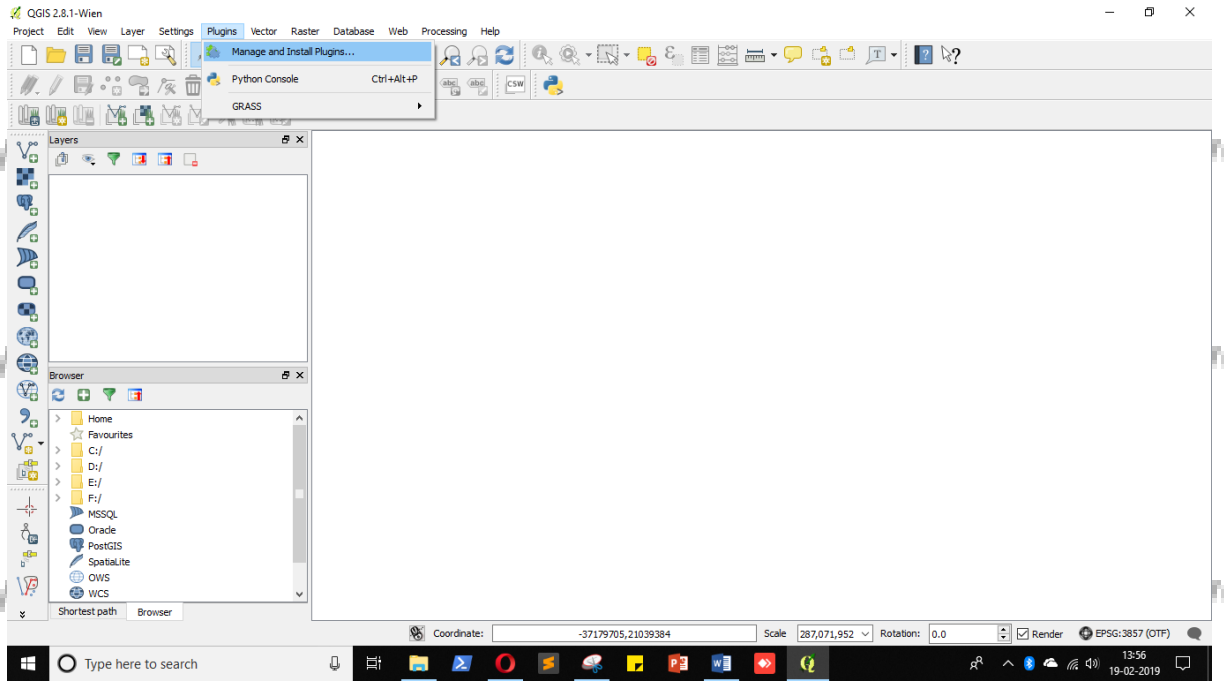
Georeferencing Aerial Imagery

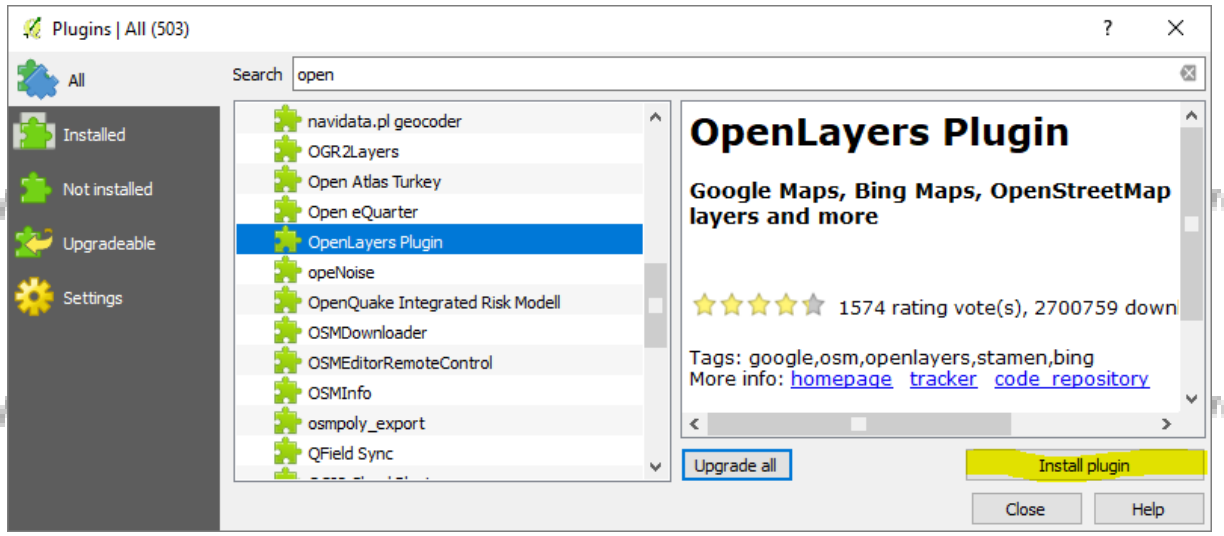
Download the resources file from the below the link.

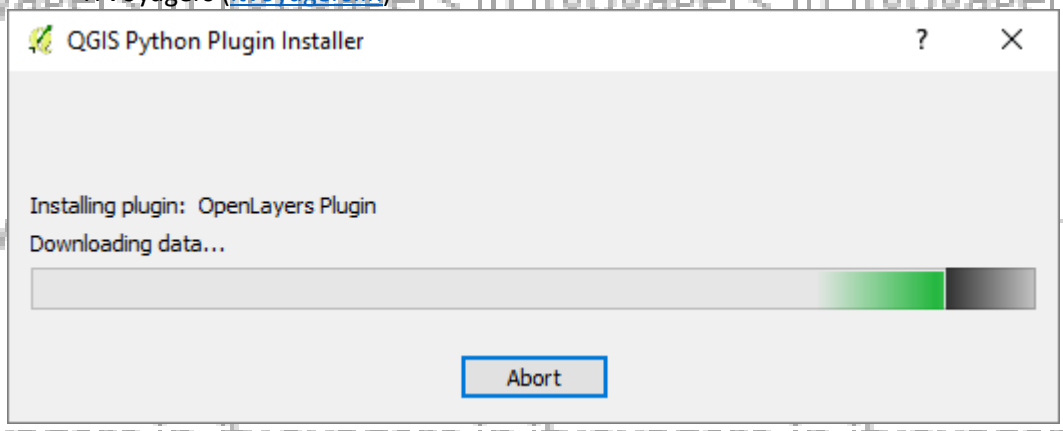
https://drive.google.com/drive/folders/1c5spoeHNwUfrszIPM37IAyluxJgxF31z?usp=sharing

We have to install “OpenLayers Plugin” plugin. For that go to Plugins > Manage and Install Plugins…



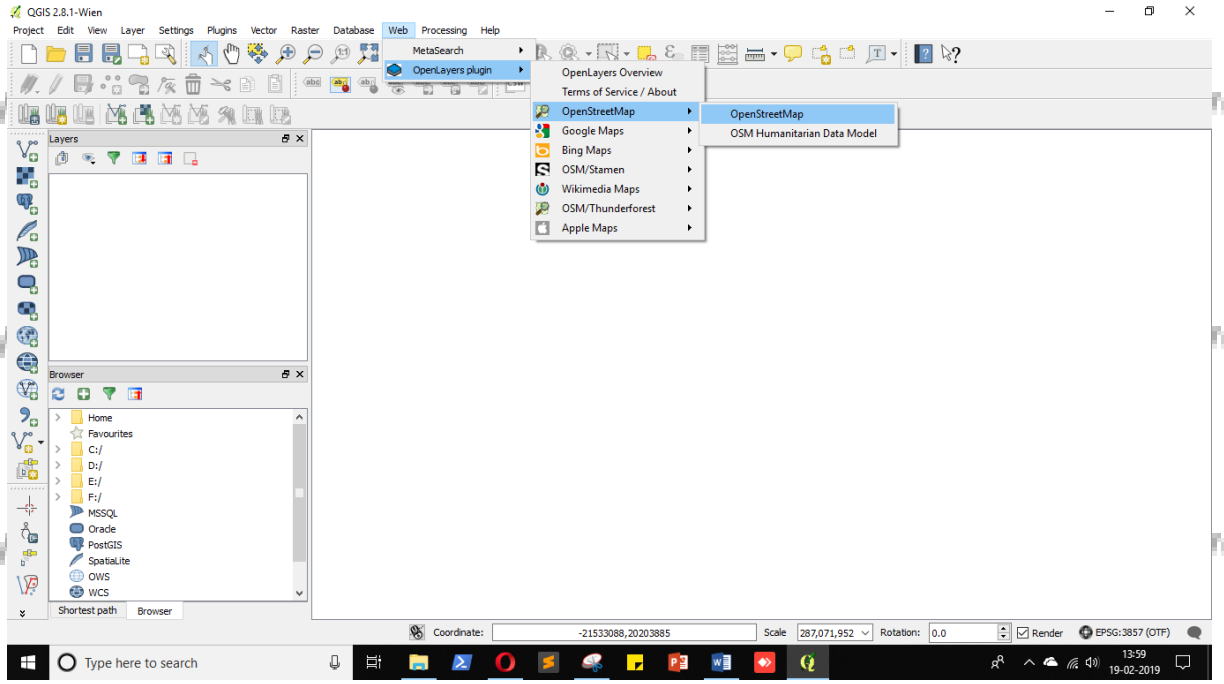
Type “open” in search box and select “OpenLayer Plugin” and click on “Install Plugin”



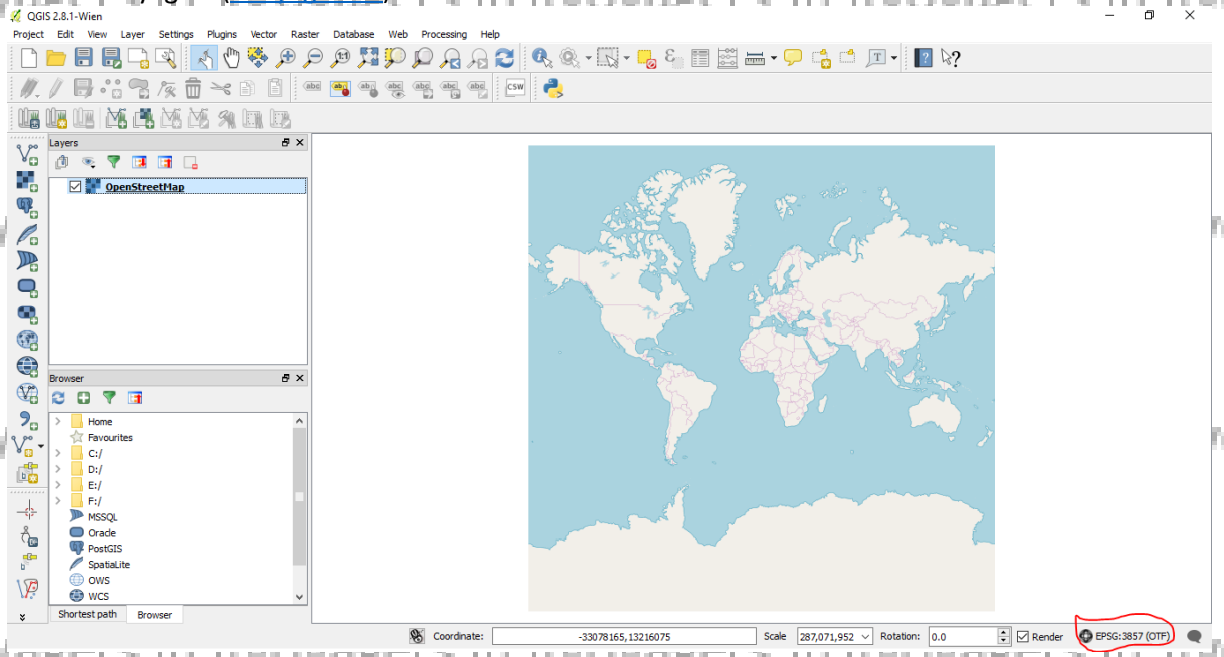


Click on close once it get install.

We have to add pre-rendered OpenStreetMap, for that go to Web > OpenStreetMap >OpenStreetMap

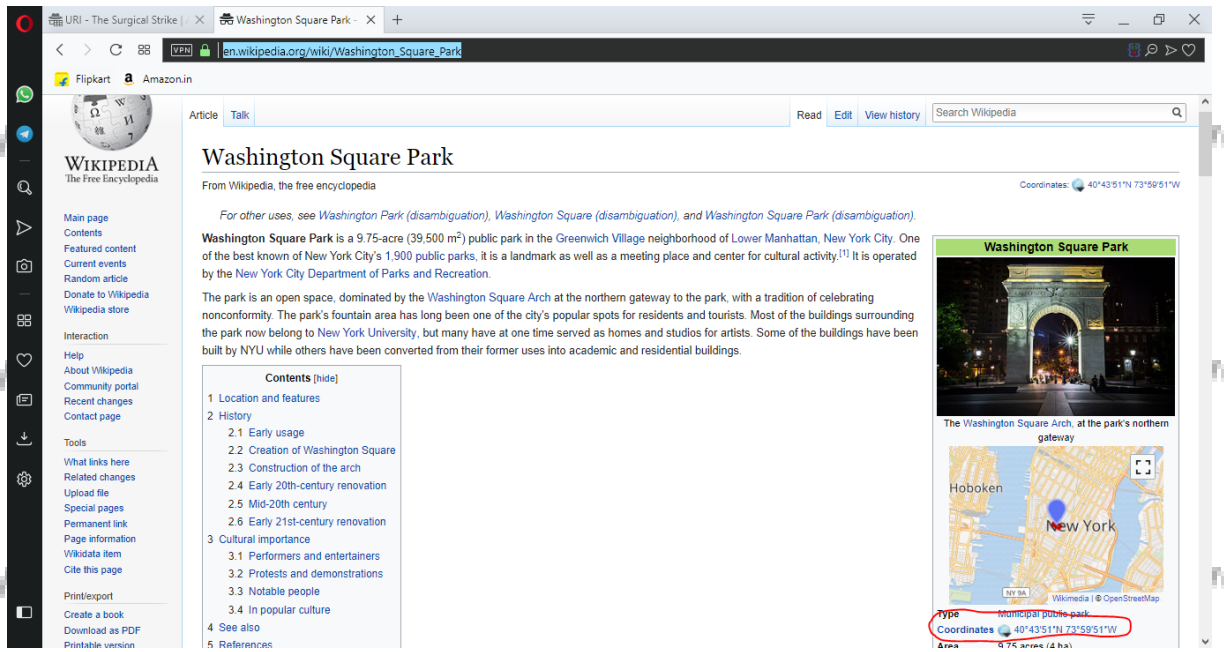


Following map will get loaded.



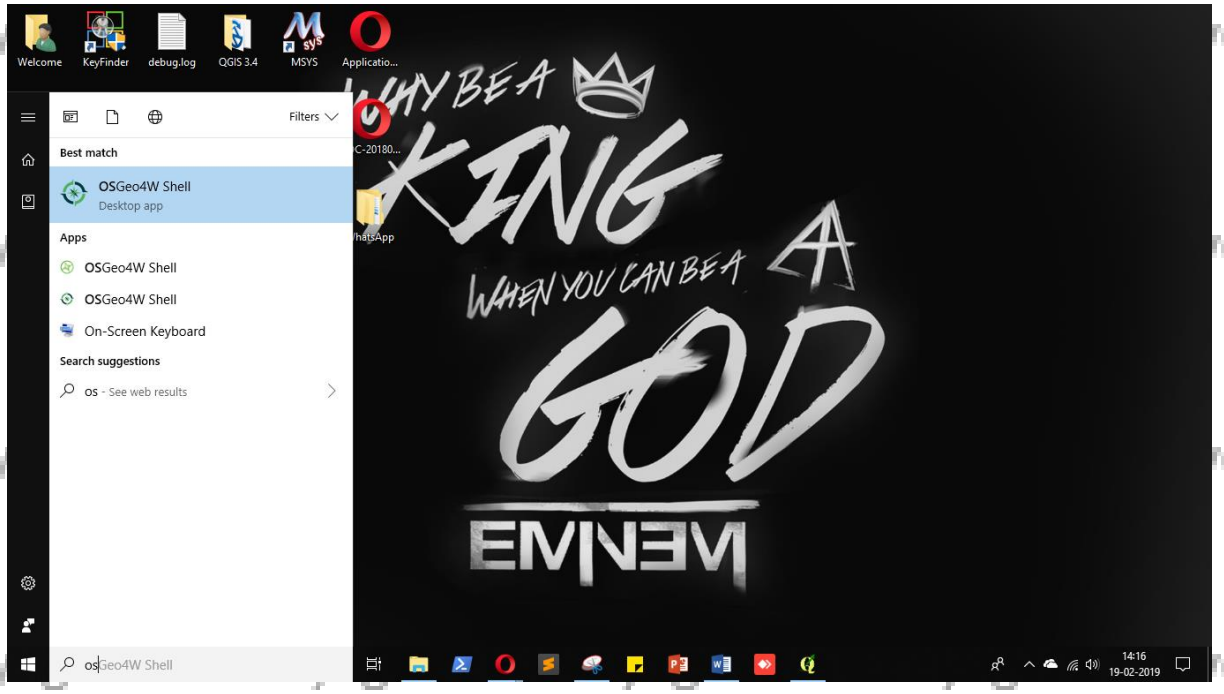
We can see that map's CRS is set to "EPSG 3857- WGS 84 / Pseudo Mercator". We know that we have "Washington Square Park" image and we have to perform "Georeferencing" on it. First we have to zoom in to map and find "Washington Square Park" it is quite difficult. If we have the coordinates for it so can directly zoom to it. To get coordinate for the "Washington Square Park" we can Google it, we can open in Wikipedia from search results (You can also click on link given below).

https://en.wikipedia.org/wiki/Washington_Square_Park



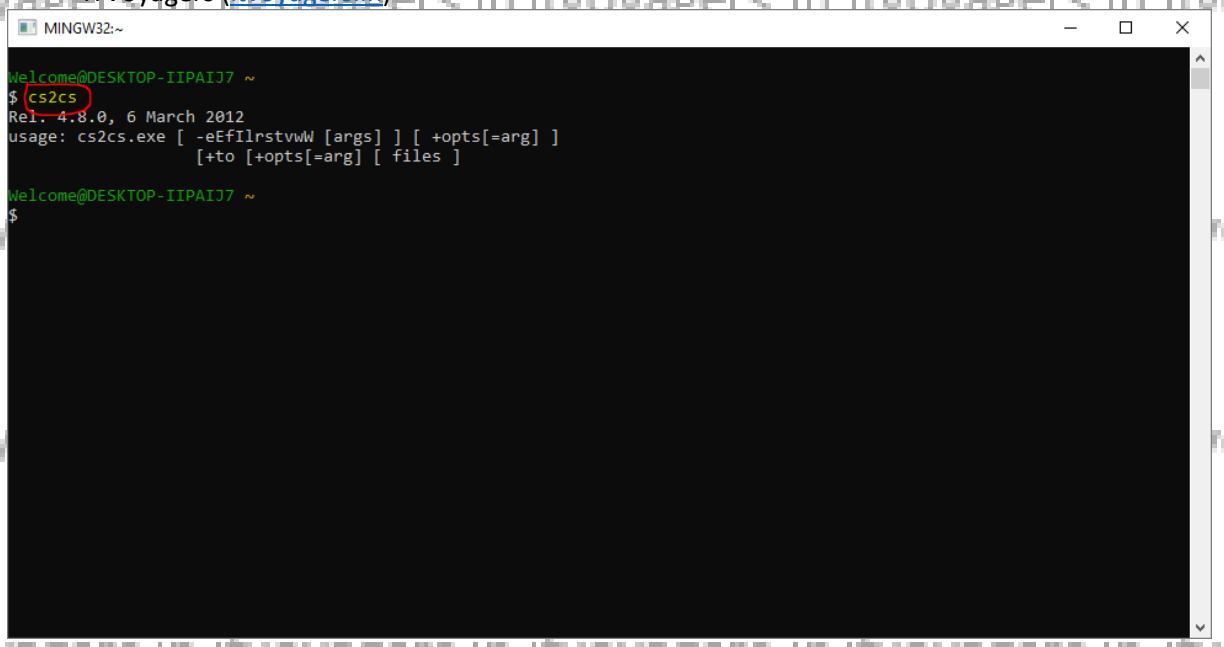
We can see coordinates are mention on right side of web page. But problem is that those coordinates are in "EPSG:4326" CRS and our project is in

"EPSG:3857" CRS. Now we have to convert those coordinate to "EPSG:3857" CRS form. For that we can open "OSGeo$W Shell" or "MSYS" as shown below (we ITVoyagers will suggest you to use MSYS)



"OR"

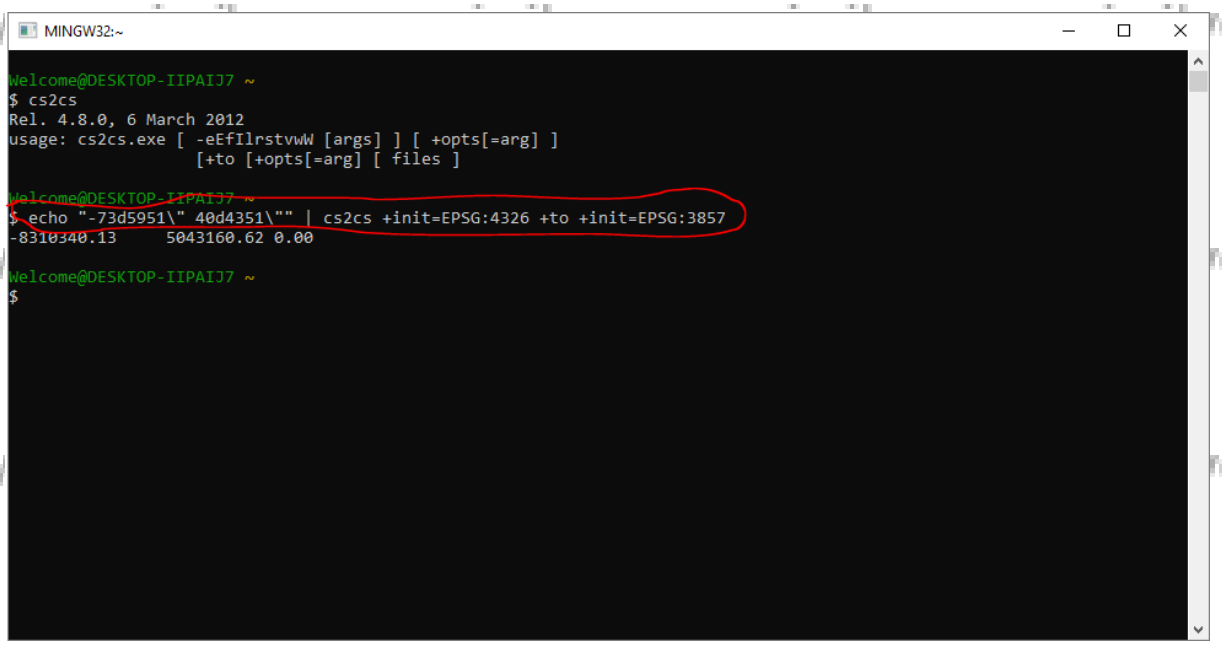
Open "MSYS". Command line will get open. Now there are few commands which we have to execute to perform conversion. "cs2cs" is a command line tool which we can use for CRS conversion. Just enter "cs2cs" in command to check if it is installed.

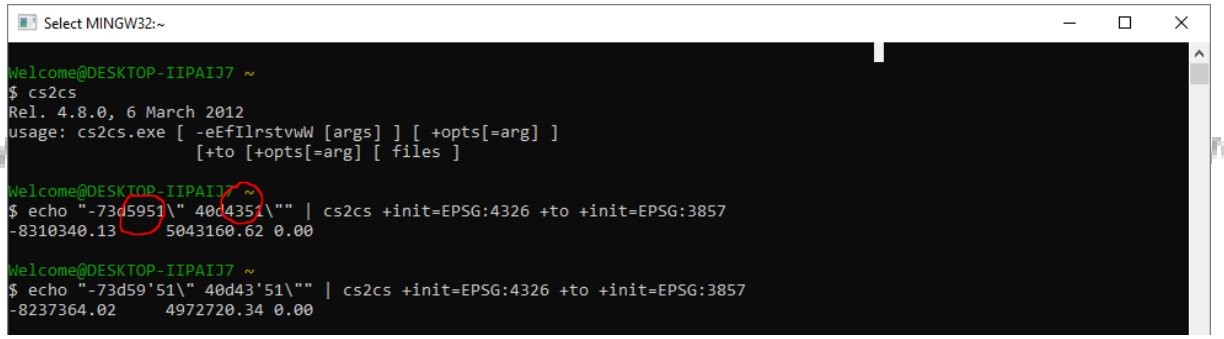


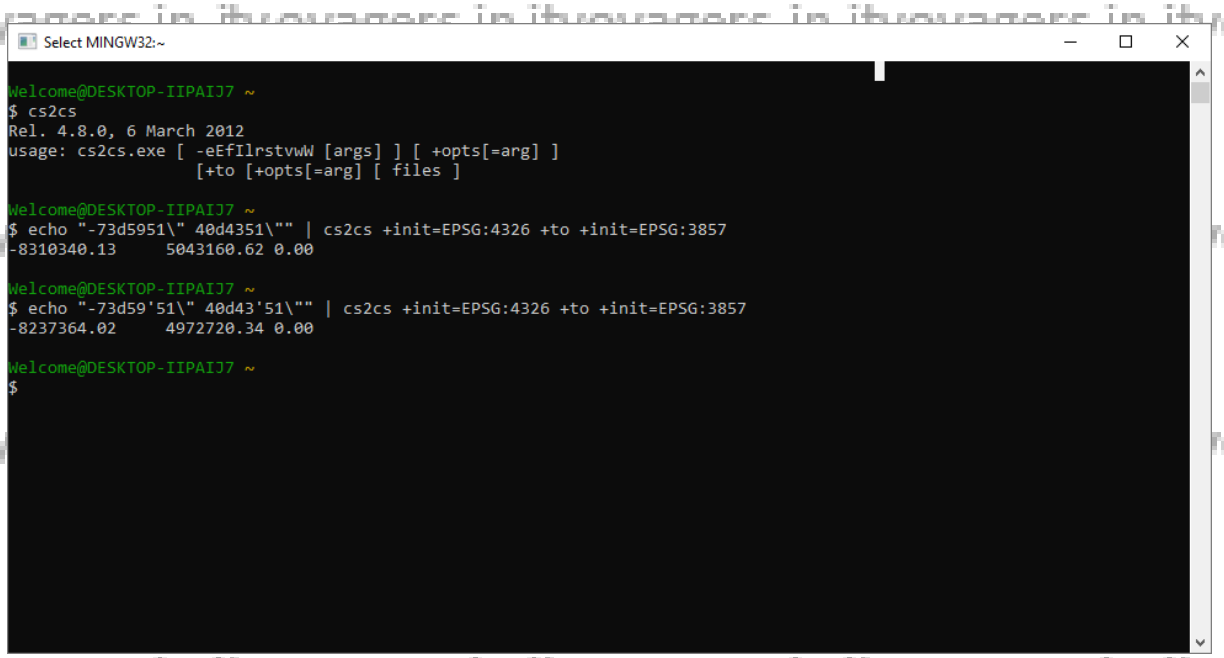
We are using the coordinates which saw on Wikipedia website in following command. Now to convert CRS we have to type following command in command line

"echo "-73d59'51\" 40d43'51\"" | cs2cs +init=EPSG:4326 +to +init=EPSG:3857"

Note: If you copy-paste it and press entered you will get converted coordinate but those are not real coordinate because when you copy-paste the command the single quote in between "-73d59" - "51" and "40d43" and "51"will be missed. So we have to type it manually or add single quote after copy-paste

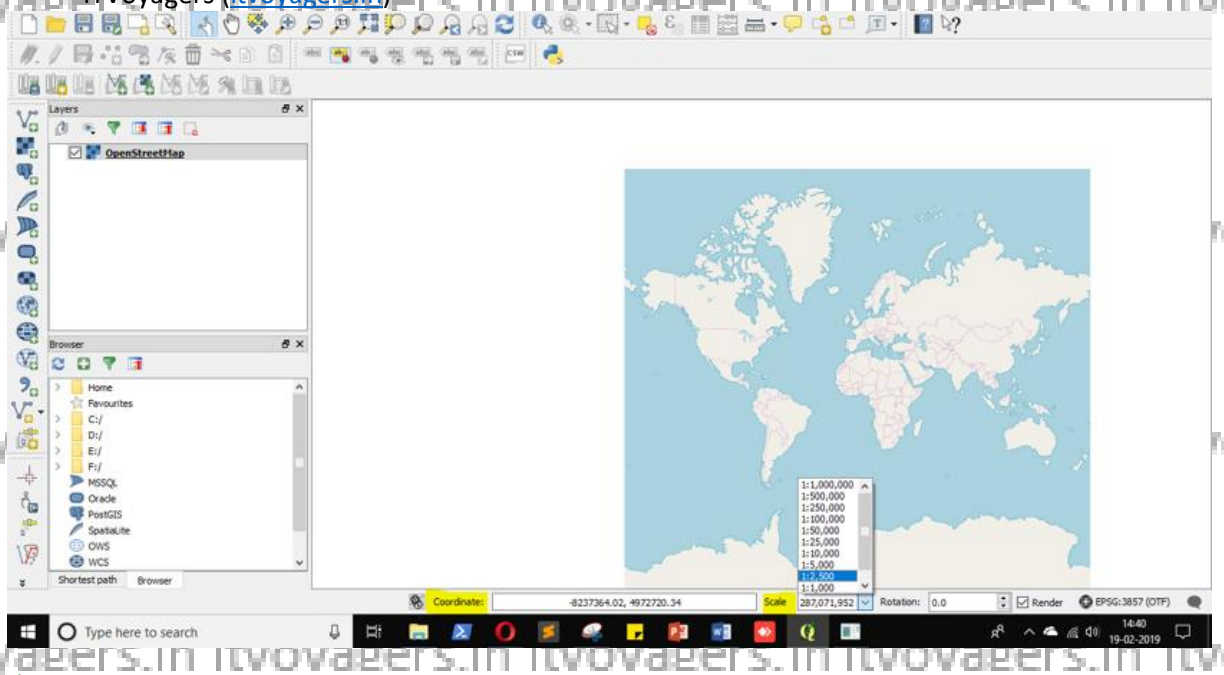


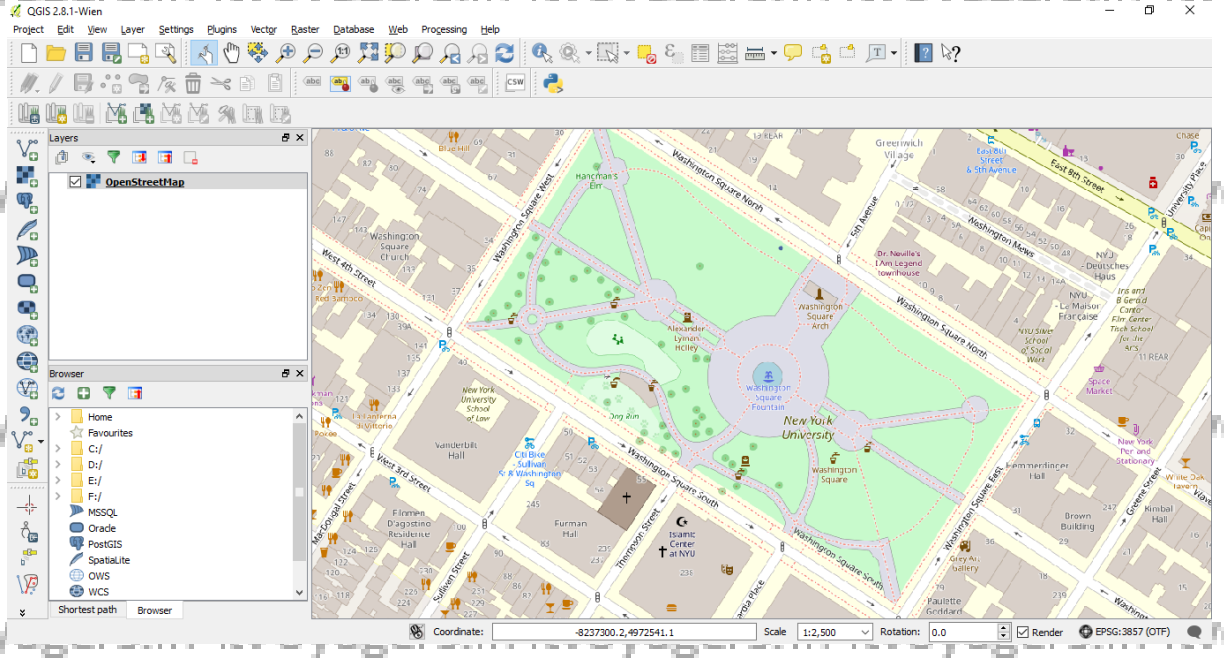




Once you executed correct command you will get the coordinates in "EPSG:3857" CRS so "-8237364.02, 4972720.34" are the correct coordinates.

Go to QGIS in "Coordinate" textbox type those above mentioned coordinate and press "ENTER" button and set "Scale" to "1:2500" and press "ENTER" button again please note that if you didn't press "ENTER" button then your entries will not get registered.

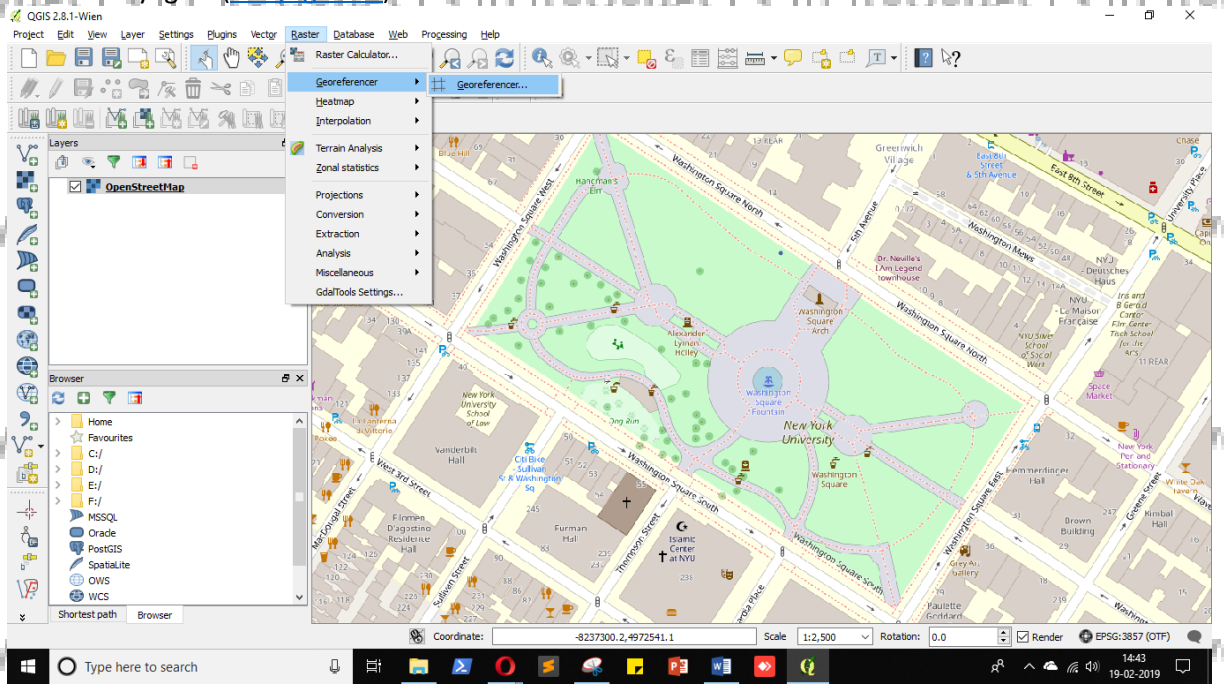




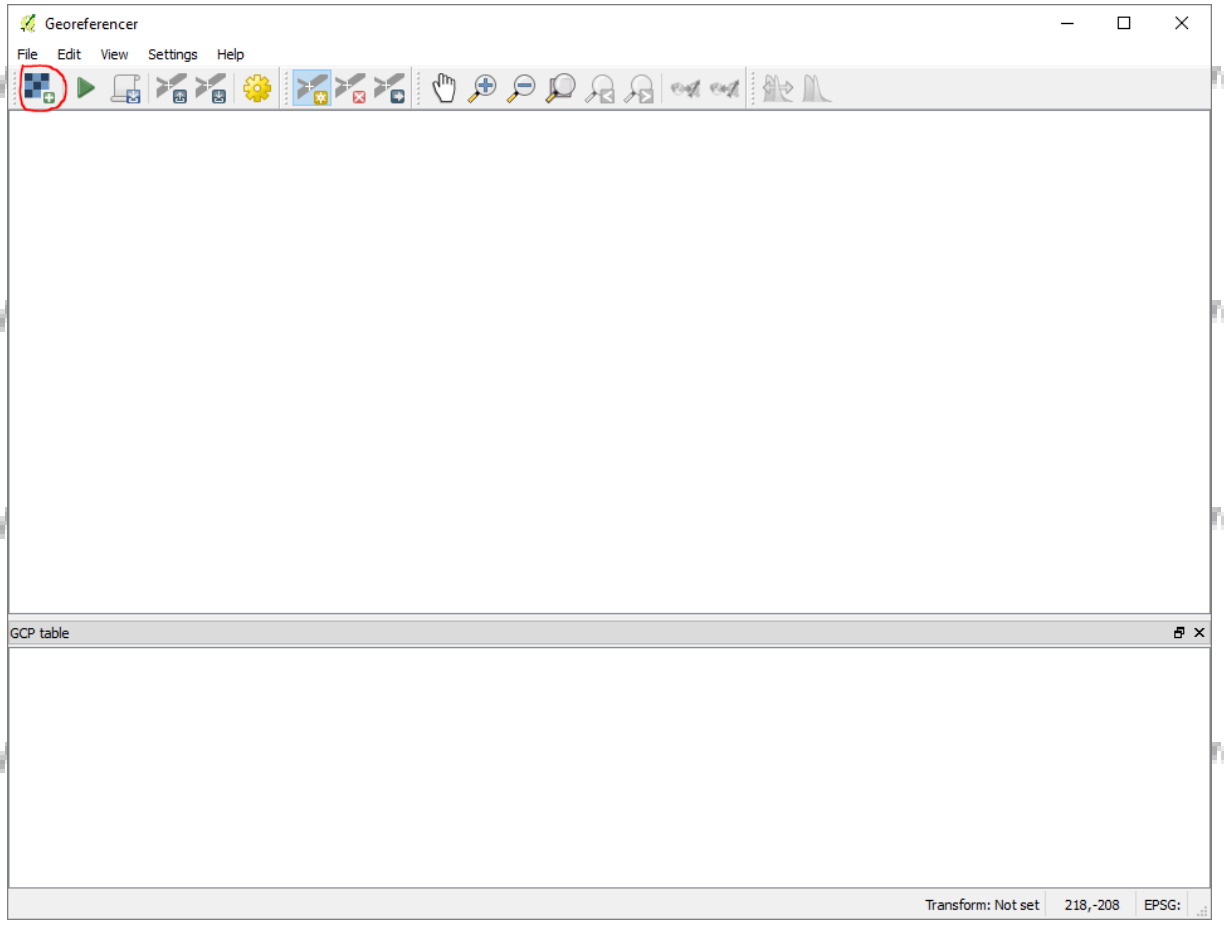
Note: you can direct zoom to "Washington Square Park" with using this "-8237364.02, 4972720.34" coordinates you don't have to perform the CRS conversion steps, those steps are for you to understand "cs2cs" tool and "MSYS".

Now go to

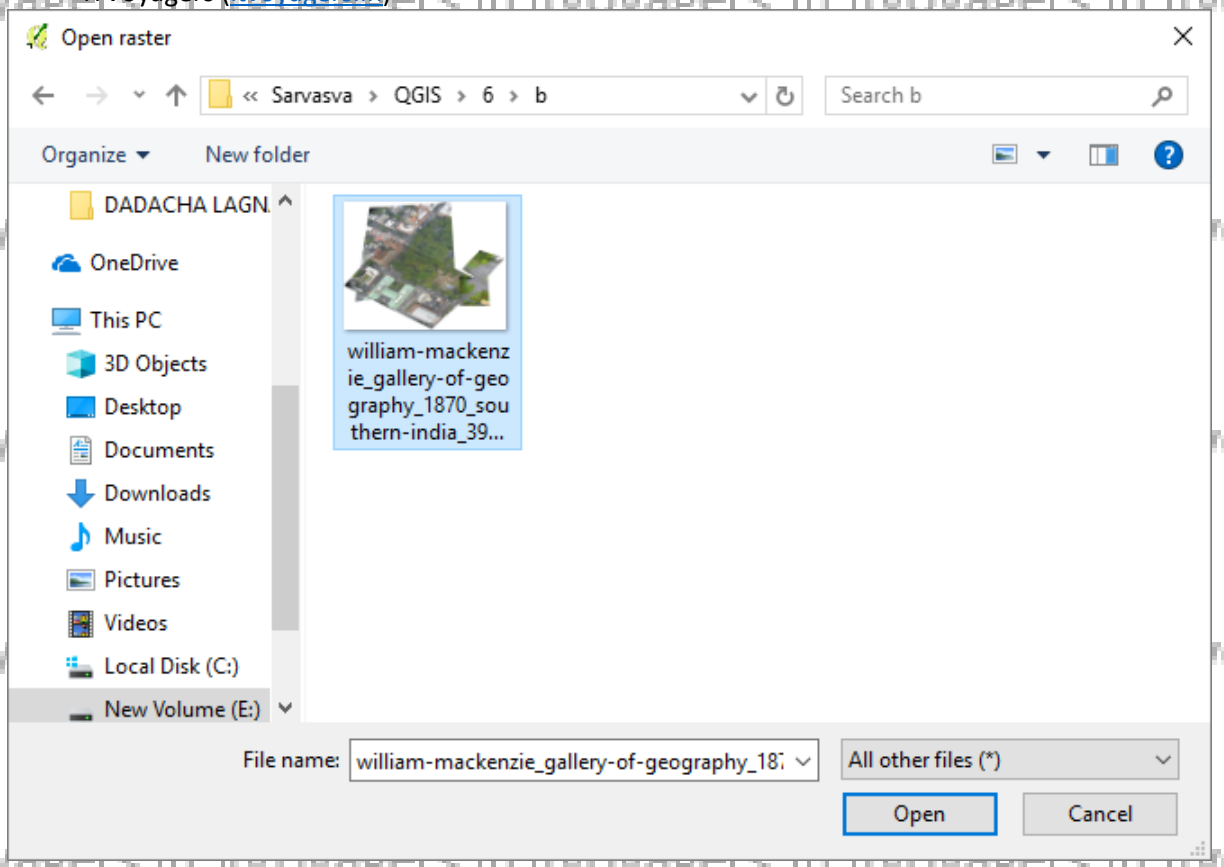
Raster > Georeferencer > Georeferencer…



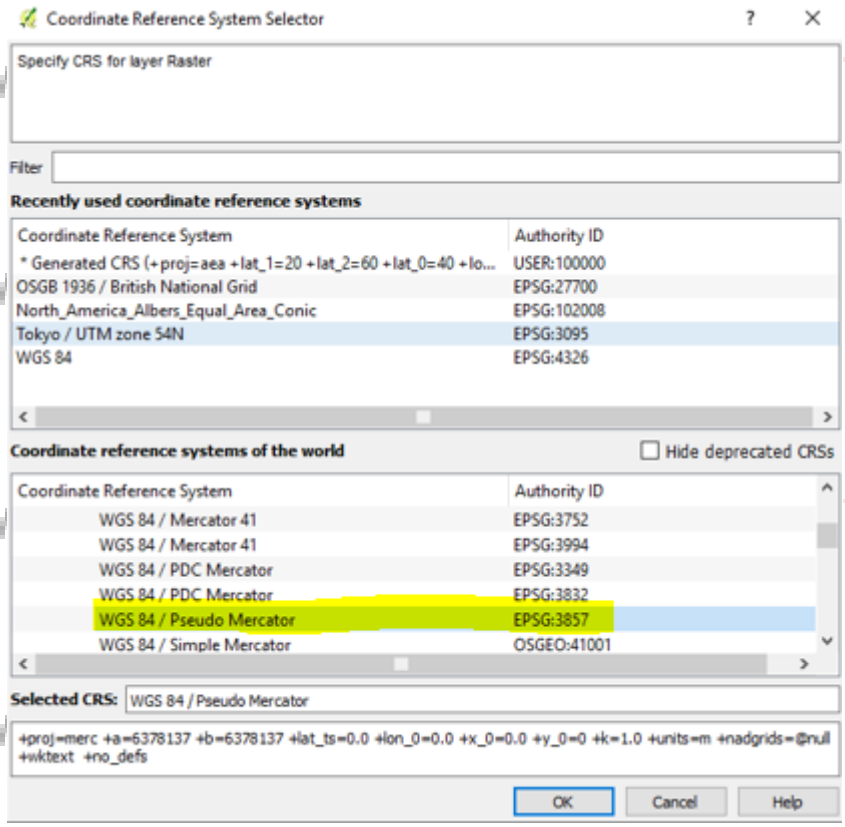
"Georeferencer" window will get load. Now click on "Open raster" button.



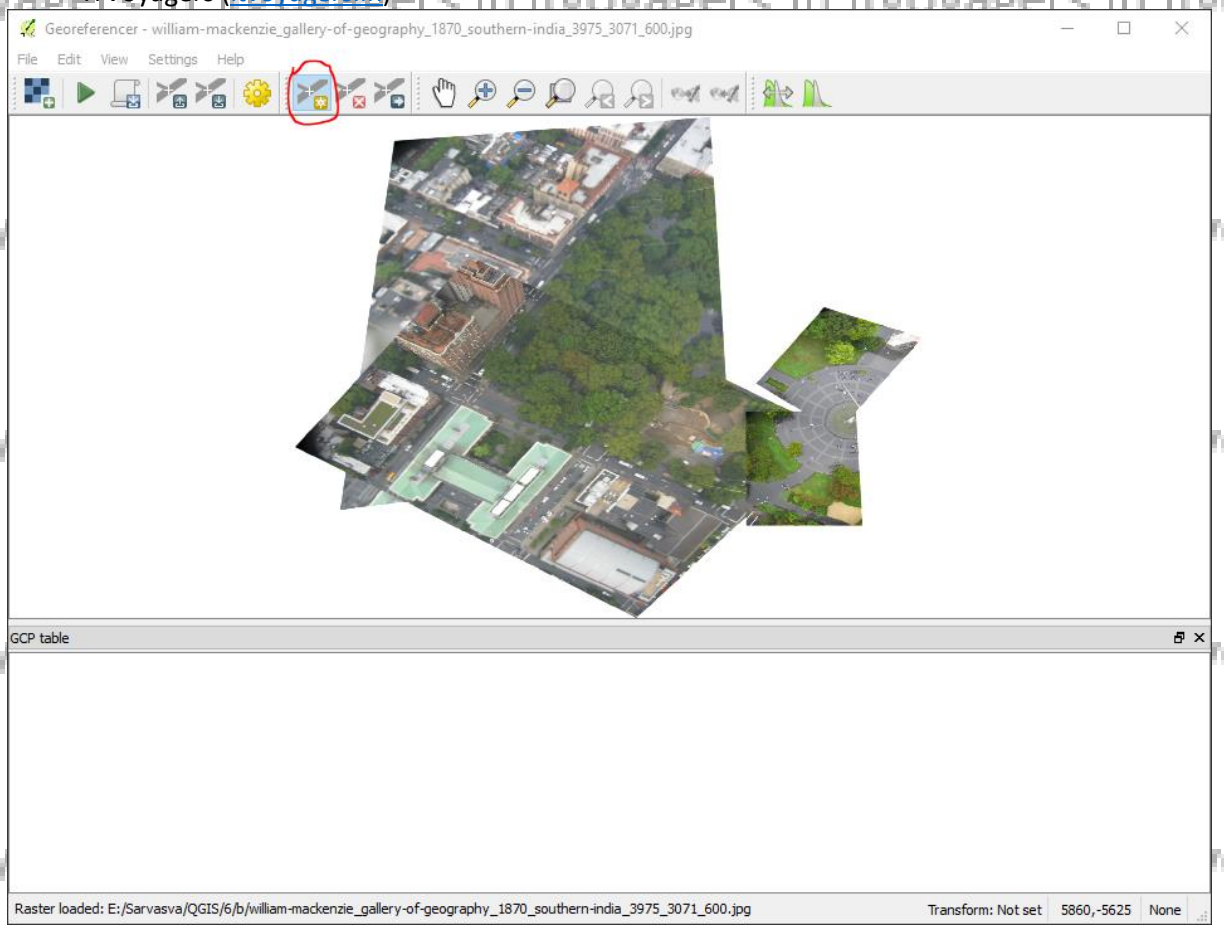
Select "william-mackenzie_gallery-of-geography_1870_southern-india_3975_3071_600.jpg" file and click on "Open".



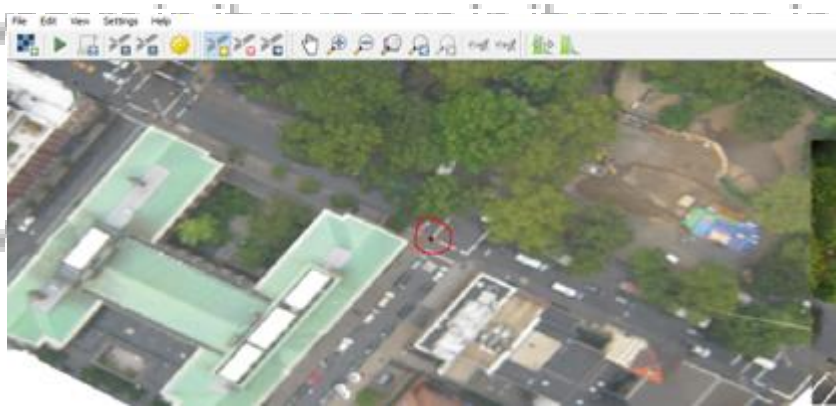
"Coordinate Reference System Selector" select "EPSG:3857" and click on "OK".

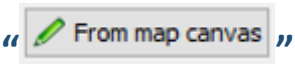


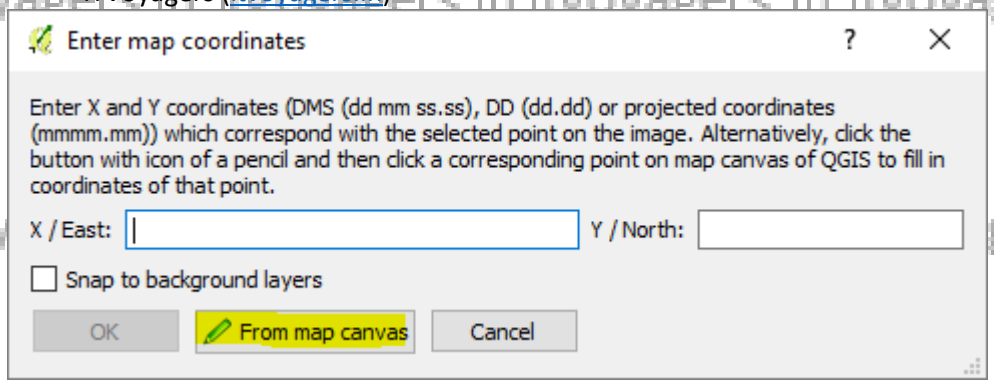
To add reference point click on "Add point" button.



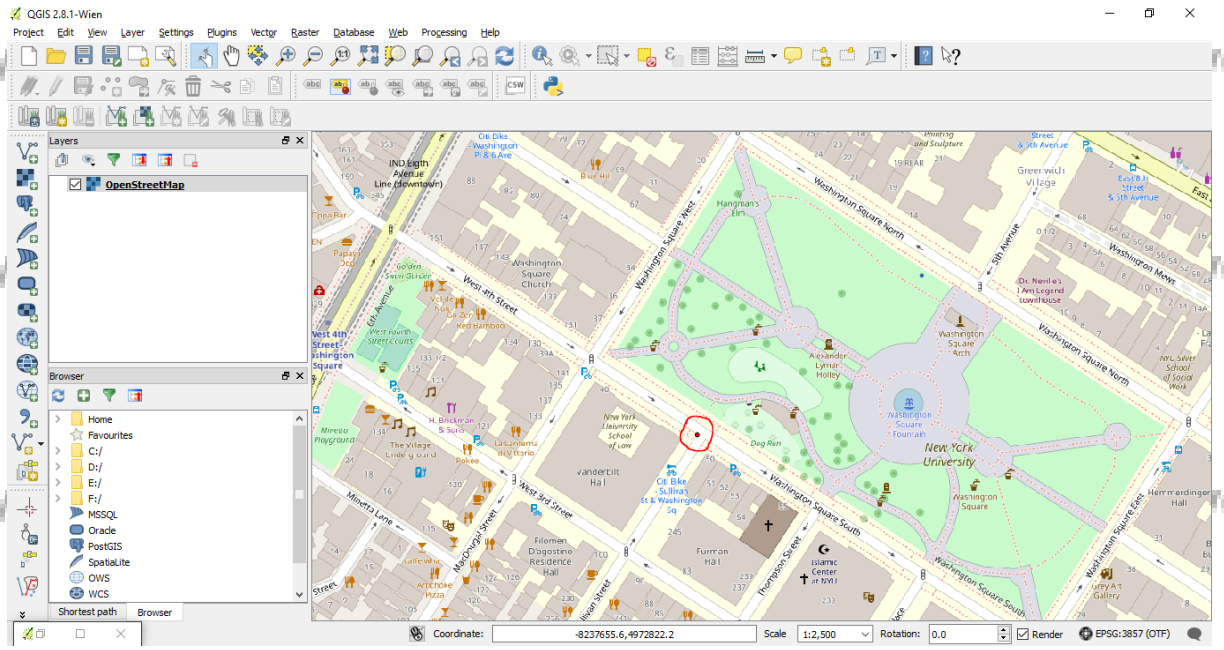
Now we have to click on such point which we can easily locate in "OpenStreetMap" layer in canvas. First we are selecting following point

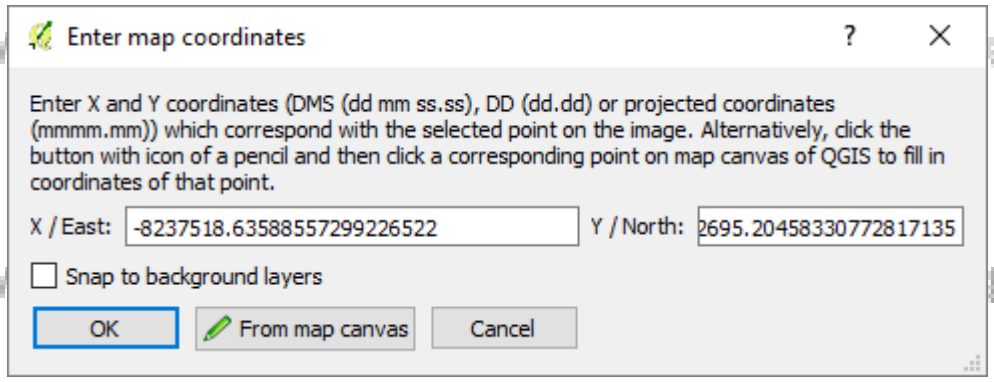


Once you click on the point you will get the following window, which will ask you to enter the coordinate for the point. We are going to select point from "OpenStreetMap" layer in canvas, for that click on "  **" button.**

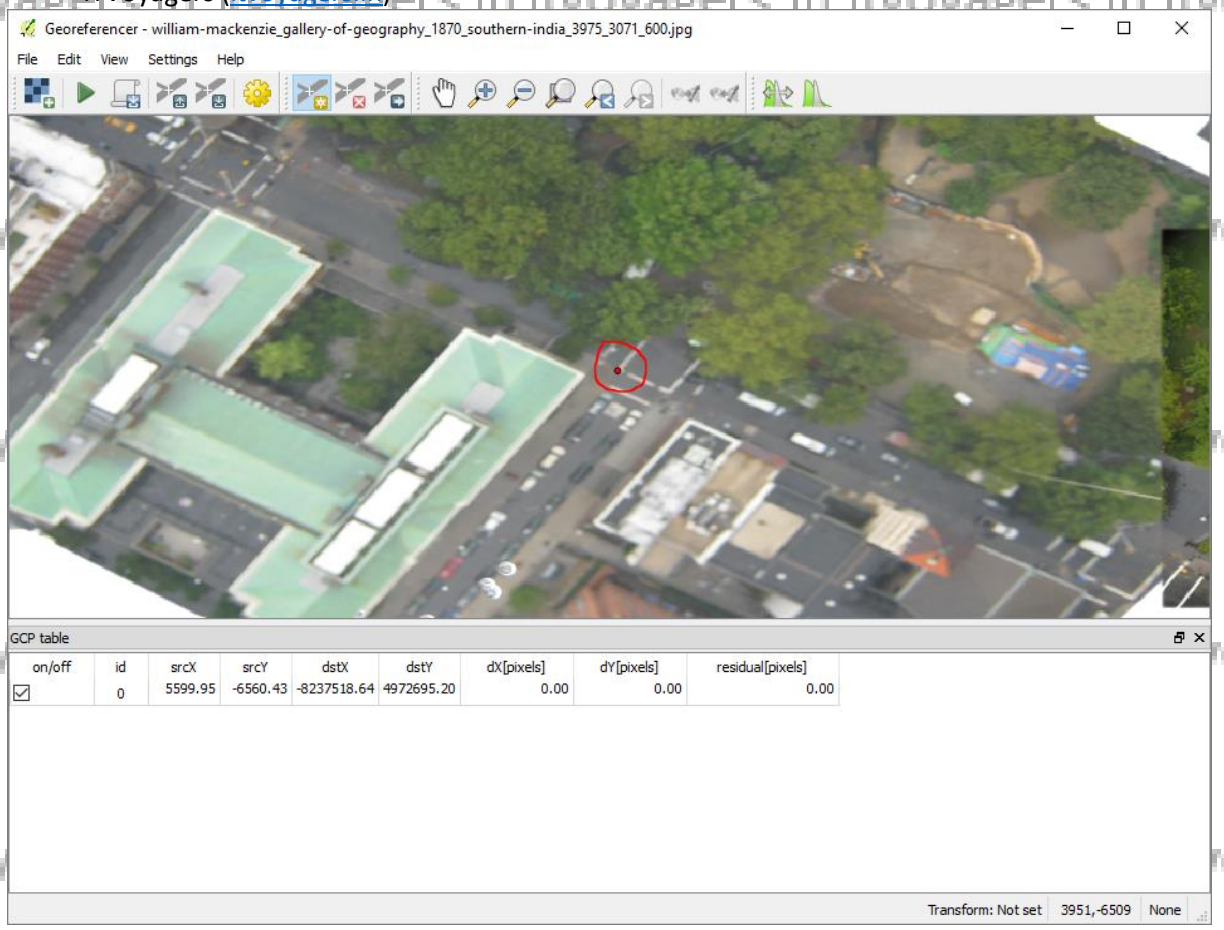


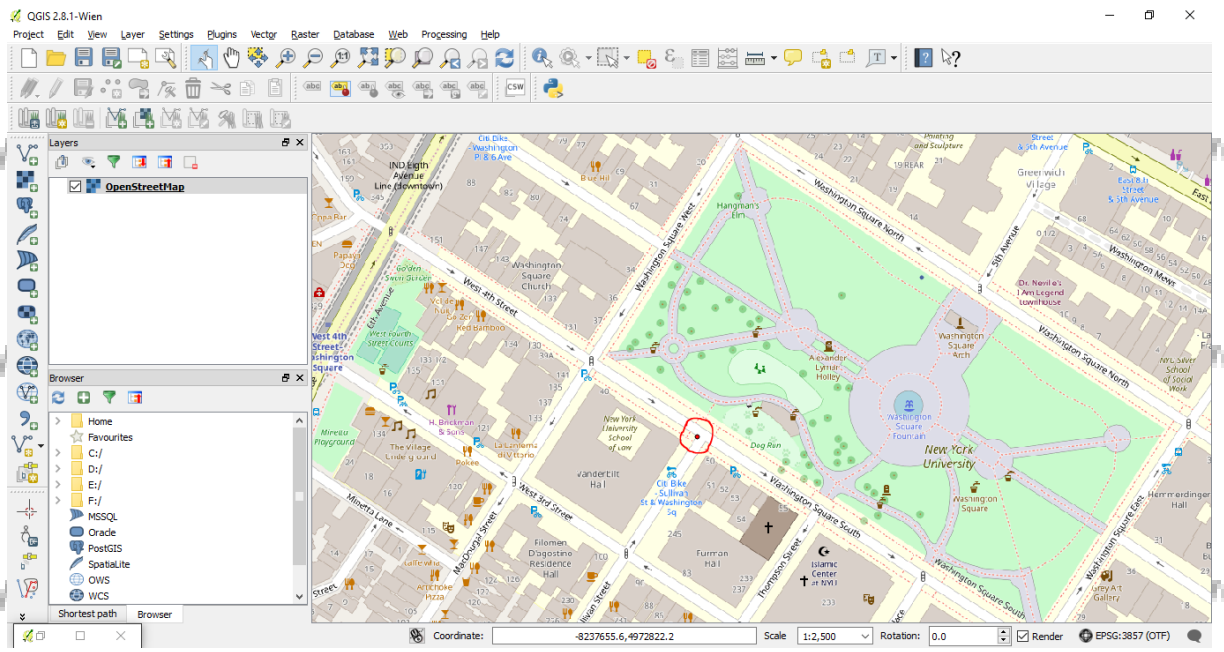
Select following point from "OpenStreetMap" layer in canvas, once you click on it coordinate for that point will get load in "Enter map coordinates" window.



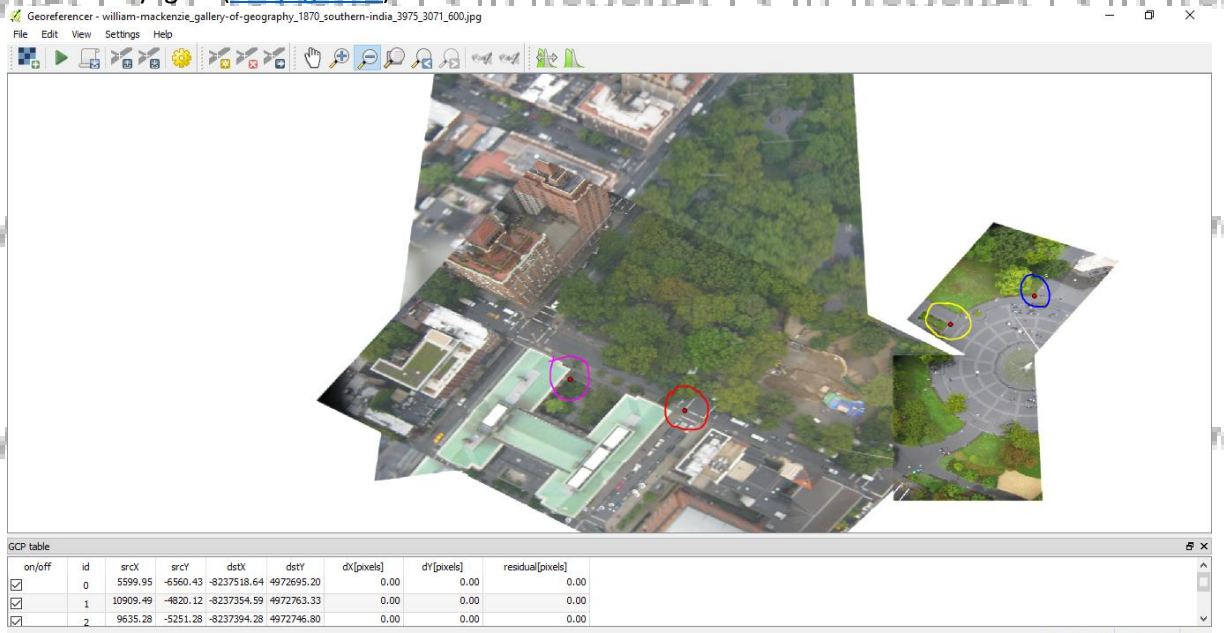


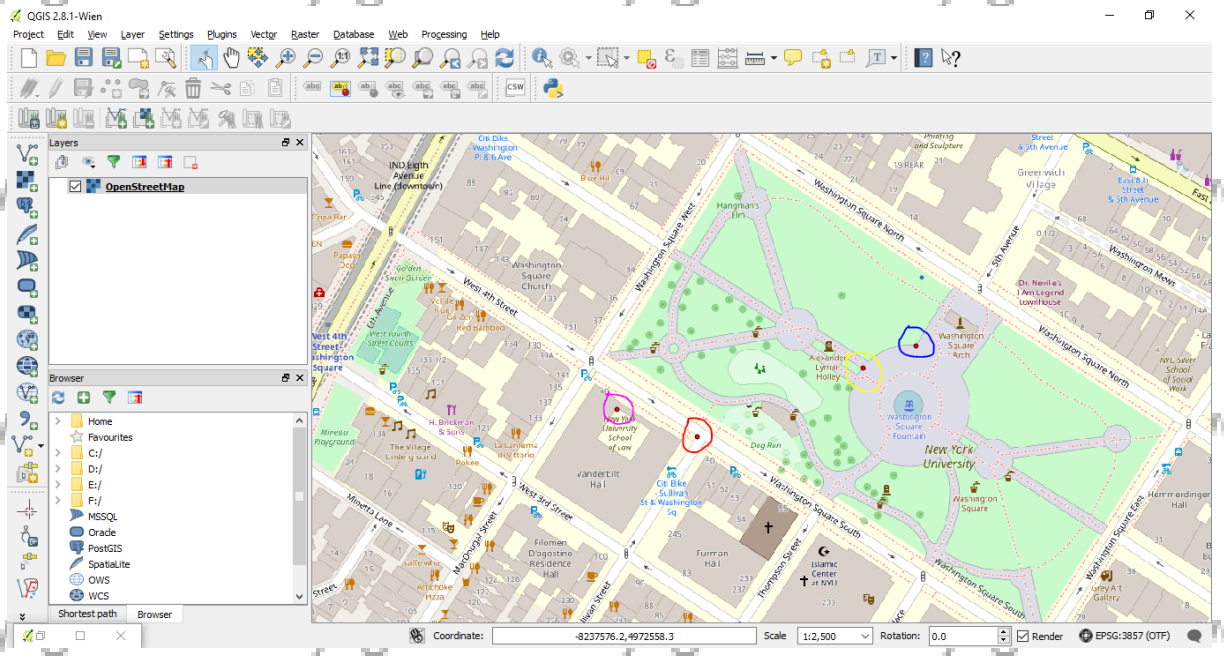
Click on "OK".





Like this add four points for georeferencing. We (ITVoyagers) have selected following points.



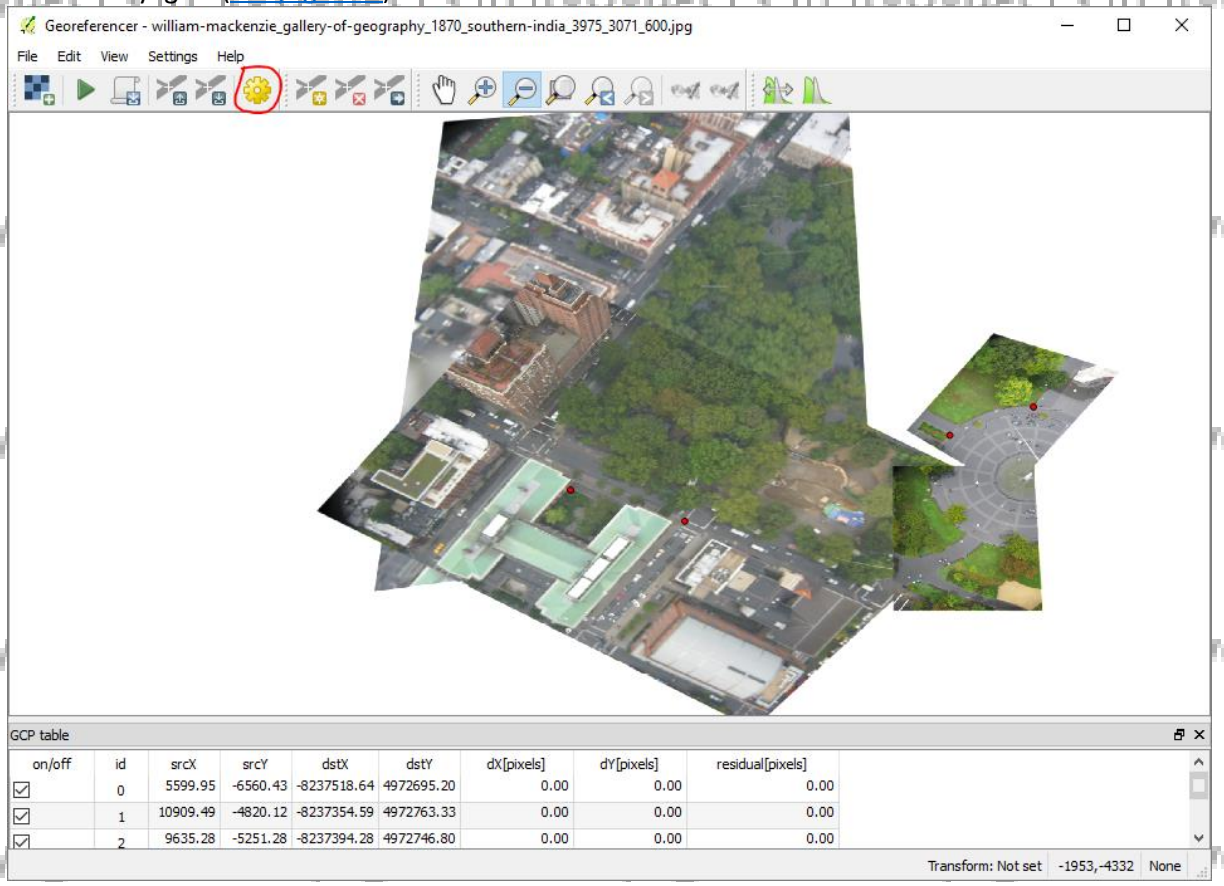


Following is the "GCP table" for the four points we selected (we have used colour coding to show which point represent which entre in "GCP table").

GCP table

on/off	id	srcX	srcY	dstX	dstY	dX[pixels]	dY[pixels]	residual[pixels]
☑	0	5599.95	-6560.43	-8237518.64	4972695.20	-0.00	0.00	0.00
☑	1	10909.49	-4820.12	-8237354.59	4972763.33	-0.00	0.00	0.00
☑	2	9635.28	-5251.28	-8237394.28	4972746.80	-0.00	0.00	0.00
☑	3	3859.29	-6084.75	-8237578.83	4972715.71	-0.00	0.00	0.00

Now click on "Transformation settings" button i.e. "  ".



In “Transformation settings” window please make the following changes.

Select “Thin Plate Spline” in “Transformation type”.

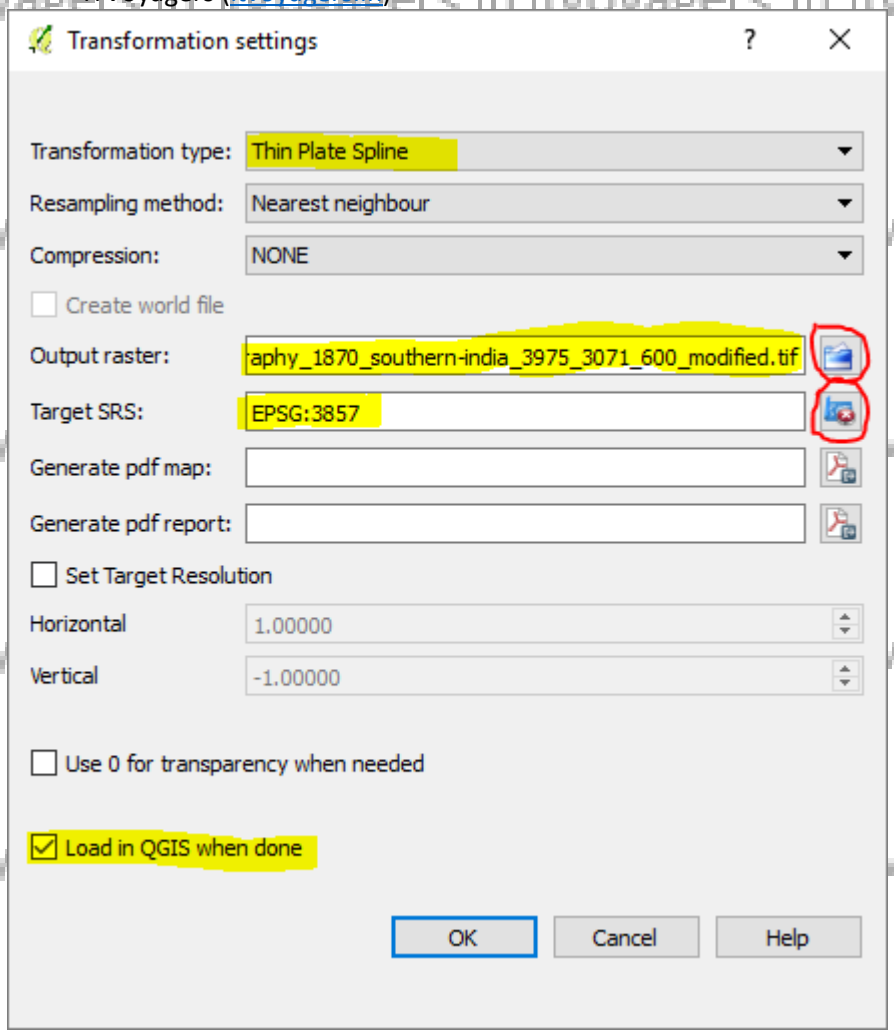
Give path and name to output file by clicking on “ ” button in front on “Output raster” textbox.

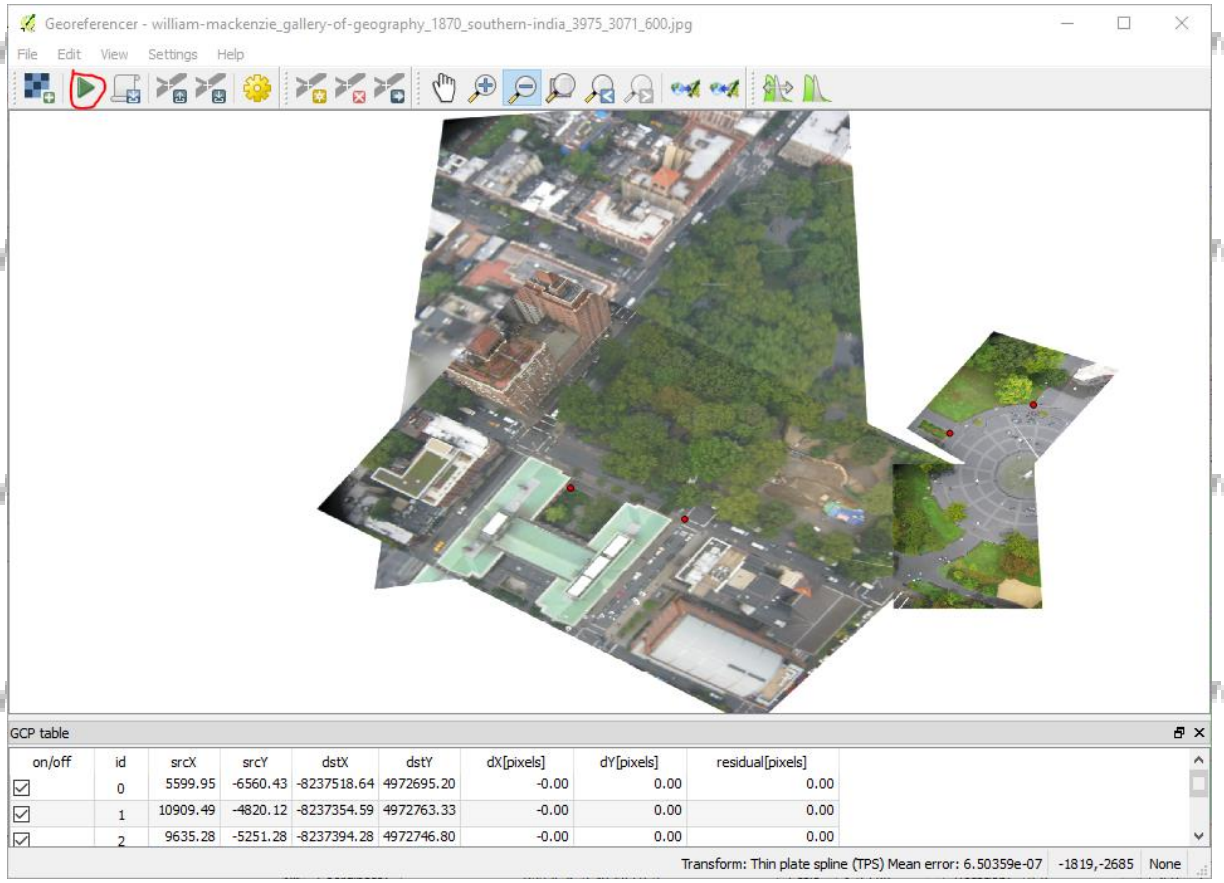
Select “EPSG:3857” CRS in “Target SRS” by click in on “ ”.

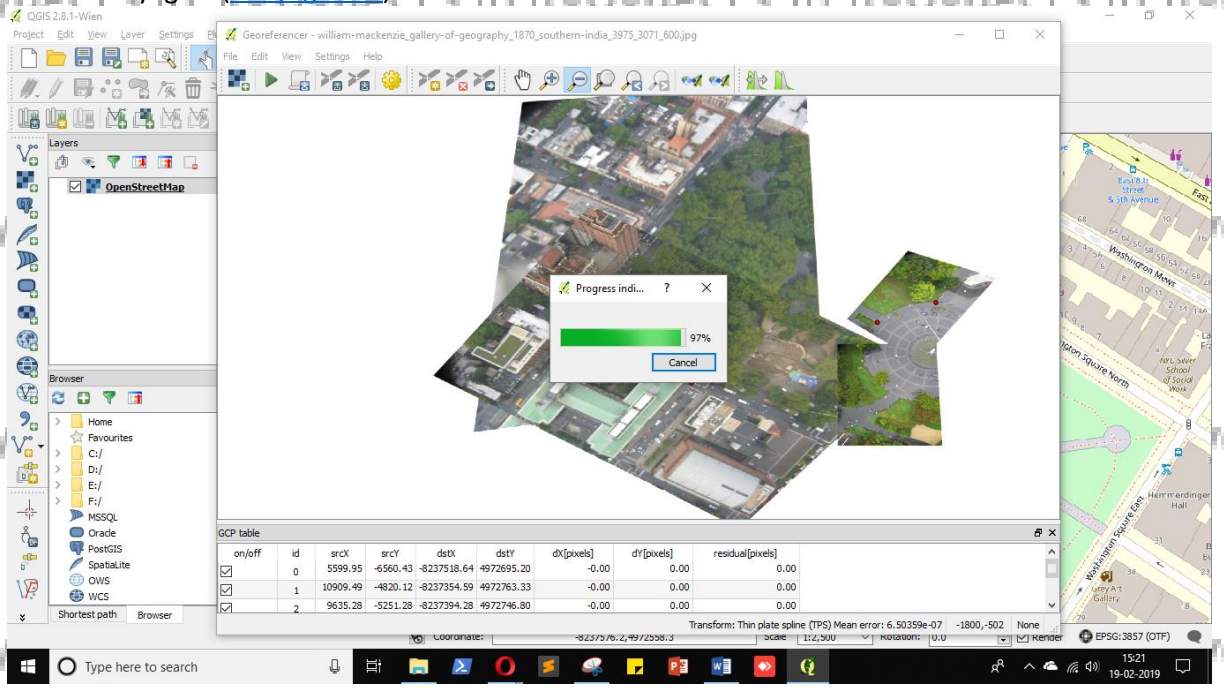
Select the “Load in QGIS when done” check box.

Click on “OK”.

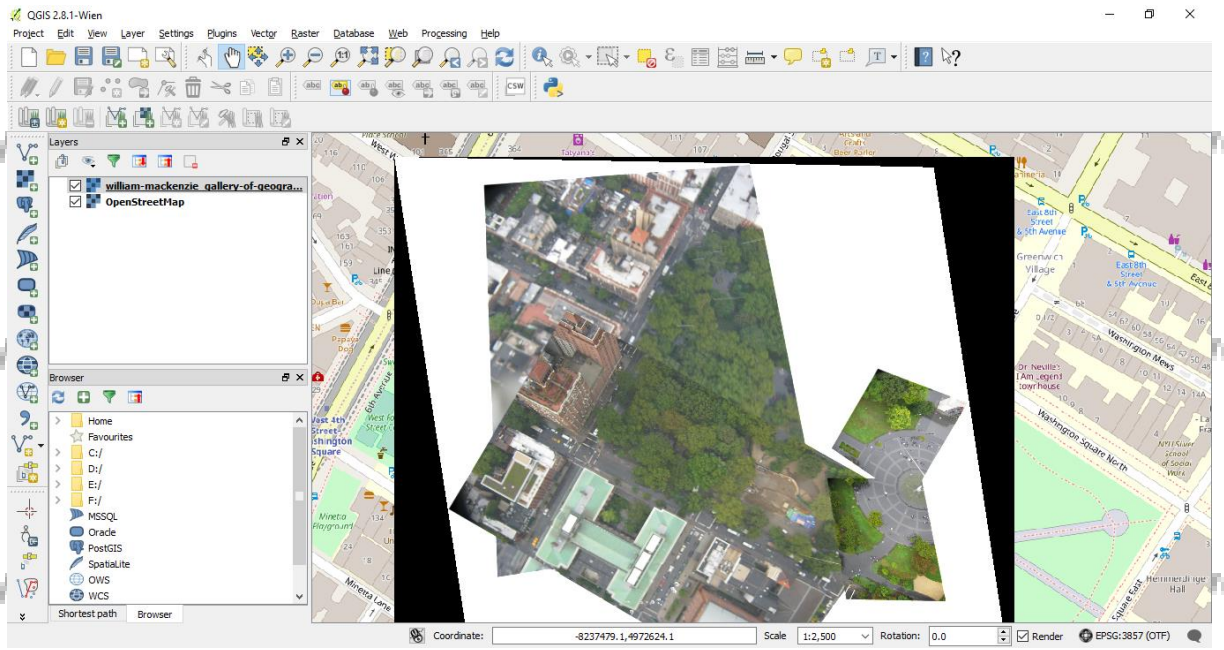
Now click on “ ” i.e. “Start georeferencing” button.


Transformation settings
Transformation type: Thin Plate Spline
Resampling method: Nearest neighbour
Compression: NONE
Create world file
Output raster: raphy_1870_southern-india_3975_3071_600_modified.tif
Target SRS: EPSG:3857
Generate pdf map:
Generate pdf report:
Set Target Resolution
Horizontal 1.00000
Vertical -1.00000
Use 0 for transparency when needed
Load in QGIS when done
OK
Cancel
Help

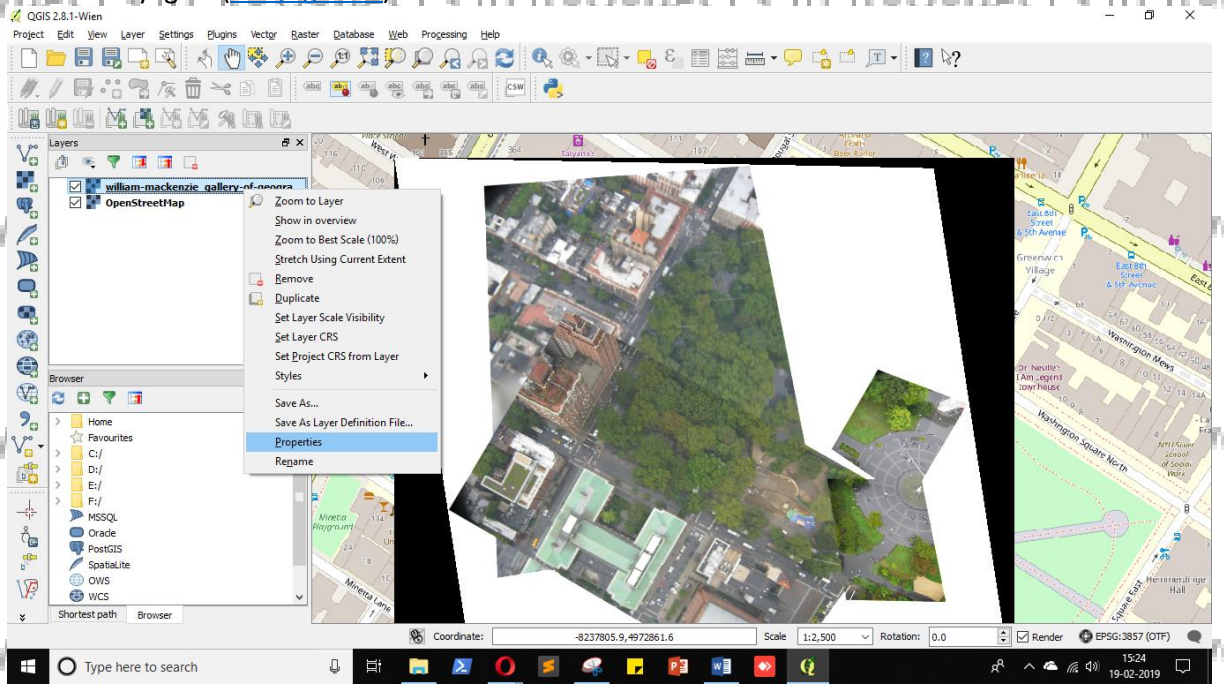

Georeferencer - william-mackenzie_gallery-of-geography_1870_southern-india_3975_3071_600.jpg
File Edit View Settings Help
GCP table
on/off id srcX srcY dstX dstY dX[pixels] dY[pixels] residual[pixels]
0 5599.95 -6560.43 -8237518.64 4972695.20 -0.00 0.00 0.00
1 10909.49 -4820.12 -8237354.59 4972763.33 -0.00 0.00 0.00
2 9635.28 -5251.28 -8237394.28 4972746.80 -0.00 0.00 0.00
Transform: Thin plate spline (TPS) Mean error: 6.50359e-07 -1819,-2685 None



Once georeferencing is done minimize the "Georeferencer" window. We see that "william-mackenzie_gallery-of-geography_1870_southern-india_3975_3071_600_modified" layer is added in canvas but it has that unnecessary portion. To remove that go to layer properties.

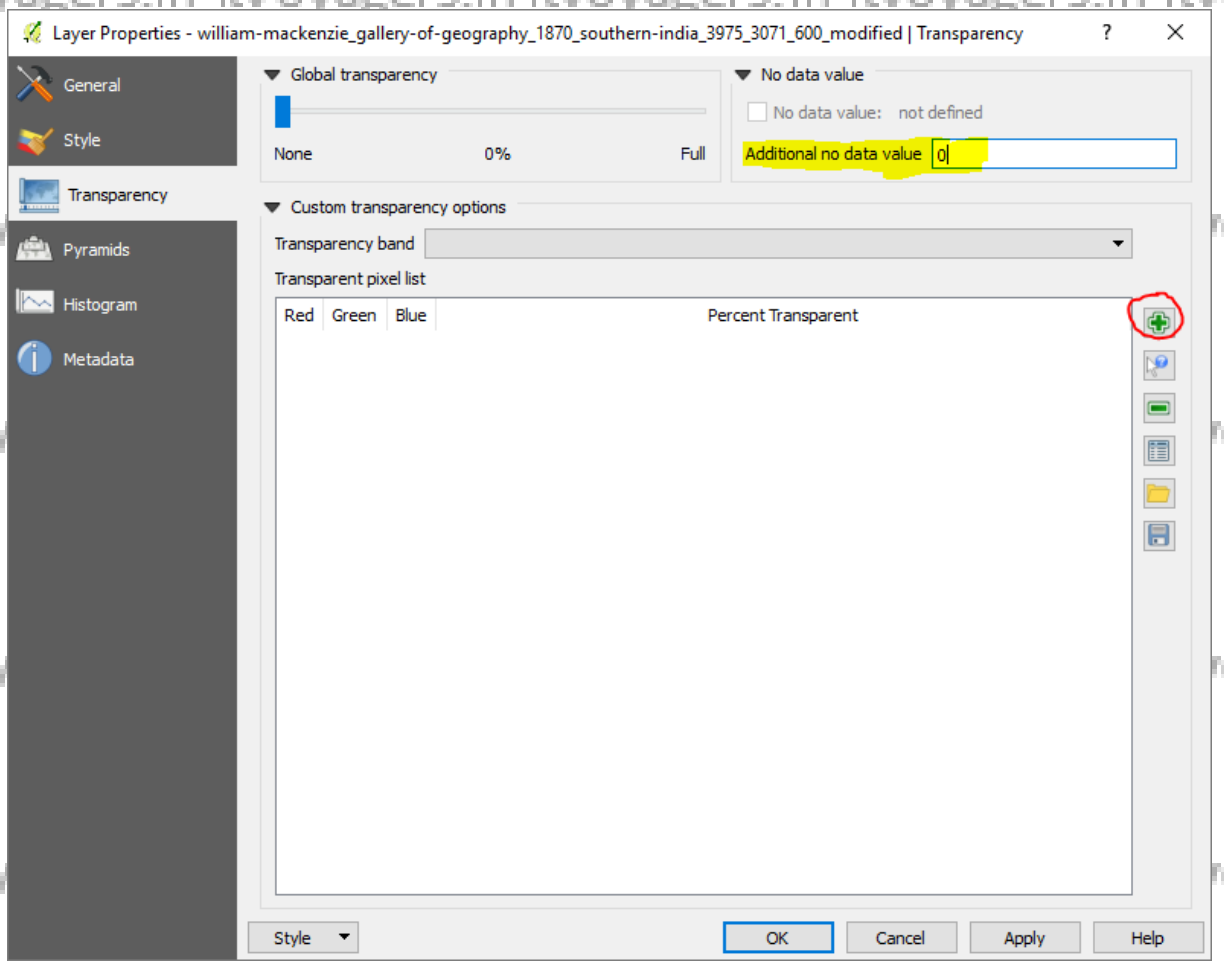


Right click on "william-mackenzie_gallery-of-geography_1870_southern-india_3975_3071_600_modified" layer and select "Properties".

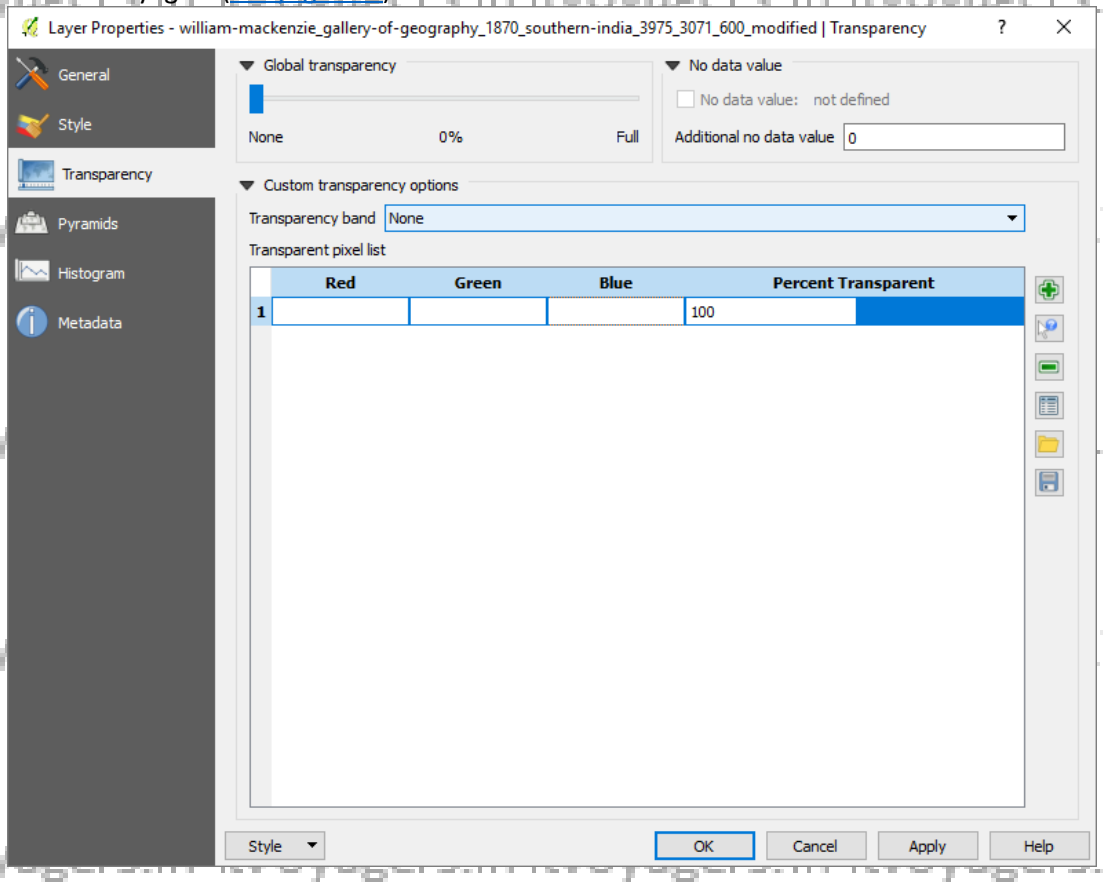


In "Transparency" tab set "Additional no data value" to "0".

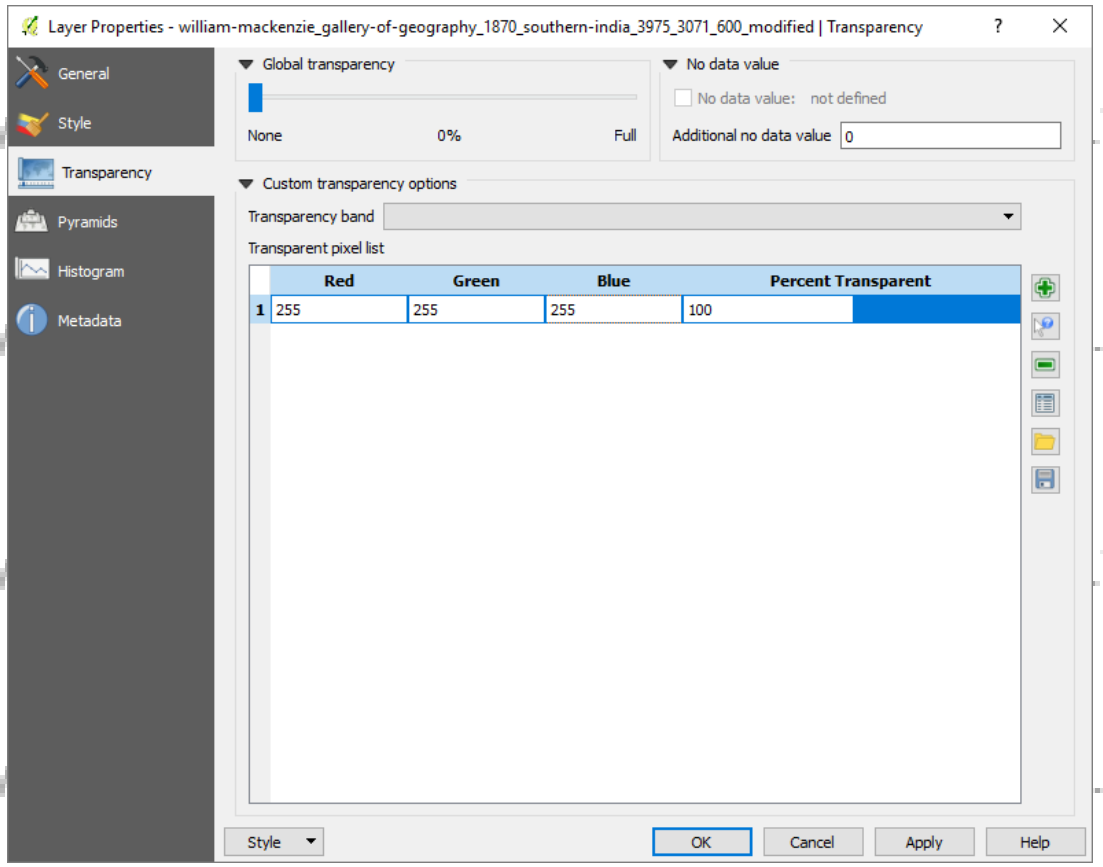
Now click on " " in "Transparency pixel list" panel.



You will get one item in "Transparency pixel list".



Now add the following values in that item and click on "OK".



And following is your final output.