

Micro-module A: Online Urban Data Gathering

A2-Digital Maps and Geospatial Data Mapping

In this micromodule, we mainly provide how to use QGIS to obtain an analysis base map and perform basic land use analysis. The data sources are mainly official data from the Hong Kong government.

In the first part, we will introduce how to obtain a vector base map of any research area in Hong Kong from HKMS. Including how to download and crop the spatial map data, as well as how to modify the style of the base map according to your needs.

In the second part, we will introduce how to obtain data from the LUHK website, as well as how to extract, cut and calculate.

1 Generate base map from HKMS2.0

1.1 Download vector data

Download the spatial map data from HKMS2.0

<https://www.hkmapservice.gov.hk/OneStopSystem/home>



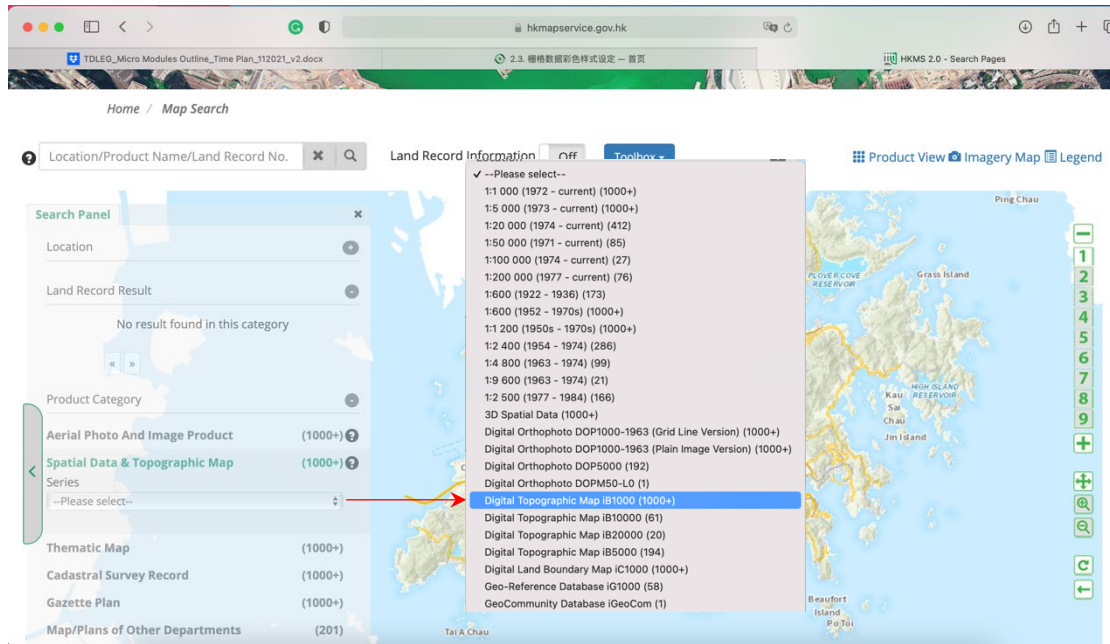
SEARCH OPEN DATA (GEOSPATIAL)

AERIAL PHOTO AND IMAGE PRODUCT

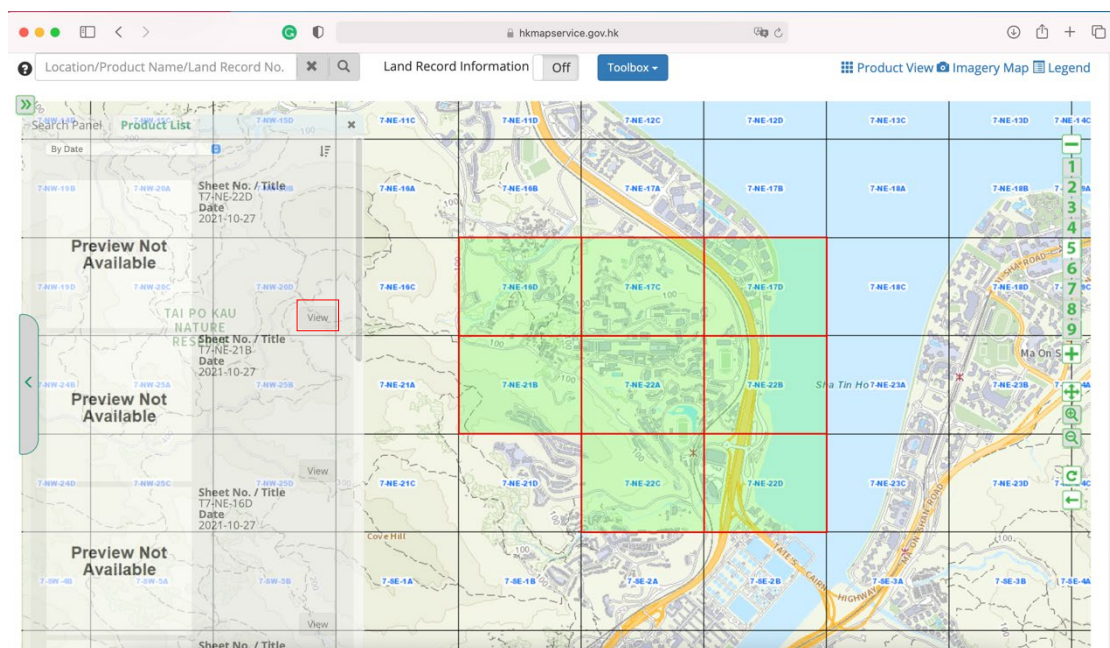
SPATIAL DATA & TOPOGRAPHIC MAP



- Select 'PRODUCT-SPATIAL DATA & TOPOGRAPHIC MAP'.
- Chose data site: Digital Topographic Map iB1000 (1000+).
- Click search.



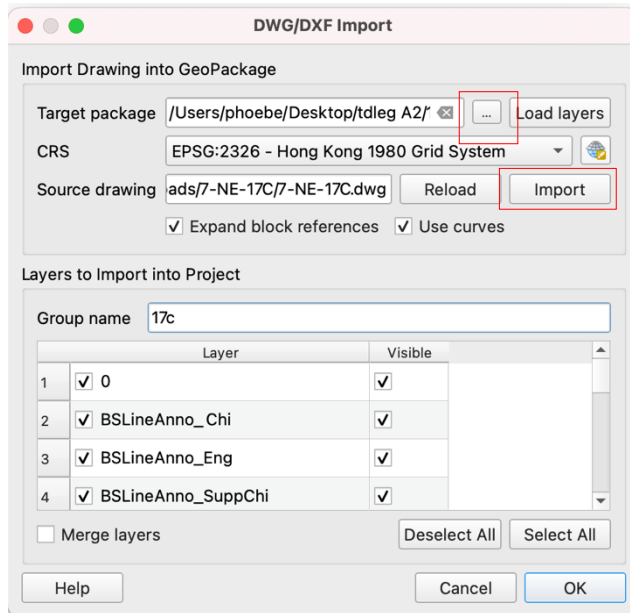
- Chose research area. In this tutorial, In this tutorial, the Chinese University campus is used as an example.



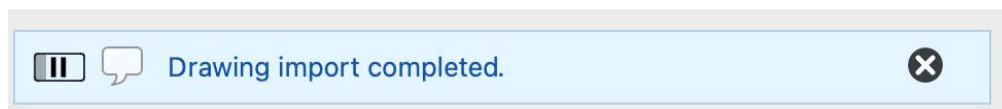
- Click the grid that can cover the research area. You can see the product list on the left.
- Click view. Select product format for DWG. Add to download queue.
- Perform the previous step on each data in the product list.
- At the right corner of the webpage, click view download queue.
- Download each data in the queue to your local file.

1.2 Import DWG data to QGIS 3.18

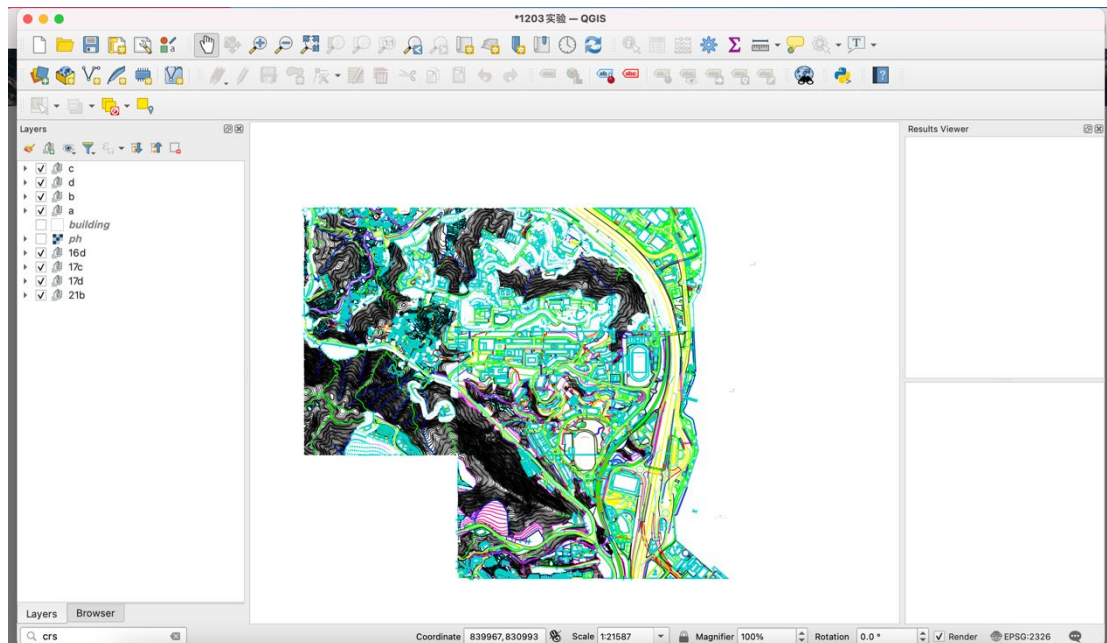
- Start QGIS 3.18.
- Project-Import/Export- Import layers from DWG/DXF.



- Set the target storage path at the target package.
- Click import to find the location of downloaded data. Wait a few seconds. It will show drawing import completed.



- Name the new group.
- Click ok.



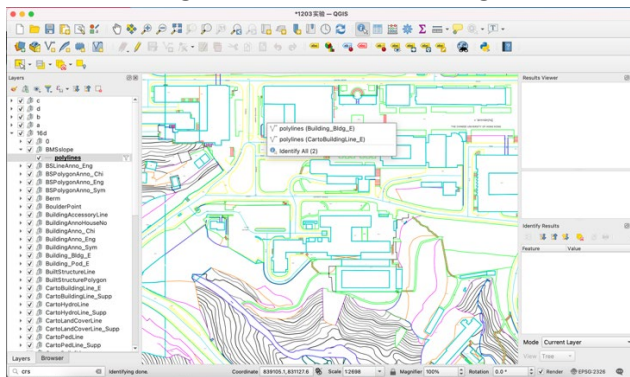
1.3 Extract urban design elements

In this tutorial, here will show how to extract the buildings in the campus of The Chinese University of Hong Kong.

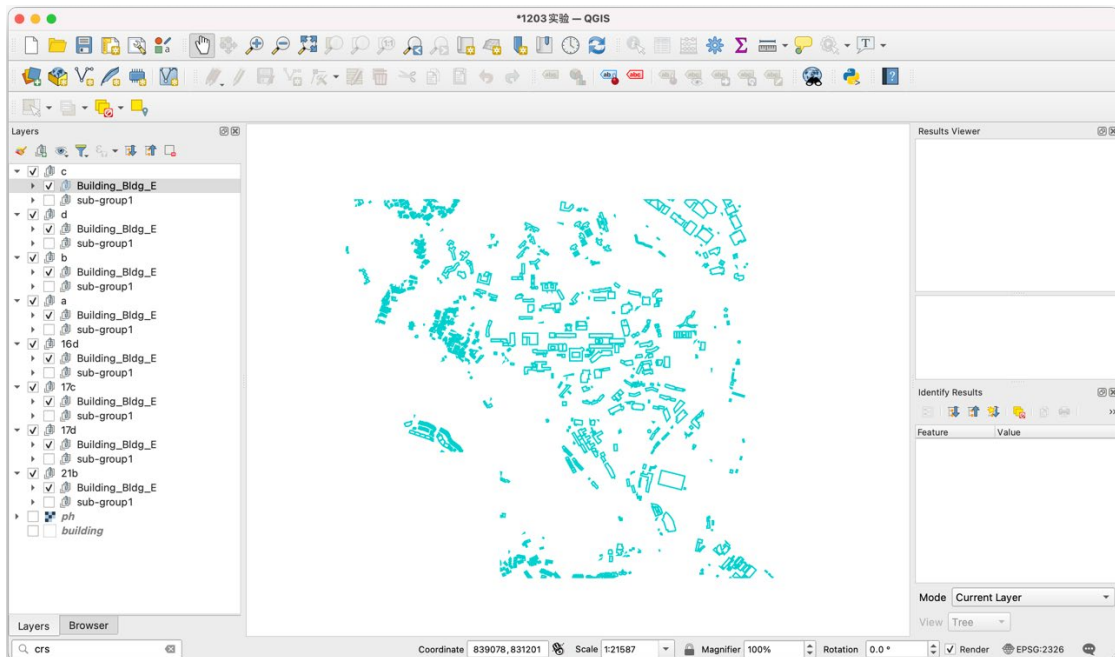
- Select a shapefile layer. Use identity feature to select elements inside one layer.



- Click the right button on the building, it will show the name of the layer.



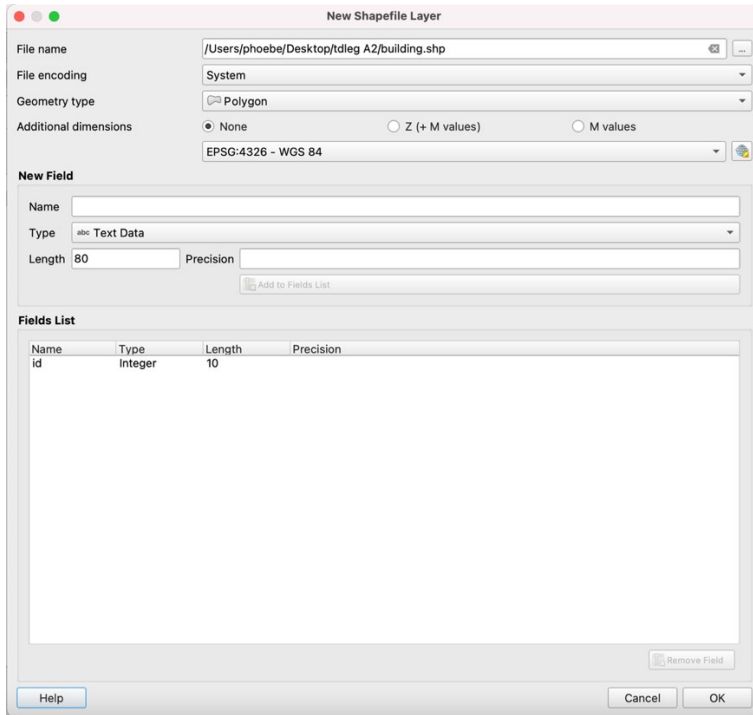
- Find the building layer in the layer panel.
- Make the other layer a new group, except the building layer. Make the new layer invisible.
- Perform the previous step on each DWG group that just imported.



1.4 Merge the selected data into one vector layer

Create a new layer.

- Layer>Create layer- New shapefile layer.
- Set file name and storage path.
- Set the geometry type to polygon.
- Click ok.



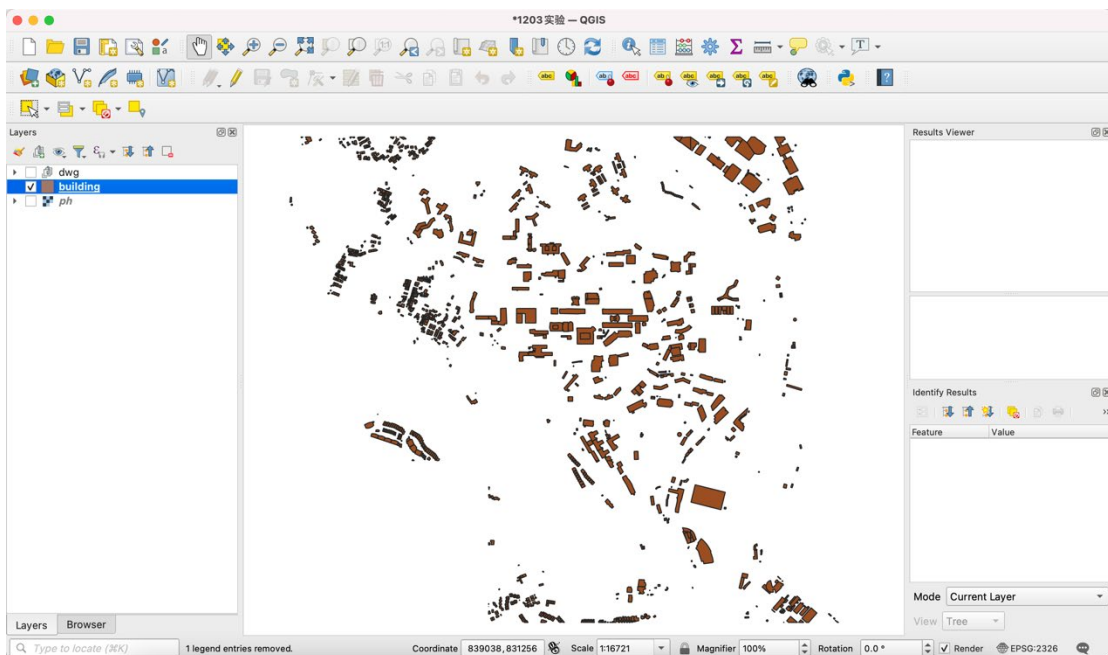
Add elements into the new layer.

- Use 'toggle editing' to change the DWG layer and the building layer into editing mode.
- Then use 'selected features by area and single click' tool.



- Selected the elements in the DWG layer and copy them to the building layer.
- Performed the previous step on each DWG layer.
- Click 'toggle editing' to exit the editing mode and save.

Then you will get a polygon layer of the buildings in CUHK campus.

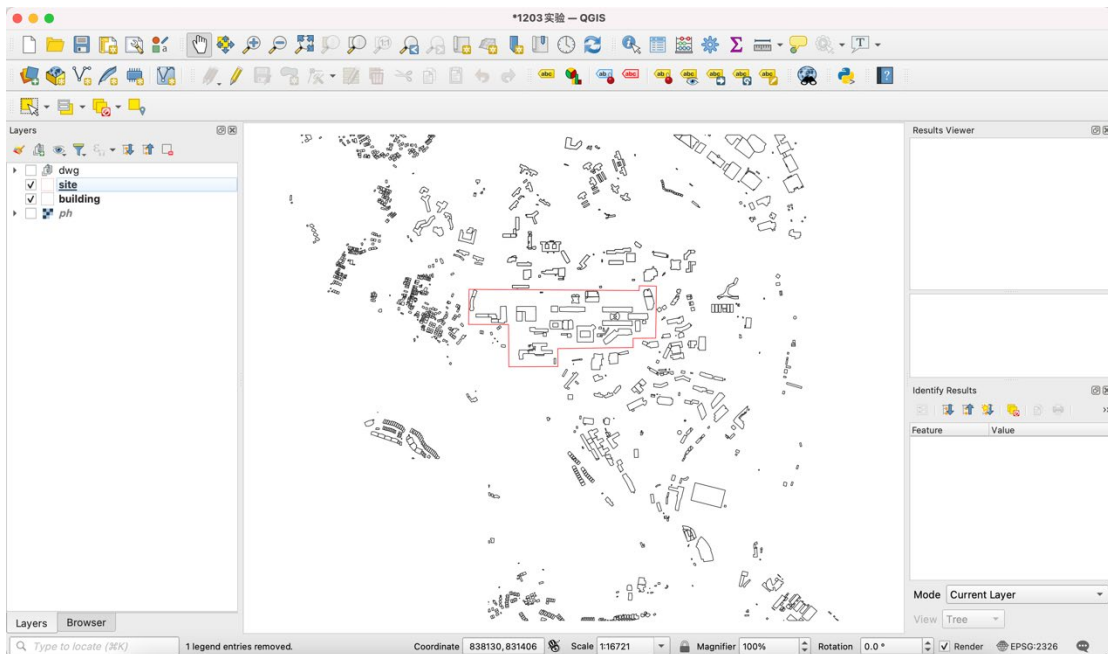


1.5 Set and cut boundaries

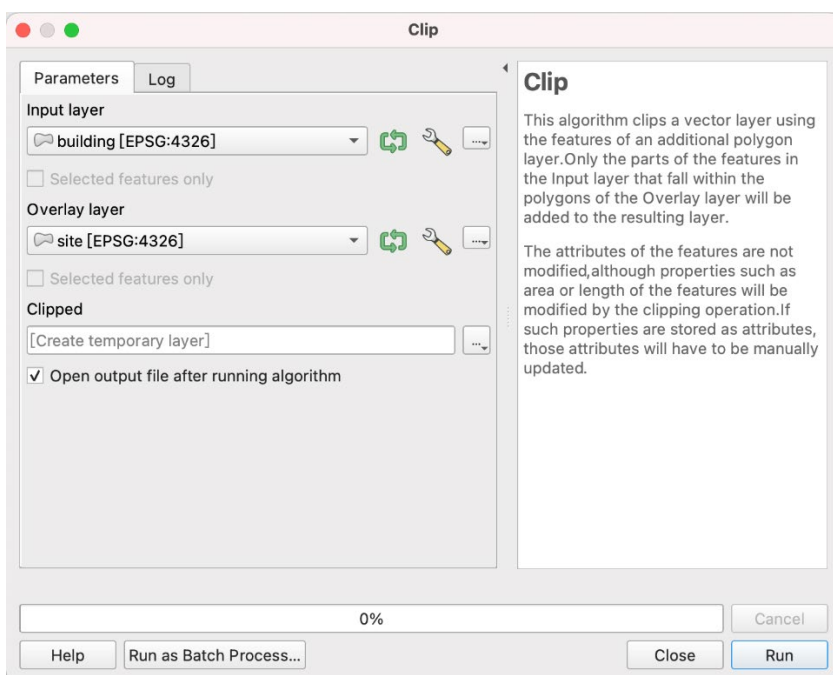
- Add a new polygon layer.
- Click 'Toggle editing' get into editing mode.
- Use 'Add polygon feature' to add a new polygon.
- Use 'Vertex tool' to edit the polygon.



Then you can draw the boundaries of the research site and edit it. In this tutorial we will take building around the University Mall as an example.

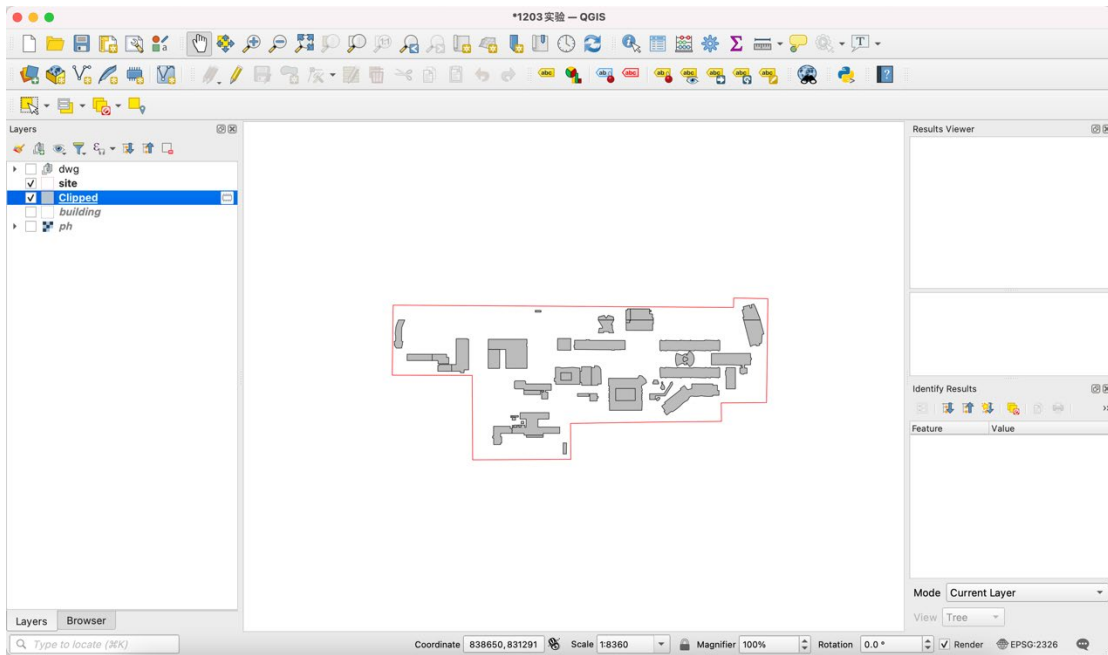


- Select the building layer
- Chose 'Vector-Geoprocessing tools-clip'



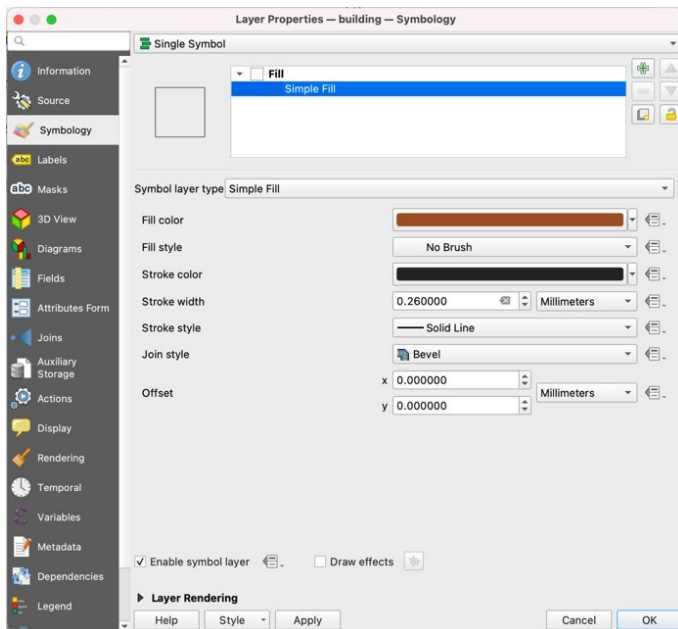
- Chose input layer as the cropped.
- Chose overlay layer as the layer you want to be scissors.
- Click 'Run'.

Then you will get a new layer named 'Clipped'.



1.6 Editing layer properties

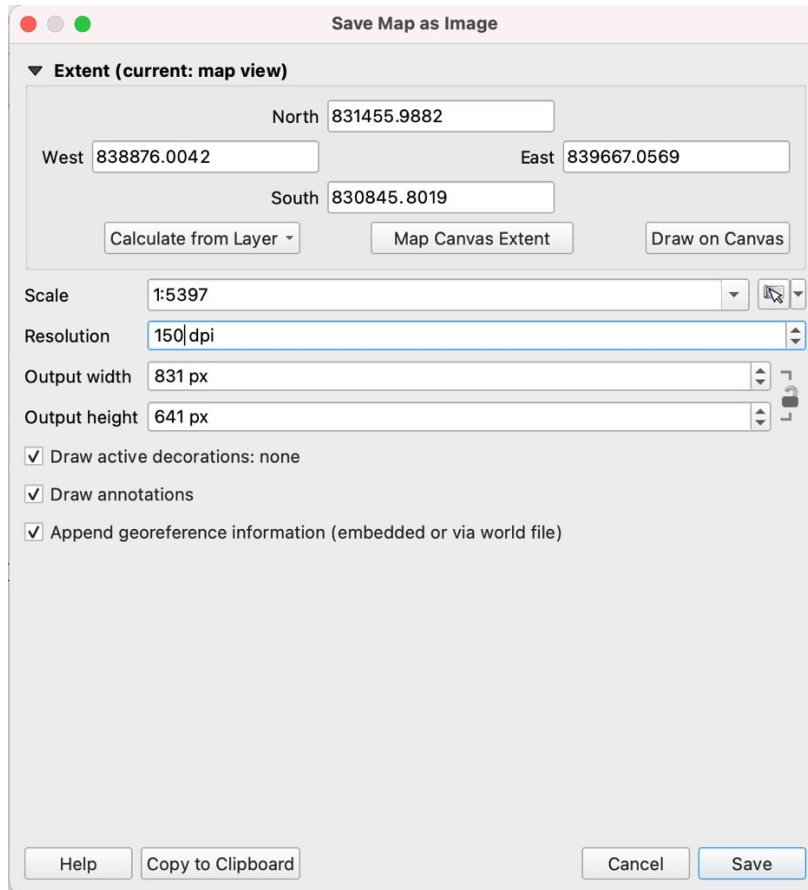
- Double click the name of building layer to get in the layer properties. Or right click and select properties.



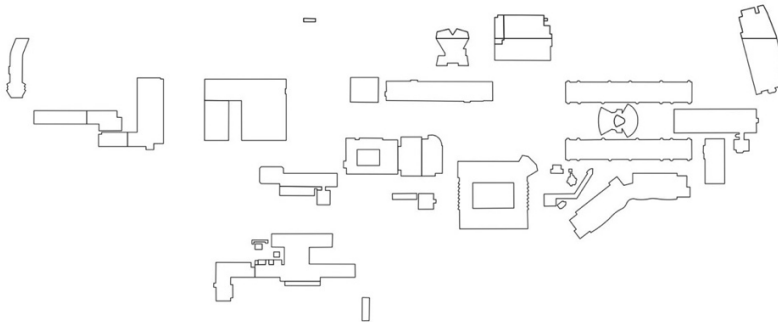
- You can change fill color and style, stroke color, width and style according to your needs.

1.7 Export the base map

- Select 'Project-Import/Export-Export map to image'.



- Set the 'Resolution, Output width and Output height'.
- Save.

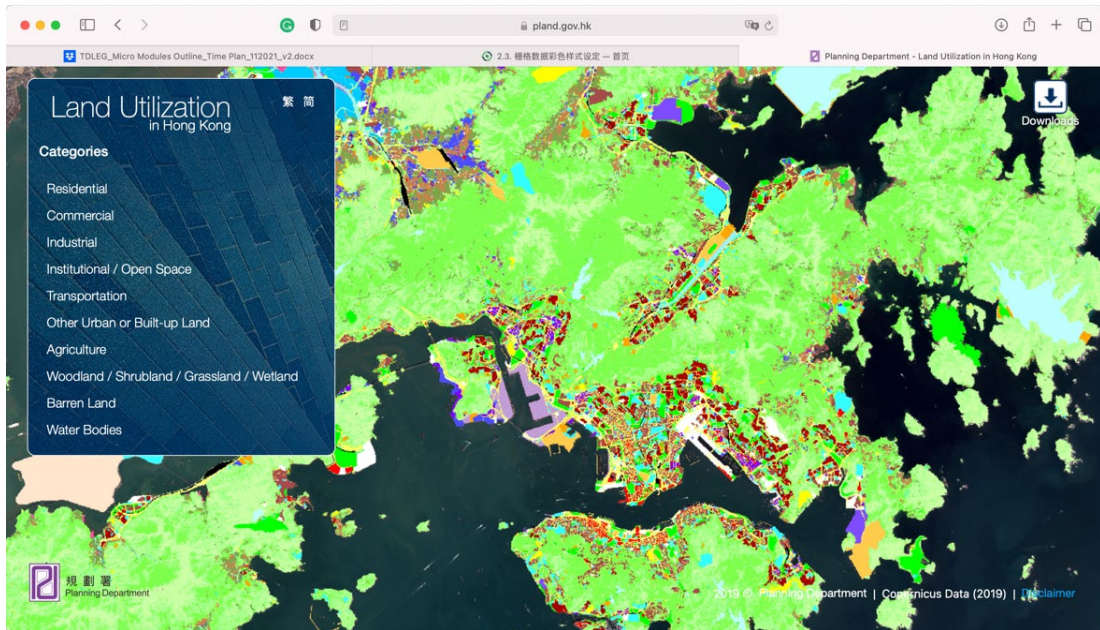


2 Get Data from Land Utilization in Hong Kong

2.1 Download Data

You can get land use data from the website of Land Utilization Hong Kong.

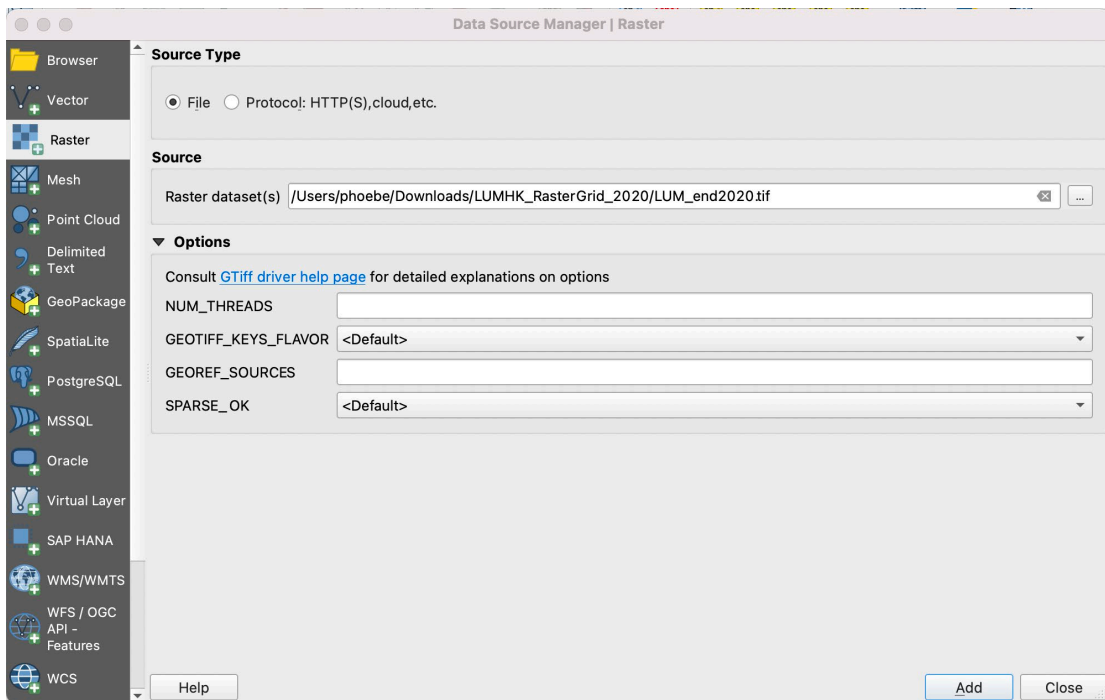
https://www.pland.gov.hk/pland_en/info_serv/open_data/landu/index.html#!



This website provides statistics and raster grid of land use in Hong Kong for the last three years. Raster grid 2020 will be chosen as an example for this tutorial. Click the number of year and download.

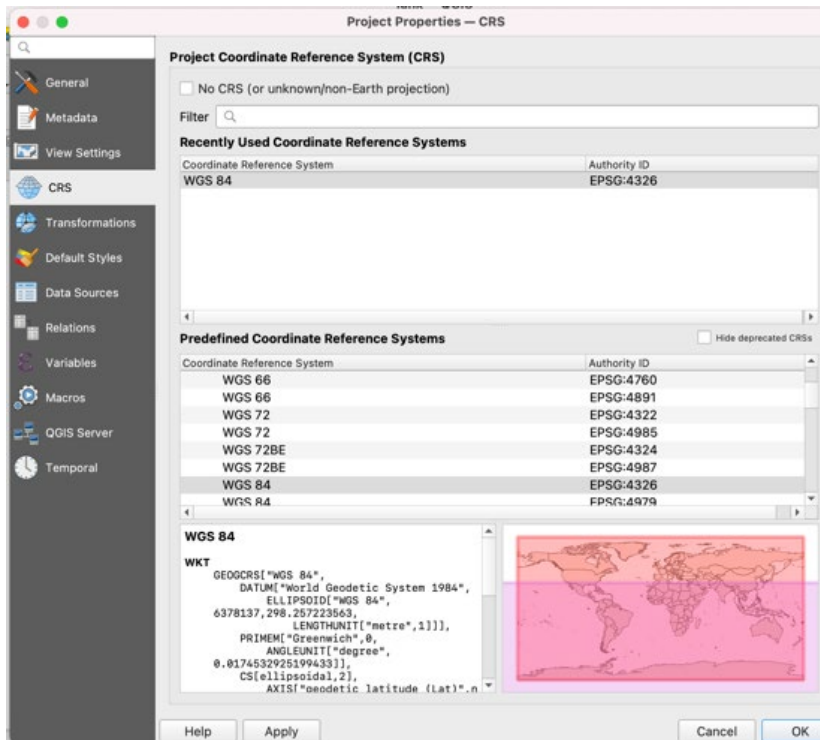
2.2 Import data and set CRS

- Start QGIS 3.18.
- Select 'Layer- Add layer- Add raster layer'.
- Select the .tif document in your download folder at the 'Raster dataset'.

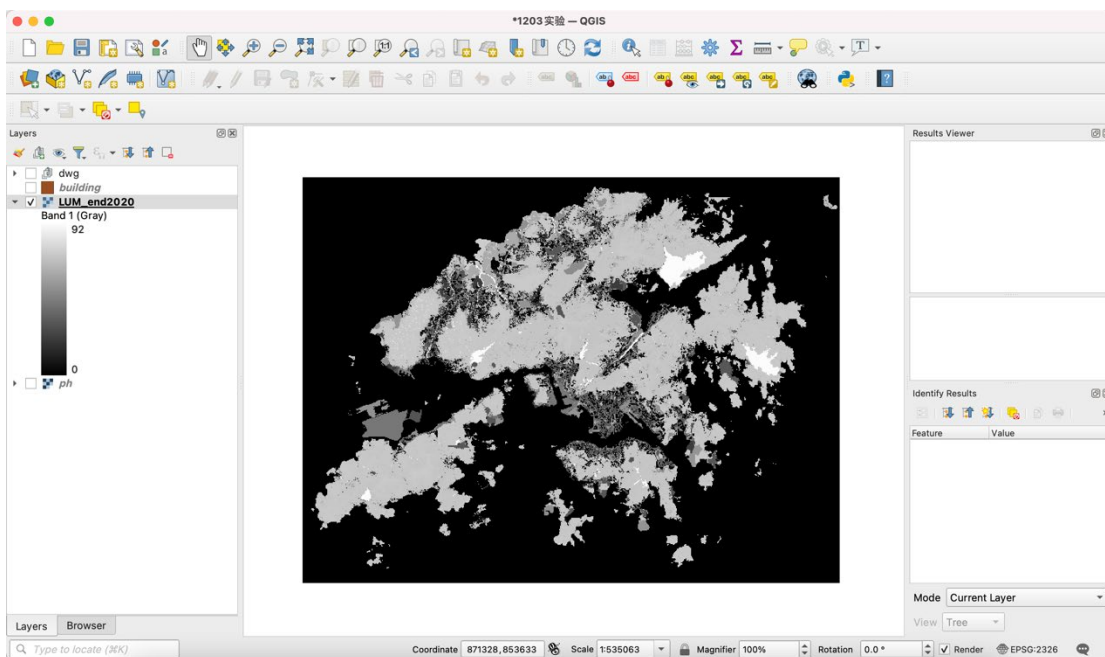


Set Coordinate Reference System.

- Search CRS (Coordinate reference System) in QGIS.
- Select WGS84-EPSSG: 4326.



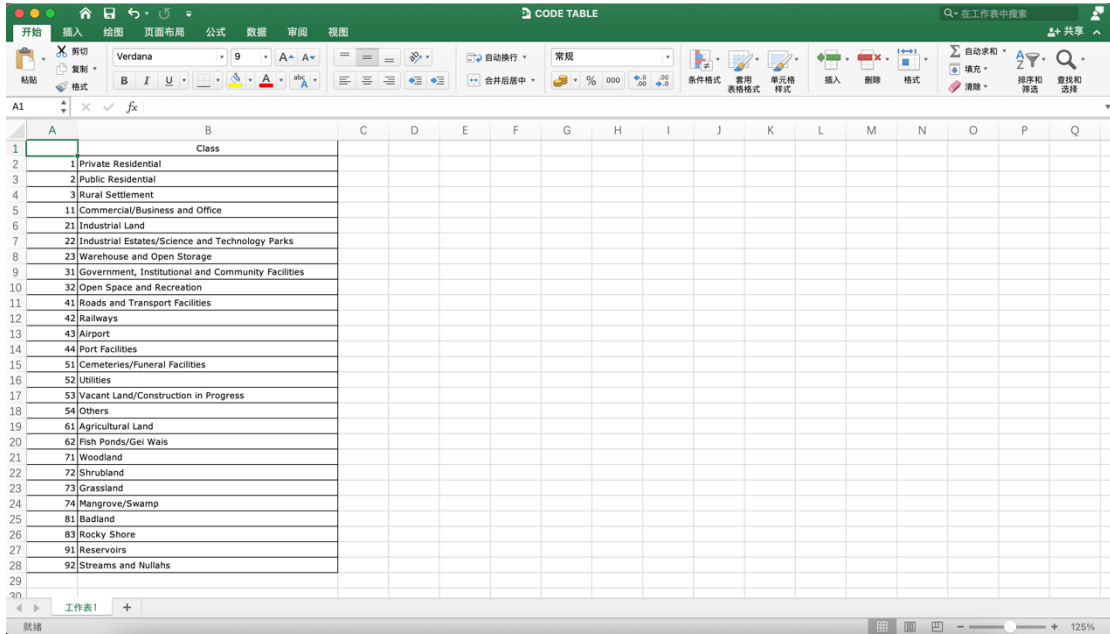
Then you will get a land use map of Hong Kong.



2.3 Set render type and color of the values.

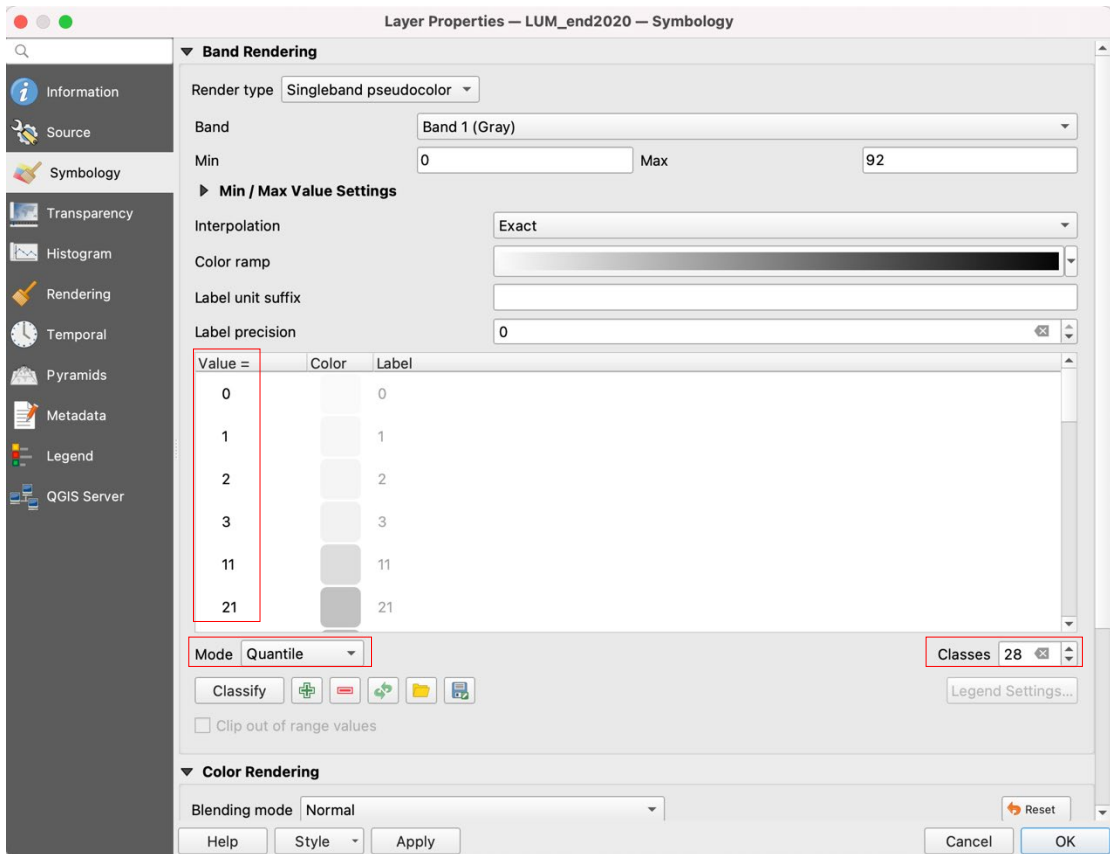
- Double click the name of LUM_end2020 layer, open the 'Layer Properties'.
- Chose 'Symbology' label.
- Select 'Singleband pseudocolor' in 'Render type'.
- You can set the type of color ramp and change the color.

In the downloaded folder there is a file called 'CODE TABLE. xlsx', which is the value and land type comparison file. You can change the color of different values in layer properties according to this sheet.



In Layer properties

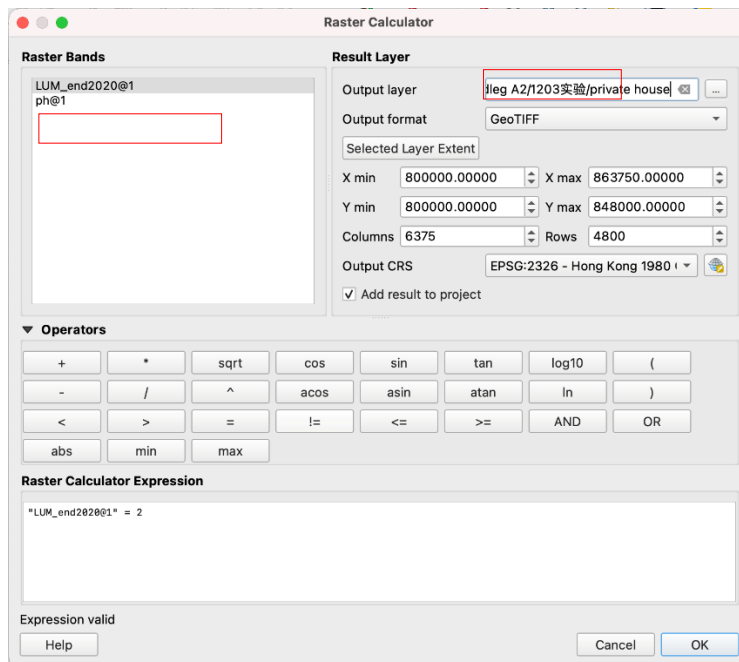
- Chose 'Quantile' in Mode.
- Set classes as 28 (In this tutorial the number of value is 28).
- Double click the number and color block under 'value=' and 'color', you can change them.
- Make the values corresponding to the sheet.
- Click 'Apply/OK'.



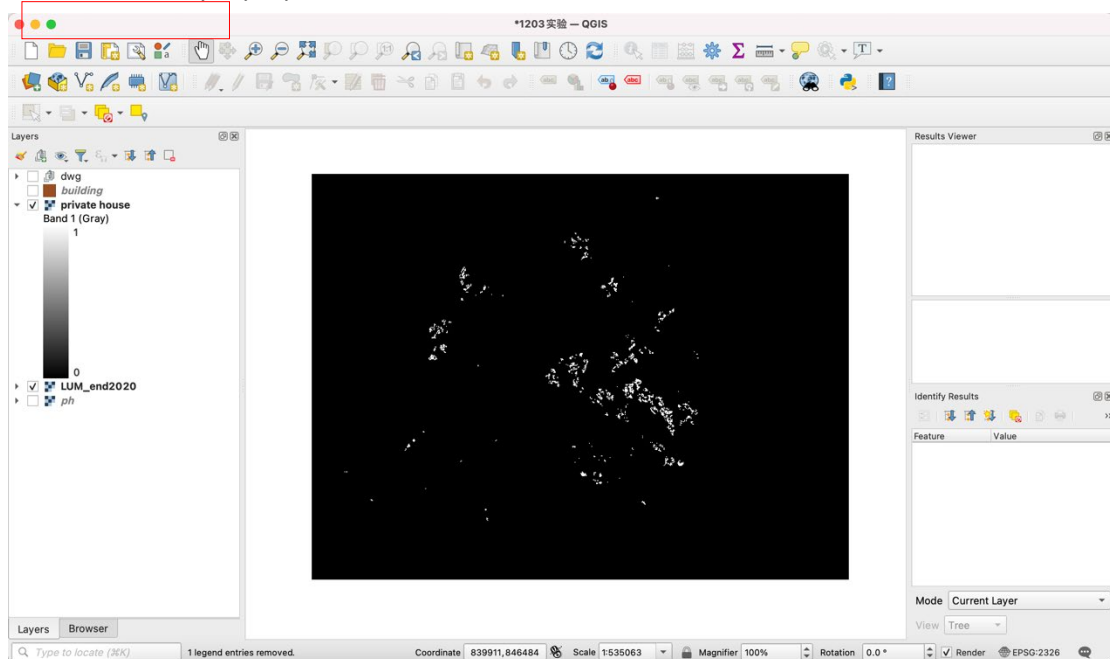
2.4 Extract one of the value

When conducting Urban Design related analysis, we often only need to analyze a certain element in the whole data set to emphasize the change and influence of this element. For example, we only analysis the distribution of public space in the land use type. In this tutorial, we will take the data of private house as an example to show how to extract data.

- Select 'Raster- Raster calculator'.
- Double click 'LUM_end2020@1' under 'Raster bands'.
- Input the formula "'LUM_end2020@1" = 2' under 'Raster calculator expression'.
- Set 'Output layer'.
- Click Ok.



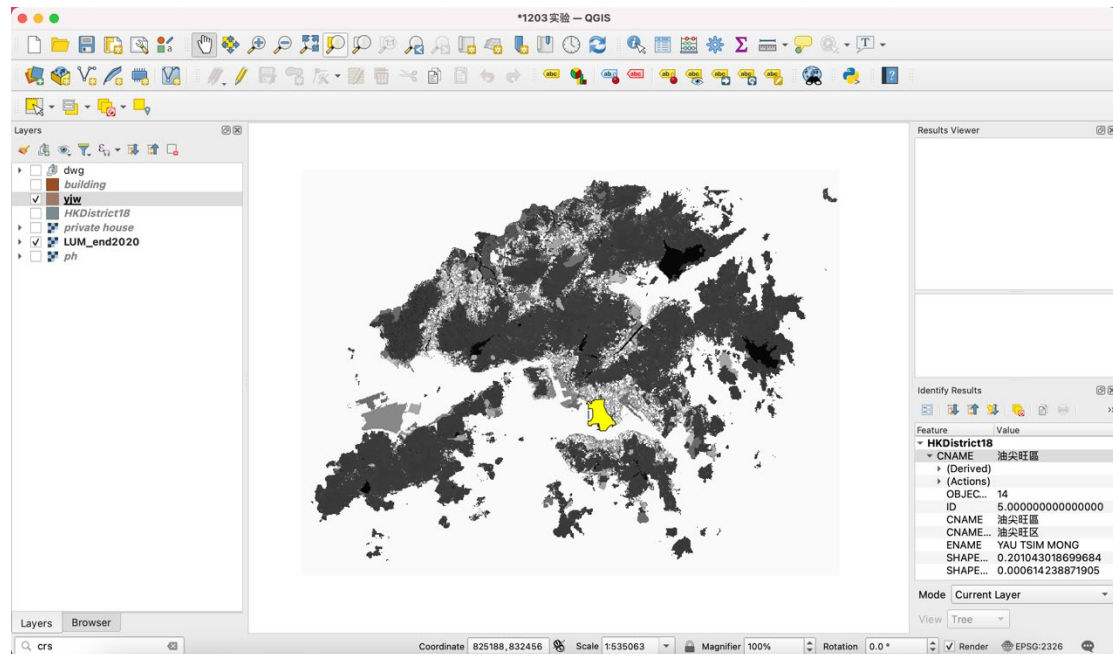
Then you can get the distribution of the private house in Hong Kong, also you can change the color in the 'Layer properties'.



2.5 Clip the boundaries of research area

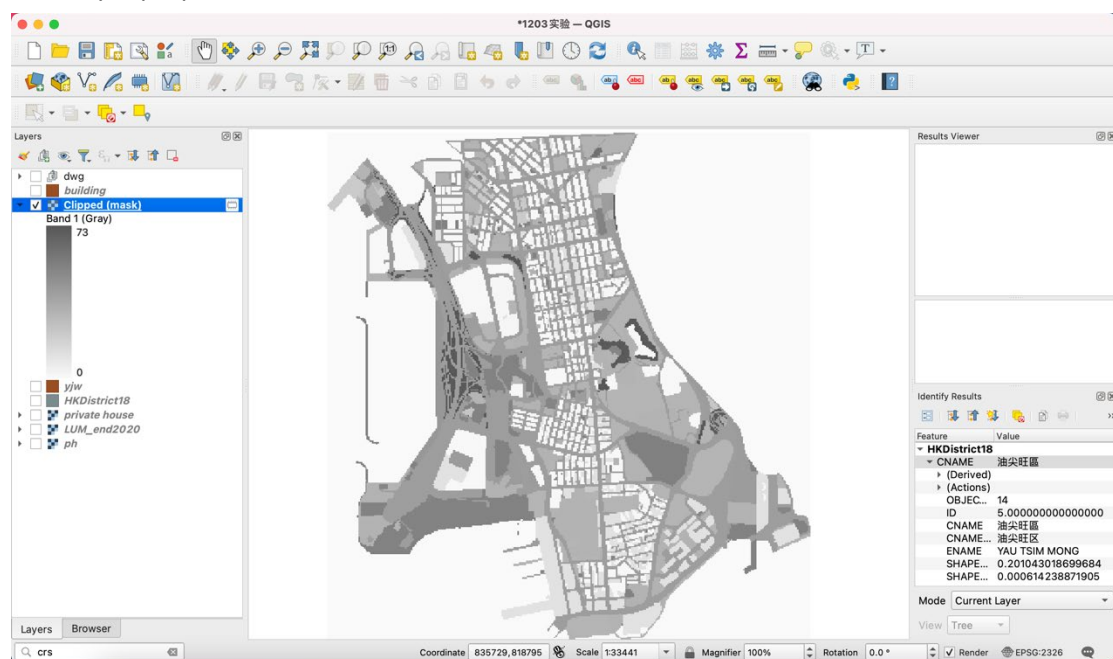
In this tutorial we will use the edge of Yau Tsim Mong District to show how to use a polygon to cut raster data. You can also draw the boundaries based on your need.

- Download Hong Kong's district administrative boundaries from ESRI Hong Kong (<https://opendata.esrichina.hk>)
- Copy the edge of Yau Tsim Mong and add to a new layer.



- Select 'Raster-Extraction-cClip raster by mask layer'.
- Chose 'Input layer' as the cropped.
- Chose 'Mask layer' as the layer you want to be scissors.
- Click 'Run'.

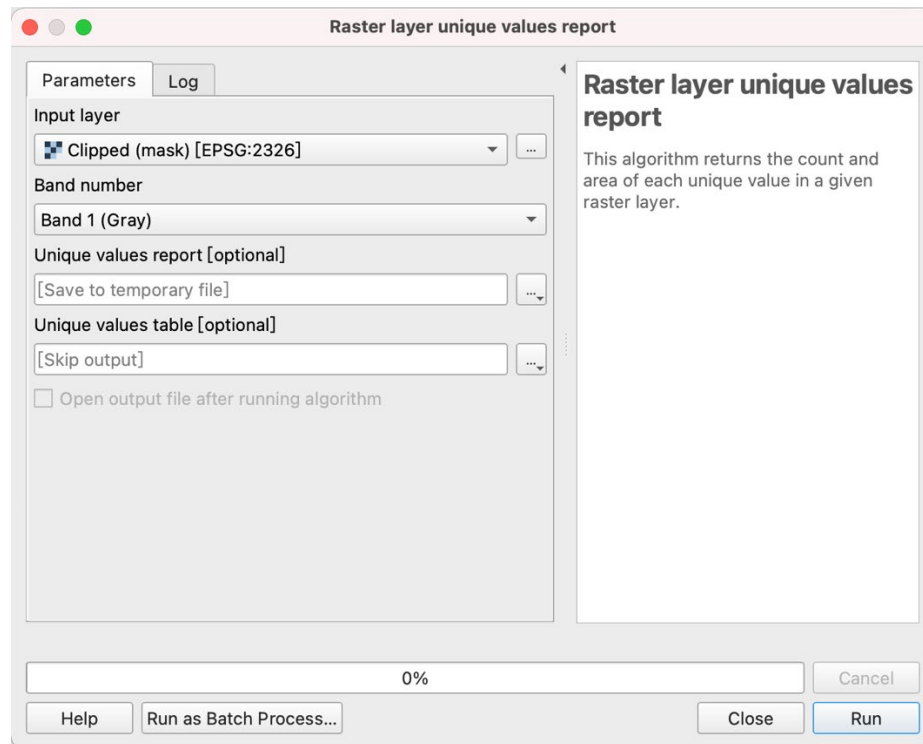
Then you will get a new layer called 'Clipped(mask)' and you can change the color mode in the "Layer properties'.



2.6 Calculate the ratio of values

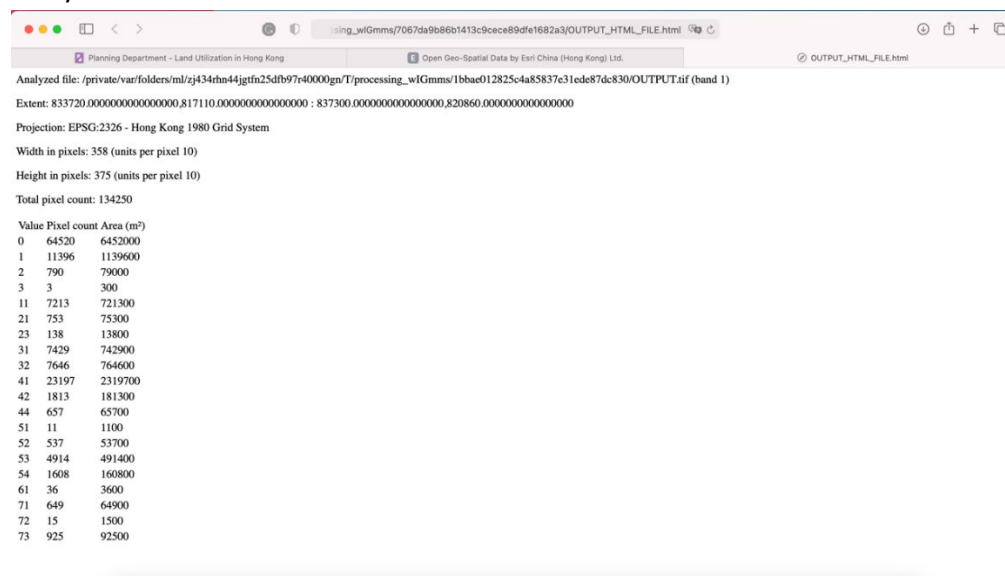
We can download the proportion of various land uses in Hong Kong from Land Utilization Hong Kong, and calculate the proportion of different land uses in our customized research scope in QGIS.

- Search 'Raster layer unique values report' in QGIS3.18.
- 'Input layer' is the layer that you want be calculated.
- Click 'Run'.



- Find the link of the file path in 'Result viewer'.

Then you can get the area of different land use in Yau Tsim Mong District. Add them to Excel and you can do some basic calculations.



On this basis, you can compare the same type of land use in the 18 districts of Hong Kong, or compare different types of land use in the same district.