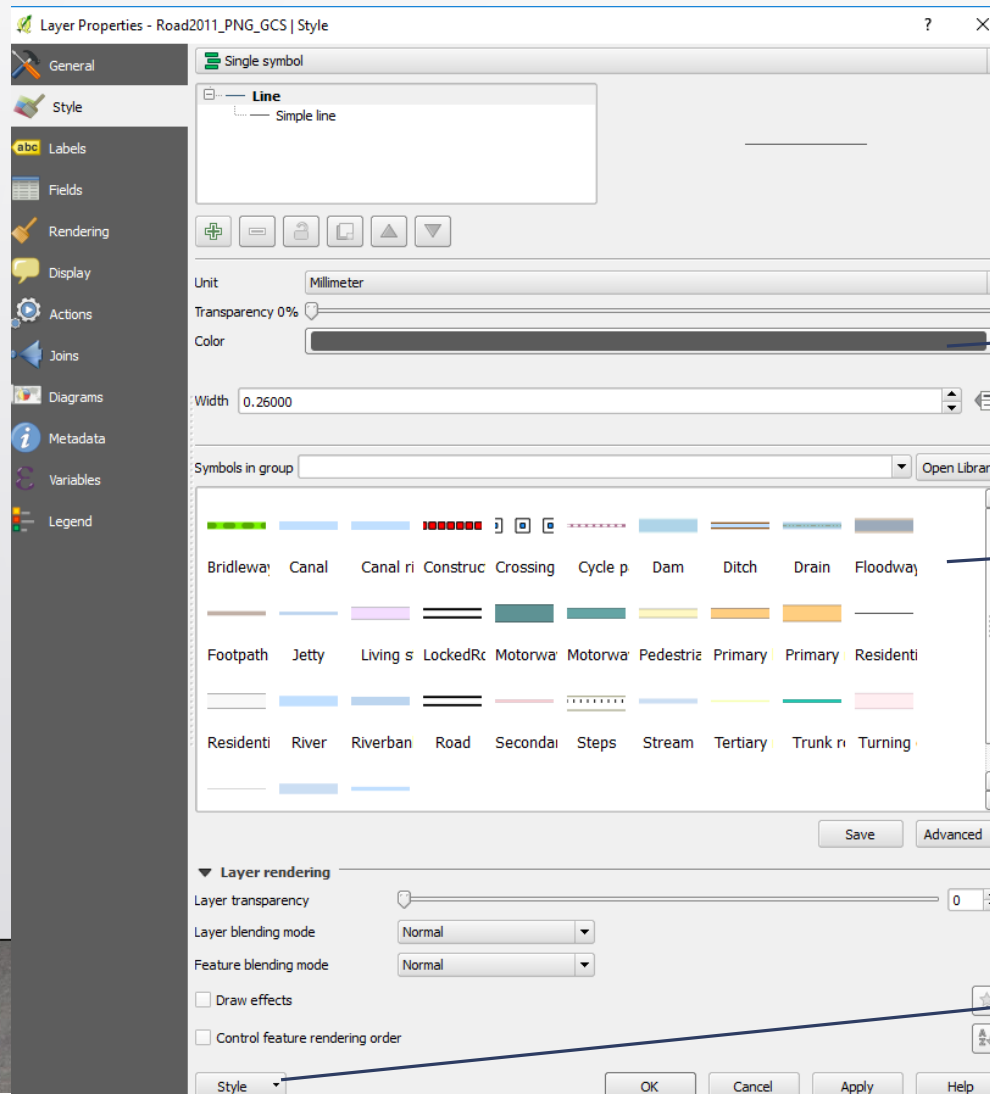
Select symbol type

Select color

Select style

Save style, in case you want to apply to the saymbology in another area

3. Symbolizing line layers

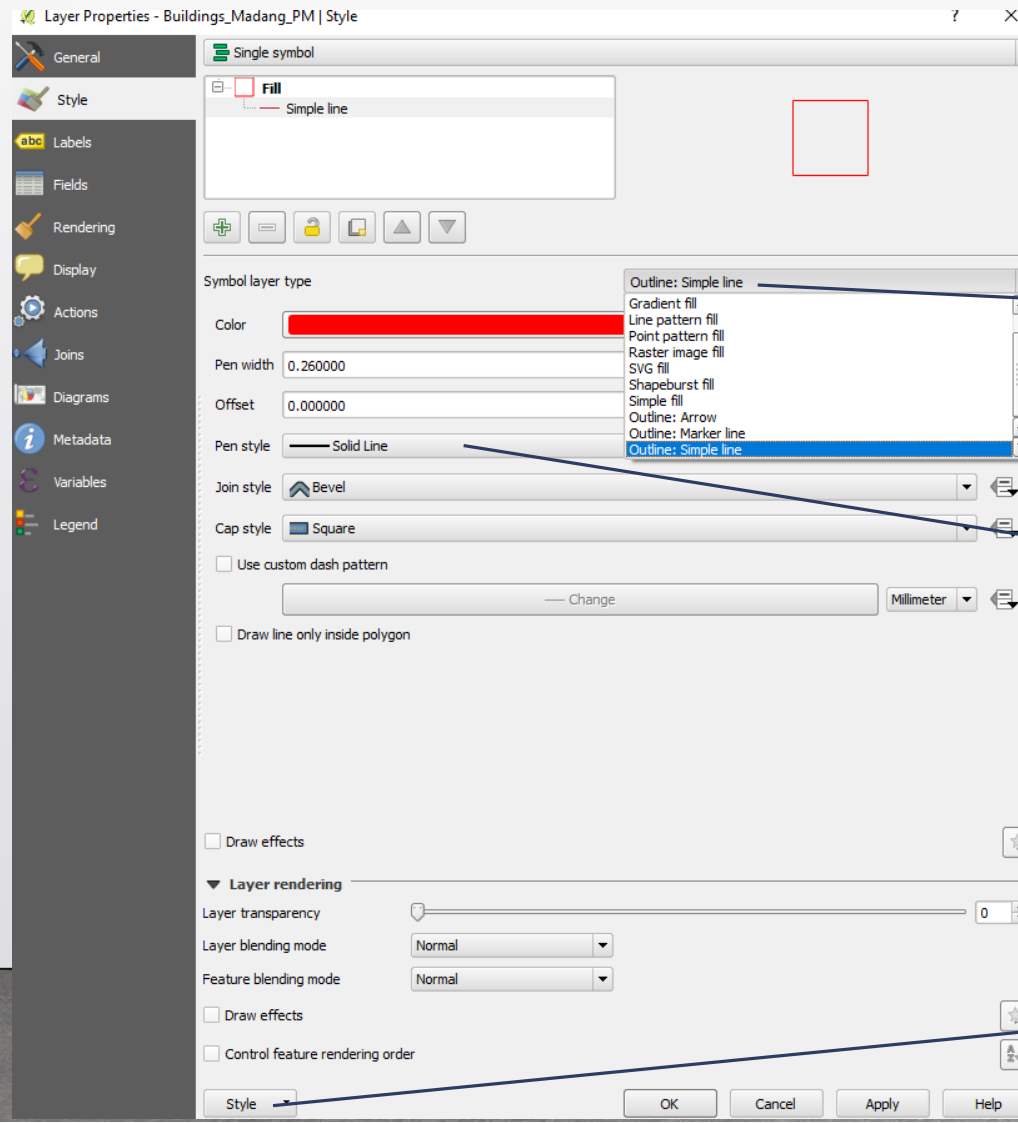


Select color

Select style

Save style, in case you want to apply to the saymbology in another area

4. Symbolizing polygon layers



Select symbol type

Select style

Save style, in case you want to apply to the symbology in another area

Digitizing building footprints

6. Create new polygon shapefile layer

New Shapefile Layer

Type

☐ Point ☐ Line ☒ Polygon

File encoding: System

EPSG:3857 - WGS 84 / Pseudo Mercator

New field

Name: id

Type: Text data

Length: 80 Precision:

Add to fields list

Fields list

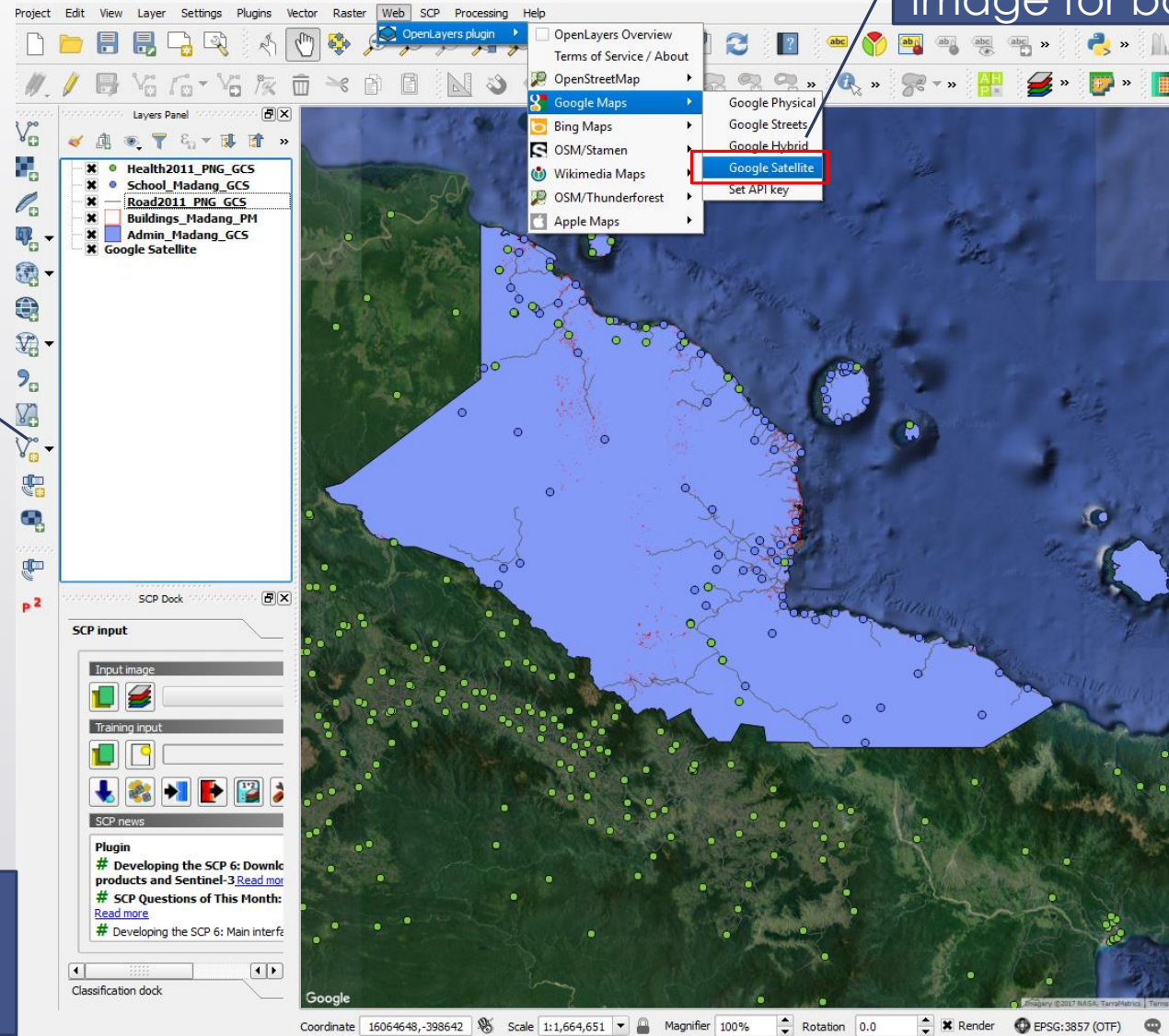
Name	Type	Length	Precision
id	Integer	10	

Remove field

OK Cancel Help

Note: Use Pseudo Mercator if digitizing based on Google Earth image

5. Open Google Satellite image for basemap



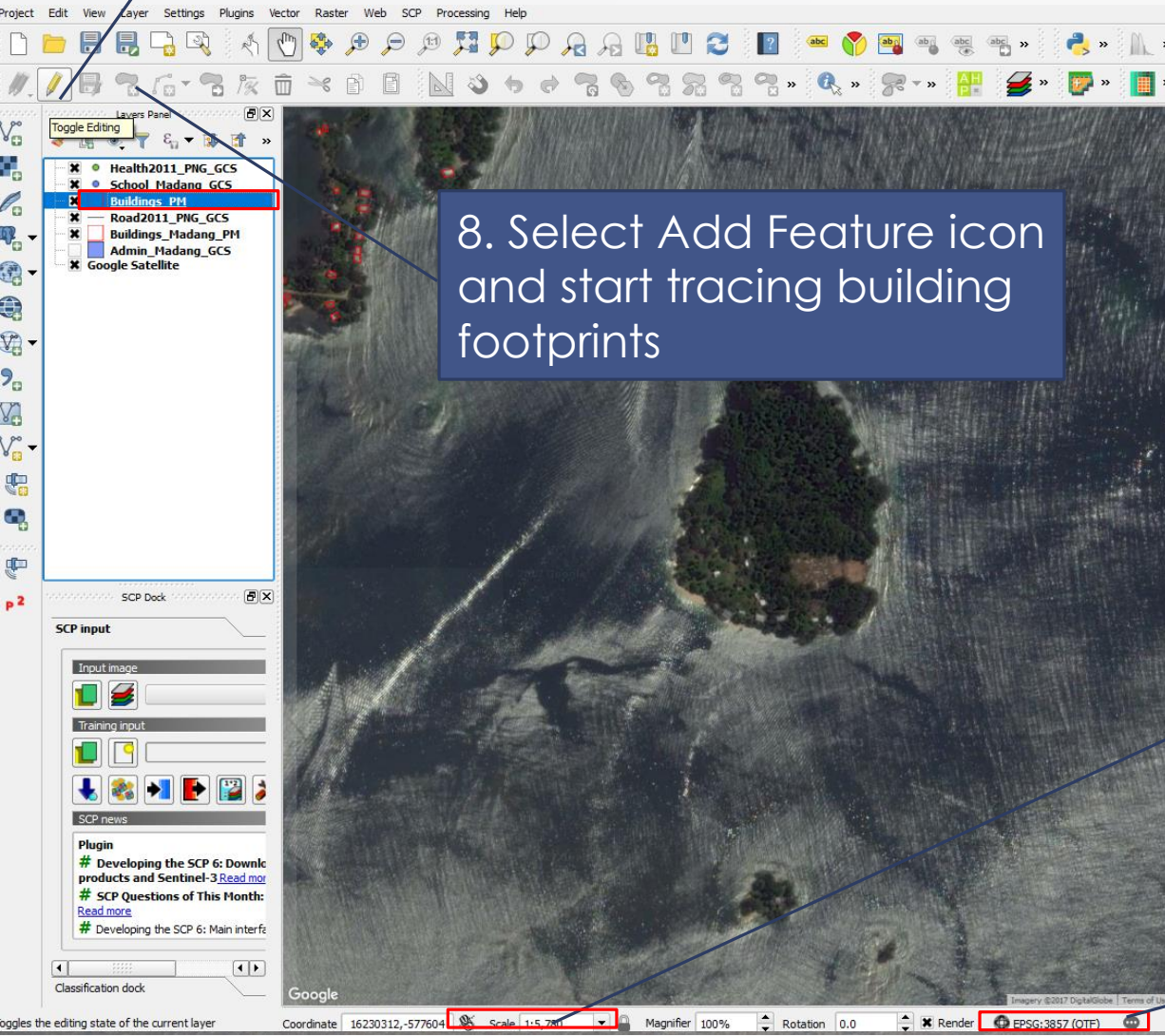
Digitizing building footprints

7. Click on layer to edit and click on toggle editing

8. Select Add Feature icon and start tracing building footprints

Note: Scale should be smaller or equal to 1: 2,500 to avoid shifting errors

Note: Coordinate system used is Pseudo Mercator EPSG 3857



Updating building attributes

The screenshot shows the QGIS interface with a table of building attributes. The table has columns: id, Usage, Structure, and Pop_Househ. The data is as follows:

id	Usage	Structure	Pop_Househ
1	Residential	Wood	6
2	Residential	Wood	6
3	Residential	Wood	6
4	Residential	Wood	6
5	Residential	Wood	6
6	Residential	Wood	6
7	Residential	Wood	6
8	Residential	Wood	6
9	Residential	Wood	6
10	Residential	Wood	6
11	Residential	Wood	6
12	Residential	Wood	6
13	Residential	Wood	6
14	Residential	Wood	6
15	Residential	Wood	6
16	Residential	Wood	6
17	Residential	Wood	6
18	Residential	Wood	6
19	Residential	Wood	6
20	Medical	Reinforced concr...	20

An 'Add field' dialog box is open, showing the 'Type' dropdown menu set to 'Whole number (integer)'. The 'Provider type' is set to 'integer' and the 'Length' is set to '0'. The 'Name' and 'Comment' fields are empty. The 'OK' and 'Cancel' buttons are at the bottom.

9. Select New field icon

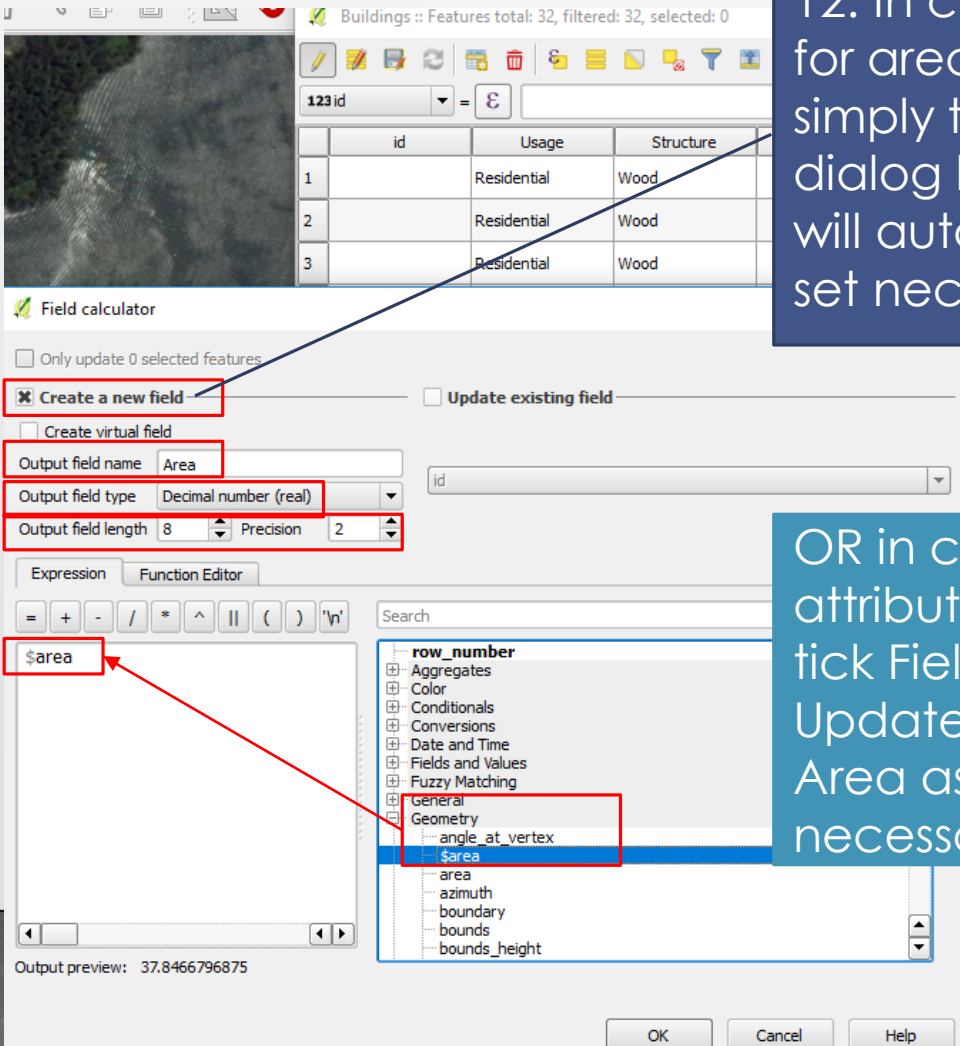
10. Set parameters

- String – descriptive e.g. usage
- Integer – e.g. population
- Real number – e.g. area

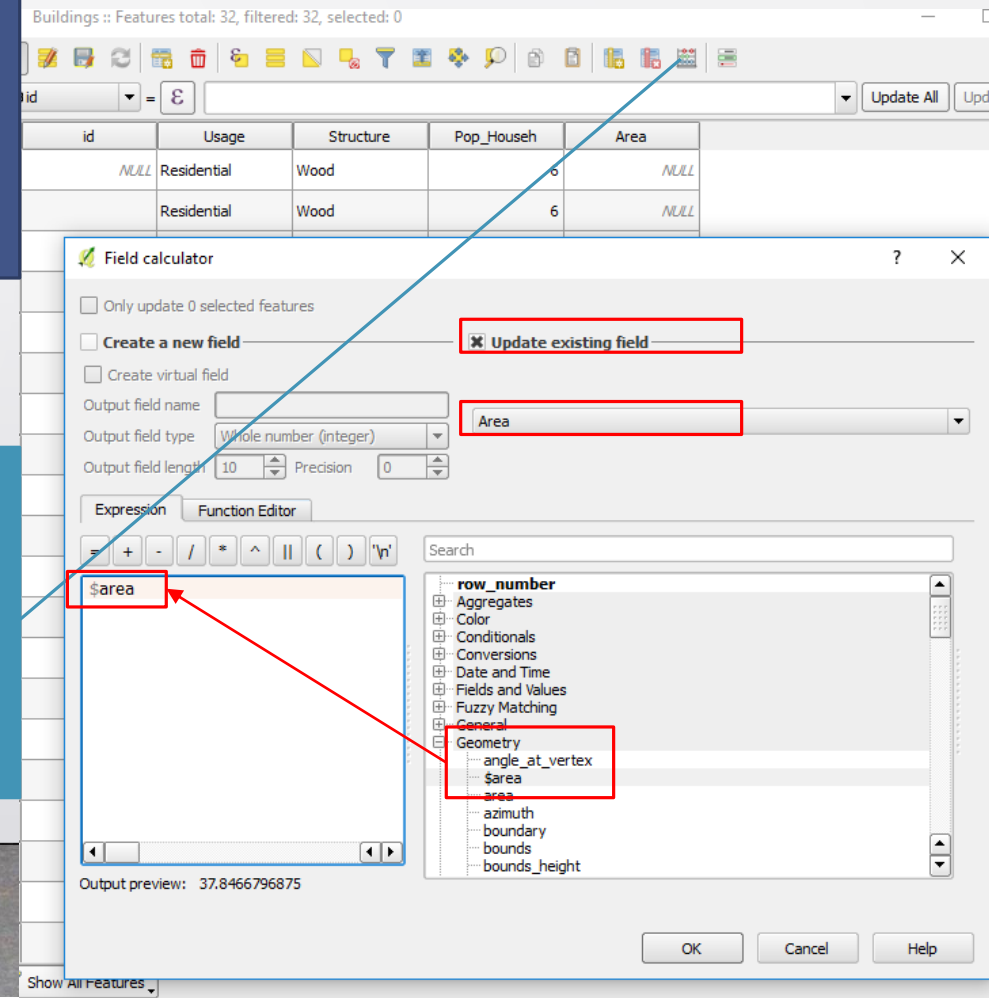
11. Update information based on building characteristics

Calculating building footprint area

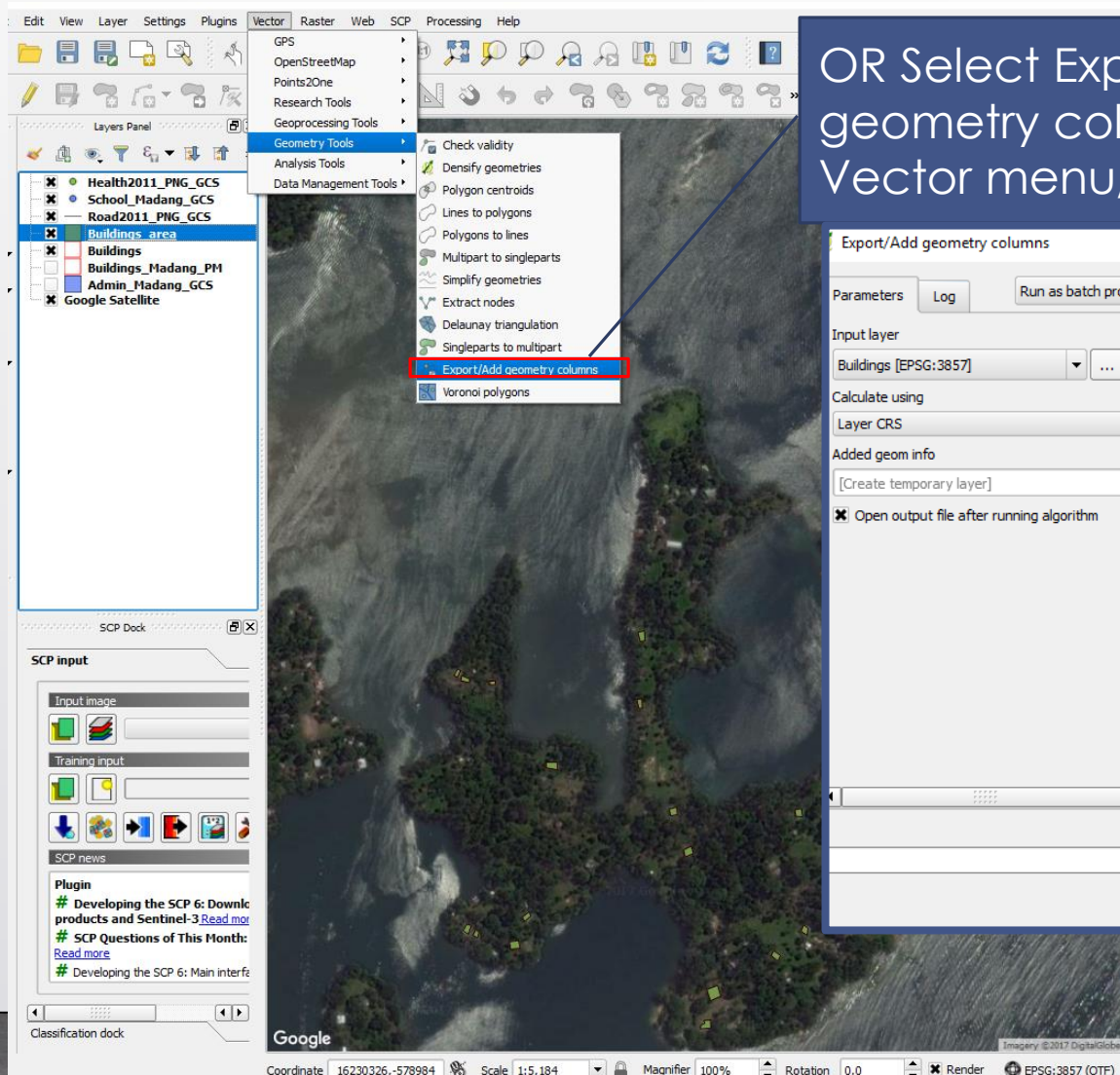
12. In case no attribute column for area has been created yet, simply tick create new field and dialog box for Field Calculator will automatically pop up, then, set necessary parameters



OR in case there exists an attribute column for area, simply tick Field Calculator icon, tick Update existing field and select Area as column, then, set necessary parameters



Calculating building footprint area



OR Select Export/Add geometry columns under Vector menu/Geometry Tools

Buildings_area :: Features total: 32, filtered: 32, selected: 0

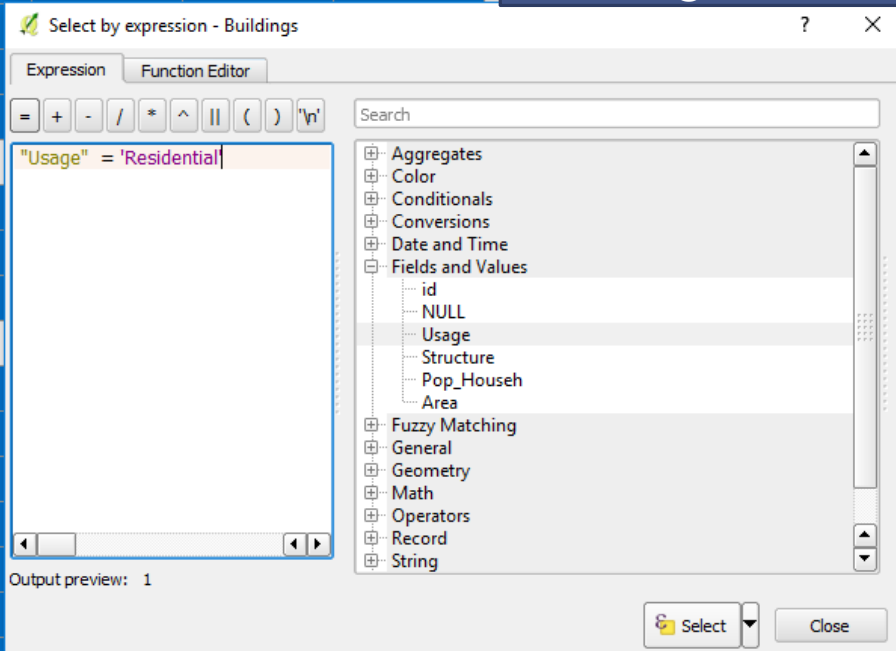
id	Usage	Structure	Pop_Househ	area	perimeter
	Residential	Wood	6	105.6630859375...	41.60257762373...
	Residential	Wood	6	115.1923828125...	47.42009281203...
	Residential	Wood	6	123.6015625000...	44.74471144277...
	Residential	Wood	6	125.1328125000...	46.54065802487...
	Residential	Wood	6	149.6347656250...	50.56552012222...
	Residential	Wood	6	16.18945312500...	16.20218551590...
	Education	Reinforced concr...	100	161.6640625000...	52.05005220677...
	Medical	Reinforced concr...	20	187.6992187500...	55.30653173753...
	Residential	Wood	6	189.8857421875...	55.59168216284...
	Residential	Wood	6	19.68847656250...	18.17210344508...
	Residential	Wood	6	217.0146484375...	59.08876068476...
	Residential	Wood	6	26.25097656250...	20.70924774391...
	Residential	Wood	6	28.00195312500...	23.03764076882...
	Residential	Wood	6	28.65625000000...	21.92357836229...
	Residential	Wood	6	37.62695312500...	25.44840934615...
	Residential	Wood	6	37.84667968750...	25.20660202040...
	Residential	Wood	6	45.50390625000...	28.71167132035...
	Residential	Wood	6	45.93945312500...	27.80611964238...
	Residential	Wood	6	50.75097656250...	30.17833276184...
	Residential	Wood	6	55.12792968750...	29.99376789290...
	Residential	Wood	6	55.12890625000...	30.34889939249...

Selecting features using expression

Buildings :: Features total: 32, filtered: 32, selected: 30

	id	Usage	Structure	Pop_Househ	Area
1	NULL	Residential	Wood	6	NULL
2		Residential	Wood	6	NULL
3		Residential	Wood	6	NULL
4		Residential			
5		Residential			
6		Residential			
7		Medical			
8		Residential			
9		Residential			
10		Residential			
11		Education			
12		Residential			
13		Residential			
14		Residential			
15		Residential			
16		Residential			
17		Residential			
18		Residential	Wood	6	NULL
19		Residential	Wood	6	NULL
20	NULL	Residential	Wood	6	NULL

13. Select Select features using an expression icon to batch select features e.g. select only residential buildings

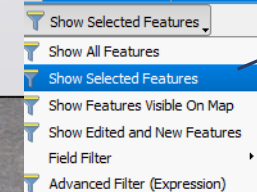


Buildings :: Features total: 32, filtered: 30, selected: 30

	id	Usage	Structure	Pop_Househ	Area
1	NULL	Residential	Wood	6	NULL
2		Residential	Wood	6	NULL
3		Residential	Wood	6	NULL
4		Residential			
5		Residential			
6		Residential			
7		Residential			
8		Residential			
9		Residential	Wood	6	NULL
10		Residential	Wood	6	NULL
11		Residential	Wood	6	NULL
12		Residential	Wood	6	NULL
13		Residential			
14		Residential			
15		Residential			
16		Residential			
17		Residential			
18	NULL	Residential	Wood	6	NULL
19	NULL	Residential	Wood	6	NULL
20	NULL	Residential	Wood	6	NULL

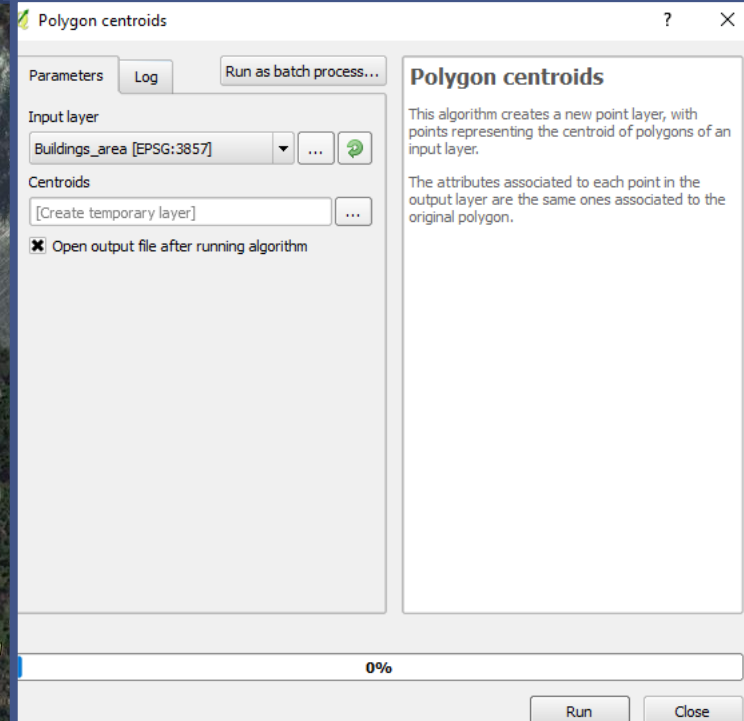
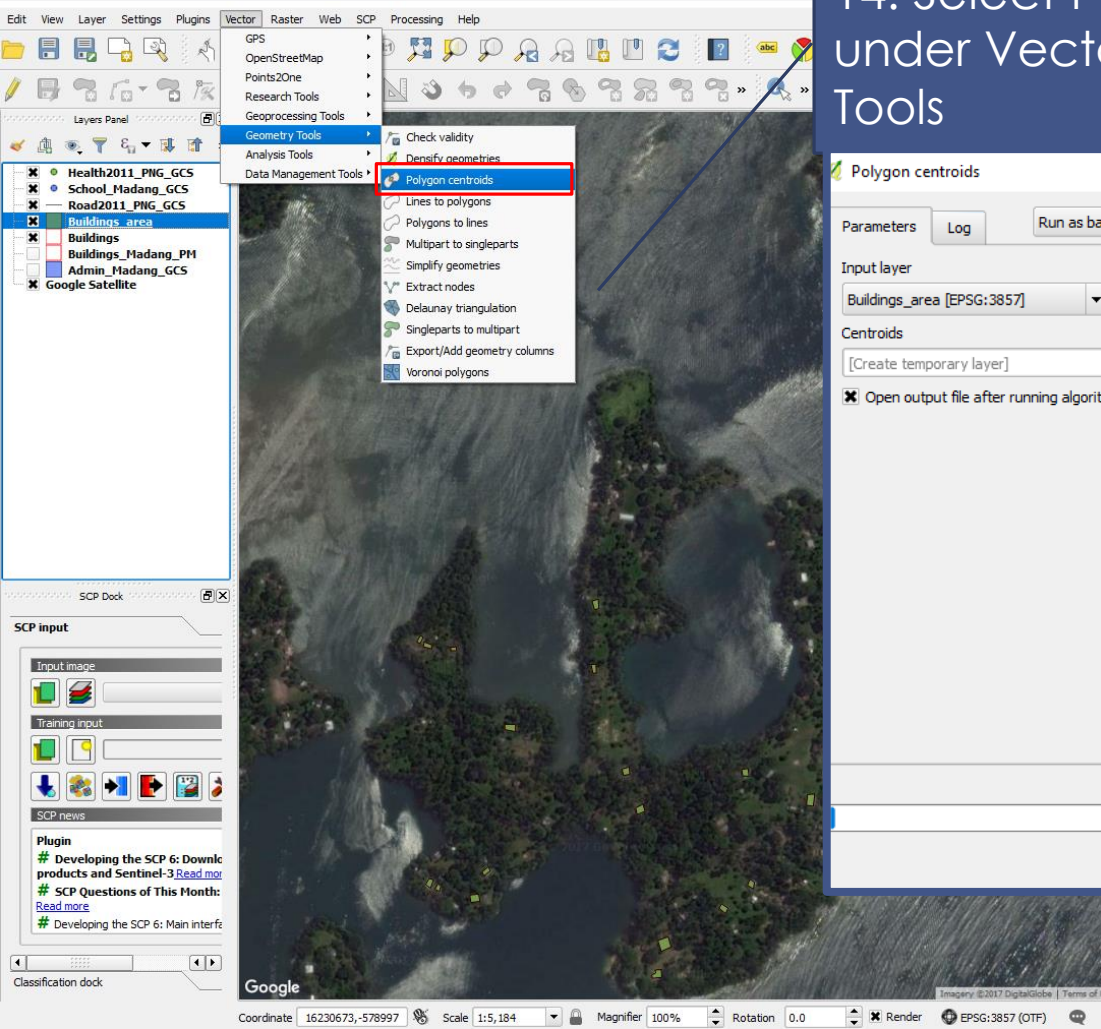
To delete unnecessary columns, select Delete Field

To display only selected items, select Show Selected Features



Converting building footprint (polygon) to centroid (point) and calculating projected coordinates

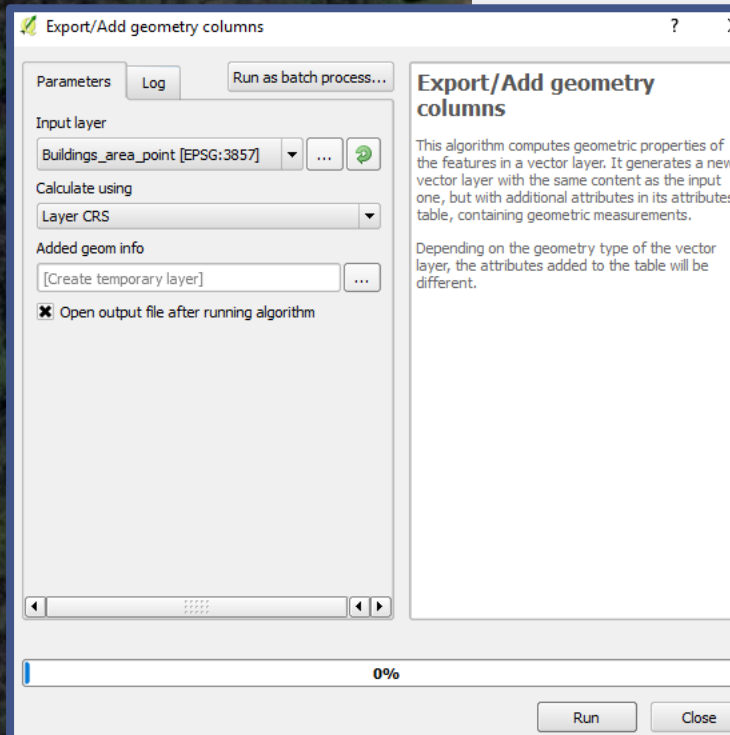
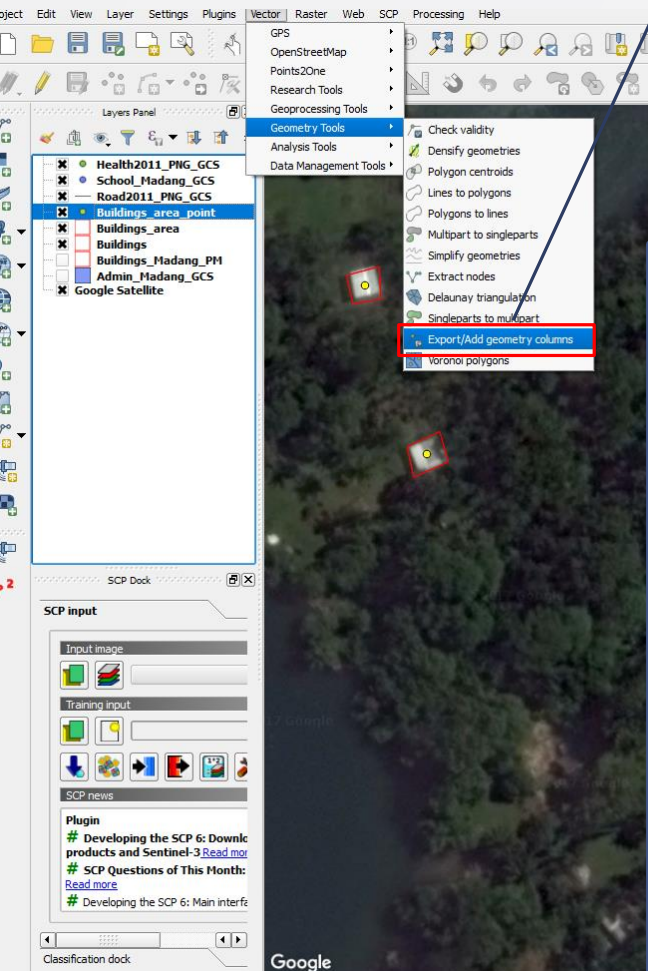
14. Select Polygon centroids under Vector menu/Geometry Tools



Converting building footprint (polygon) to centroid (point) and calculating projected coordinates

15. Select export/Add geometry columns under Vector menu/Geometry Tools

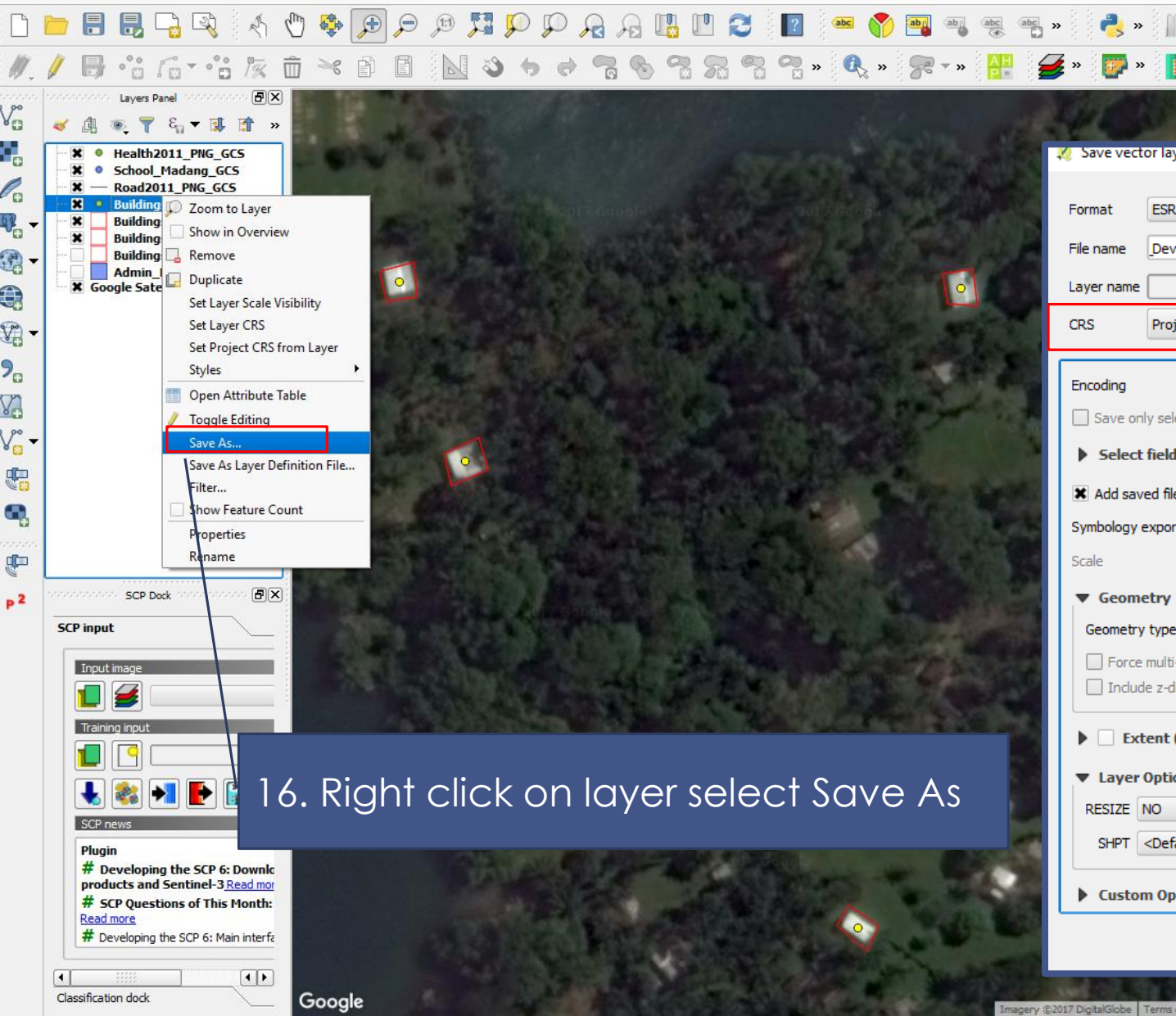
Projected coordinates



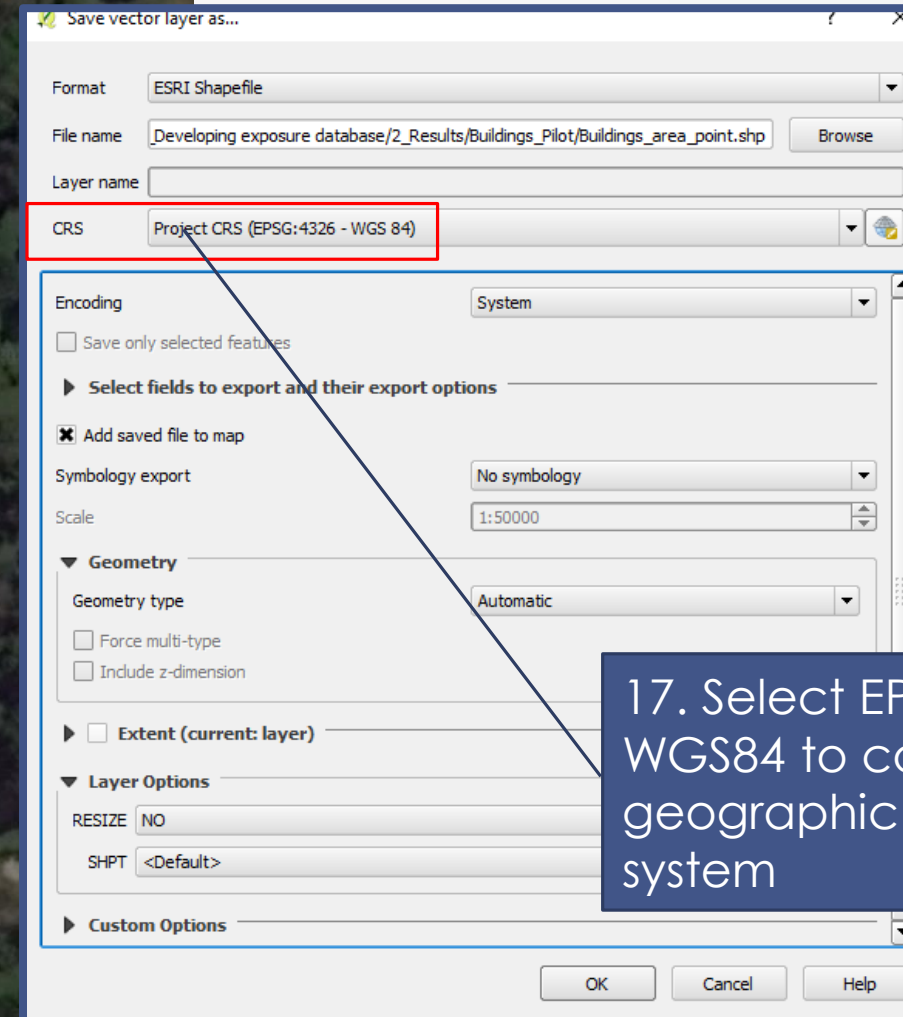
The screenshot shows the 'Buildings_area_pointbyPM' table. The 'xcoord' and 'ycoord' columns are highlighted in red. The table contains 32 rows of data, each representing a building footprint converted to a point with its projected coordinates.

	id	Usage	Structure	Pop_Househ	area	perimeter	xcoord	ycoord
		Residential	Wood	6	37.84667968750...	25.20660202040...	16230553.59286...	-579708.861482...
		Residential	Wood	6	65.19238281250...	34.27530418227...	16230518.35625...	-579704.342590...
		Residential	Wood	6	125.1328125000...	46.54065802487...	16230630.10890...	-579814.864469...
		Residential	Wood	6	115.1923828125...	47.42009281203...	16230828.17713...	-580147.700561...
		Residential	Wood	6	217.0146484375...	59.08876068476...	16230837.85287...	-580106.690592...
		Residential	Wood	6	78.75488281250...	36.52536591727...	16230917.55834...	-580059.018916...
		Residential	Wood	6	68.03613281250...	35.44608945222...	16230742.84058...	-579735.175334...
		Residential	Wood	6	92.31835937500...	39.86546395154...	16230745.32047...	-579648.660359...
		Residential	Wood	6	88.37890625000...	37.73757483224...	16230786.12421...	-579873.954086...
0		Residential	Wood	6	105.6630859375...	41.60257762373...	16230805.11050...	-579925.390919...
1		Residential	Wood	6	61.68945312500...	33.20288195034...	16230597.38797...	-580008.909874...
2		Residential	Wood	6	76.56738281250...	36.04019764134...	16230521.32373...	-580024.491072...
3		Residential	Wood	6	45.93945312500...	27.80611964238...	16230532.74743...	-580031.011161...
4		Residential	Wood	6	123.6015625000...	44.74471144277...	16230582.17763...	-580045.124446...
5		Residential	Wood	6	45.50390625000...	28.71167132035...	16230508.35537...	-579696.246856...
6		Residential	Wood	6	82.91015625000...	36.69030875604...	16230946.93599...	-579875.551648...
7		Residential	Wood	6	149.6347656250...	50.56552012222...	16231034.70987...	-579912.567238...
8		Residential	Wood	6	70.44238281250...	34.64784539075...	16230954.83975...	-580026.103770...
9		Residential	Wood	6	189.8857421875...	55.59168216284...	16231203.79702...	-579270.005075...
0		Medical	Reinforced concr...	20	187.6992187500...	55.30653173753...	16231171.31368...	-579237.637800...
1		Residential	Wood	6	62.78515625000...	32.04416778894...	16231199.65462...	-579239.993191...

Reprojecting vector layer to GCS and calculating coordinates

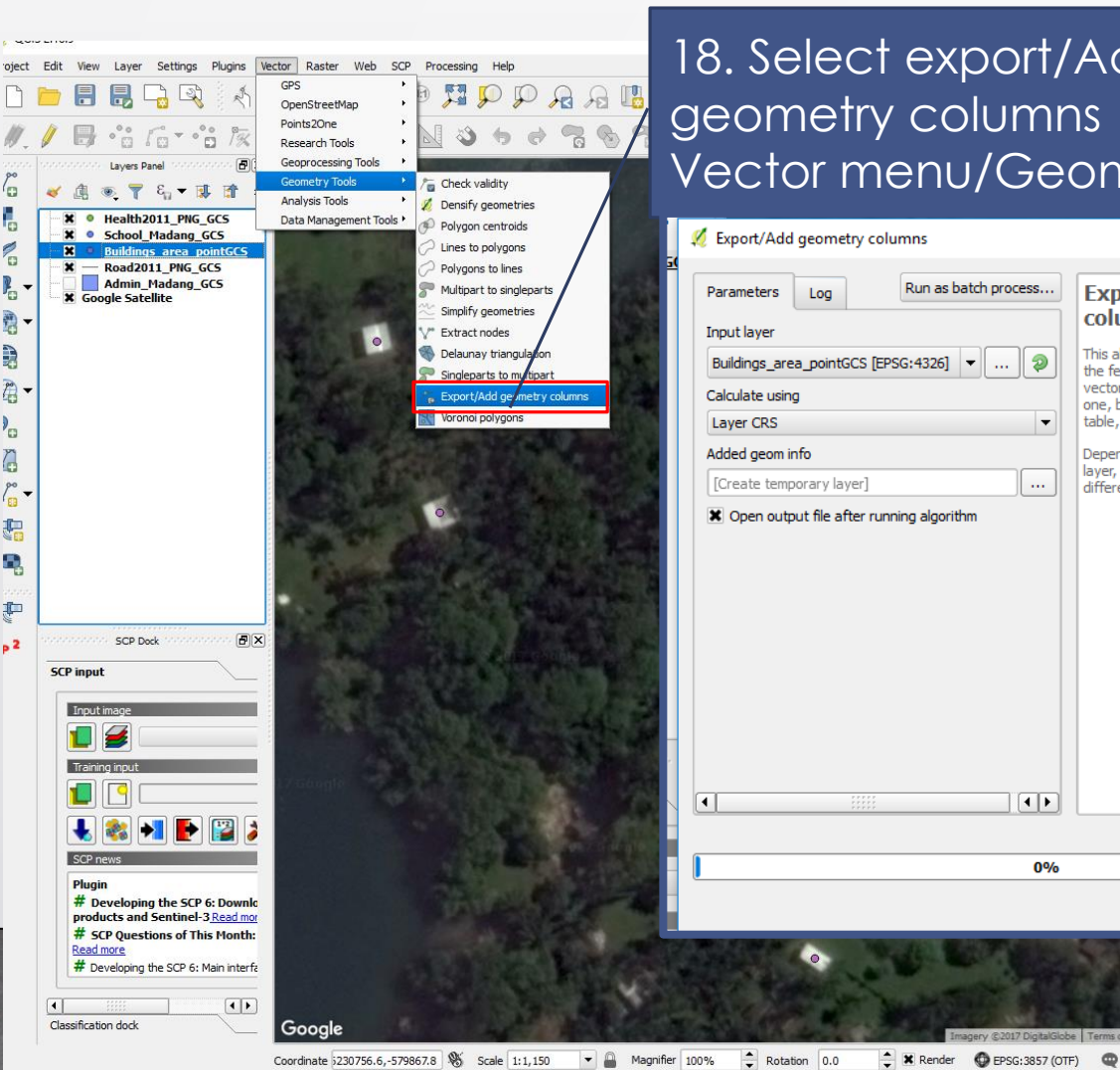


16. Right click on layer select Save As



17. Select EPSG 4326 – WGS84 to convert to geographic coordinate system

Reprojecting vector layer to GCS and calculating coordinates



Geographic coordinates

Usage	Structure	Pop_Househ	area	perimeter	xcoord	ycoord	xcoord_1	ycoord_1
Residential	Wood	6	37.84667968750...	25.20660202040...	16230553.59286...	-579708.861482...	145.8015436219...	-5.20045807002...
Residential	Wood	6	65.19238281250...	34.27530418227...	16230518.35625...	-579704.342590...	145.8012270860...	-5.20041764322...
Residential	Wood	6	125.1328125000...	46.54065802487...	16230630.10890...	-579814.864469...	145.8022309771...	-5.20140639060...
Residential	Wood	6	115.1923828125...	47.42009281203...	16230828.17713...	-580147.700561...	145.8040102543...	-5.20438398908...
Residential	Wood	6	217.0146484375...	59.08876068476...	16230837.85287...	-580106.690592...	145.8040971730...	-5.20401710889...
Residential	Wood	6	78.75488281250...	36.52536591727...	16230917.55834...	-580059.018916...	145.8048131794...	-5.20359063200...
Residential	Wood	6	68.03613281250...	35.44608945222...	16230742.84058...	-579735.175334...	145.8032436630...	-5.20069347831...
Residential	Wood	6	92.31835937500...	39.86546395154...	16230745.32047...	-579648.660359...	145.8032659403...	-5.19991949999...
Residential	Wood	6	88.37890625000...	37.73757483224...	16230786.12421...	-579873.954086...	145.8036324865...	-5.20193501565...
Residential	Wood	6	105.6630859375...	41.60257762373...	16230805.11050...	-579925.390919...	145.8038030433...	-5.20239517733...
Residential	Wood	6	61.68945312500...	33.20288195034...	16230597.38797...	-580008.909874...	145.8019370401...	-5.20314234980...
Residential	Wood	6	76.56738281250...	36.04019764134...	16230521.32373...	-580024.491072...	145.8012537434...	-5.20328174131...
Residential	Wood	6	45.93945312500...	27.80611964238...	16230532.74743...	-580031.011161...	145.8013563642...	-5.20334007091...
Residential	Wood	6	123.6015625000...	44.74471144277...	16230582.17763...	-580045.124446...	145.8018004032...	-5.20346633024...
Residential	Wood	6	45.50390625000...	28.71167132035...	16230508.35537...	-579696.246856...	145.8011372466...	-5.20034521735...
Residential	Wood	6	82.91015625000...	36.69030875604...	16230946.93599...	-579875.551648...	145.8050770833...	-5.20194930769...
Residential	Wood	6	149.6347656250...	50.56552012222...	16231034.70987...	-579912.567238...	145.8058655695...	-5.20228045477...
Residential	Wood	6	70.44238281250...	34.64784539075...	16230954.83975...	-580026.103770...	145.8051480840...	-5.20329616873...
Residential	Wood	6	189.8857421875...	55.59168216284...	16231203.79702...	-579270.005075...	145.8073845052...	-5.19653197145...
Medical	Reinforced concr...	20	187.6992187500...	55.30653173753...	16231171.31368...	-579237.637800...	145.8070927024...	-5.19624240627...



Thank you