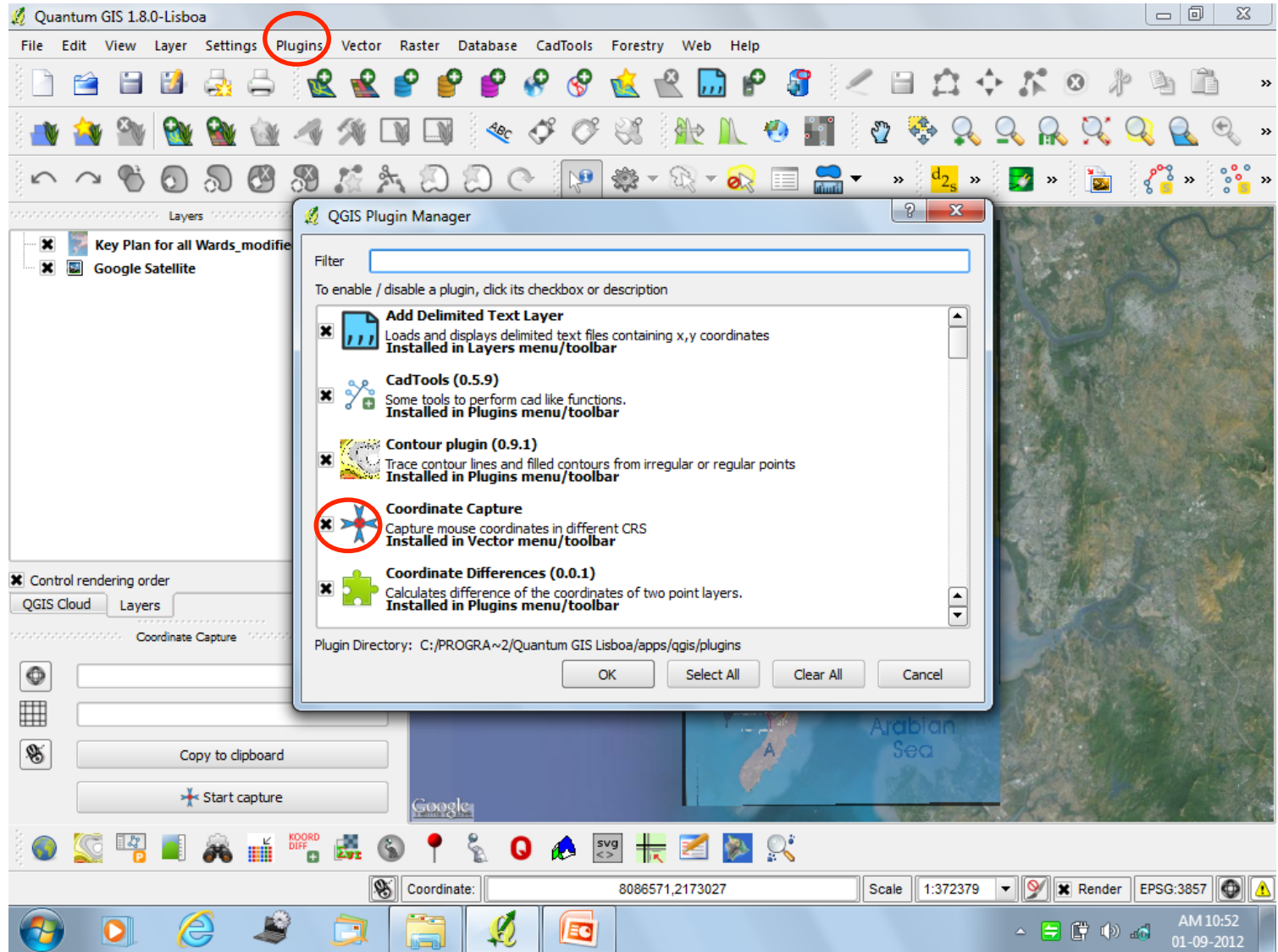


HOW TO GEO-REFERENCE A RASTER MAP

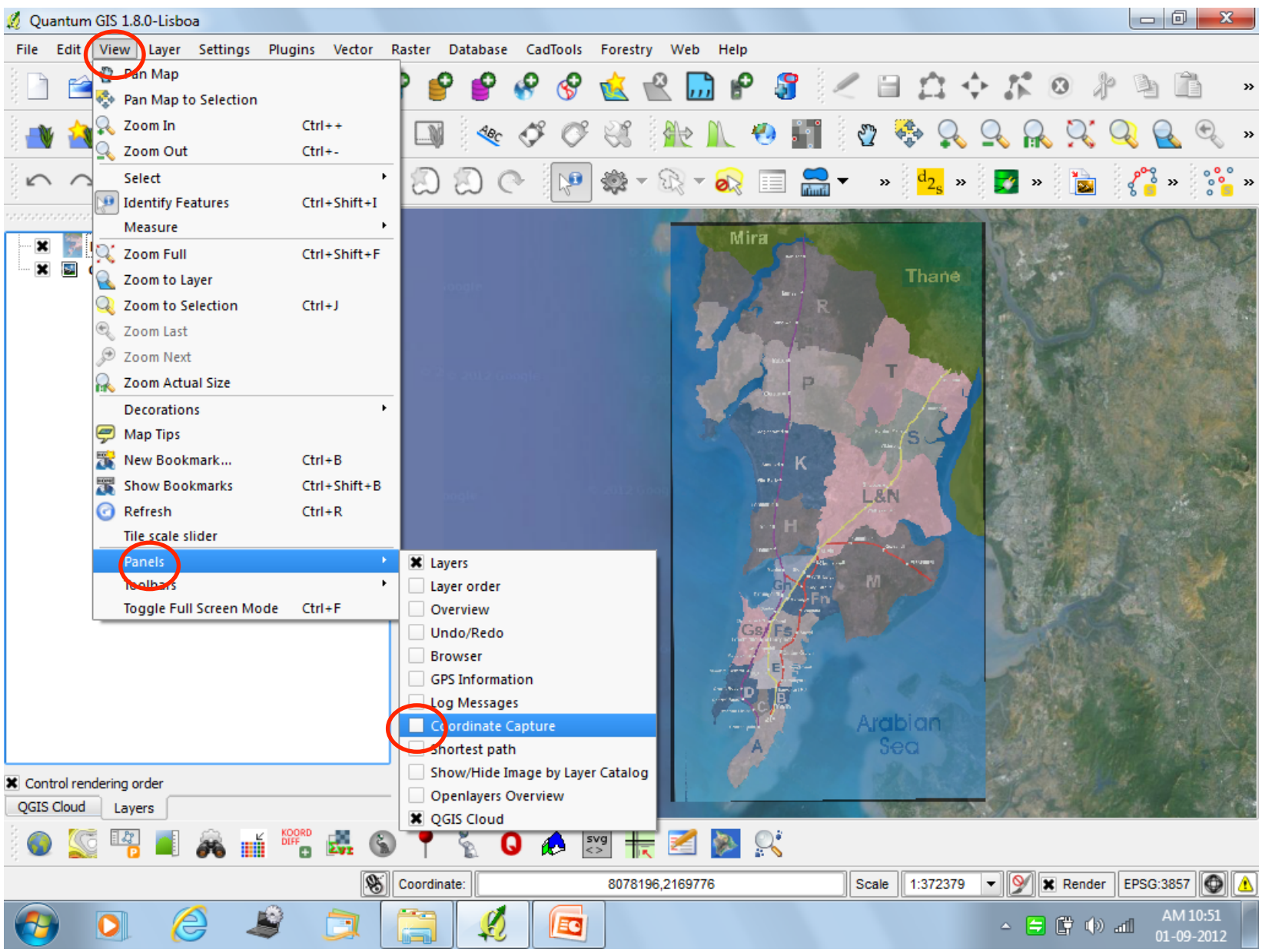
Case Taken : A Development Plan Sheet of Mumbai

Tutorial by
Abhijit Ekbote

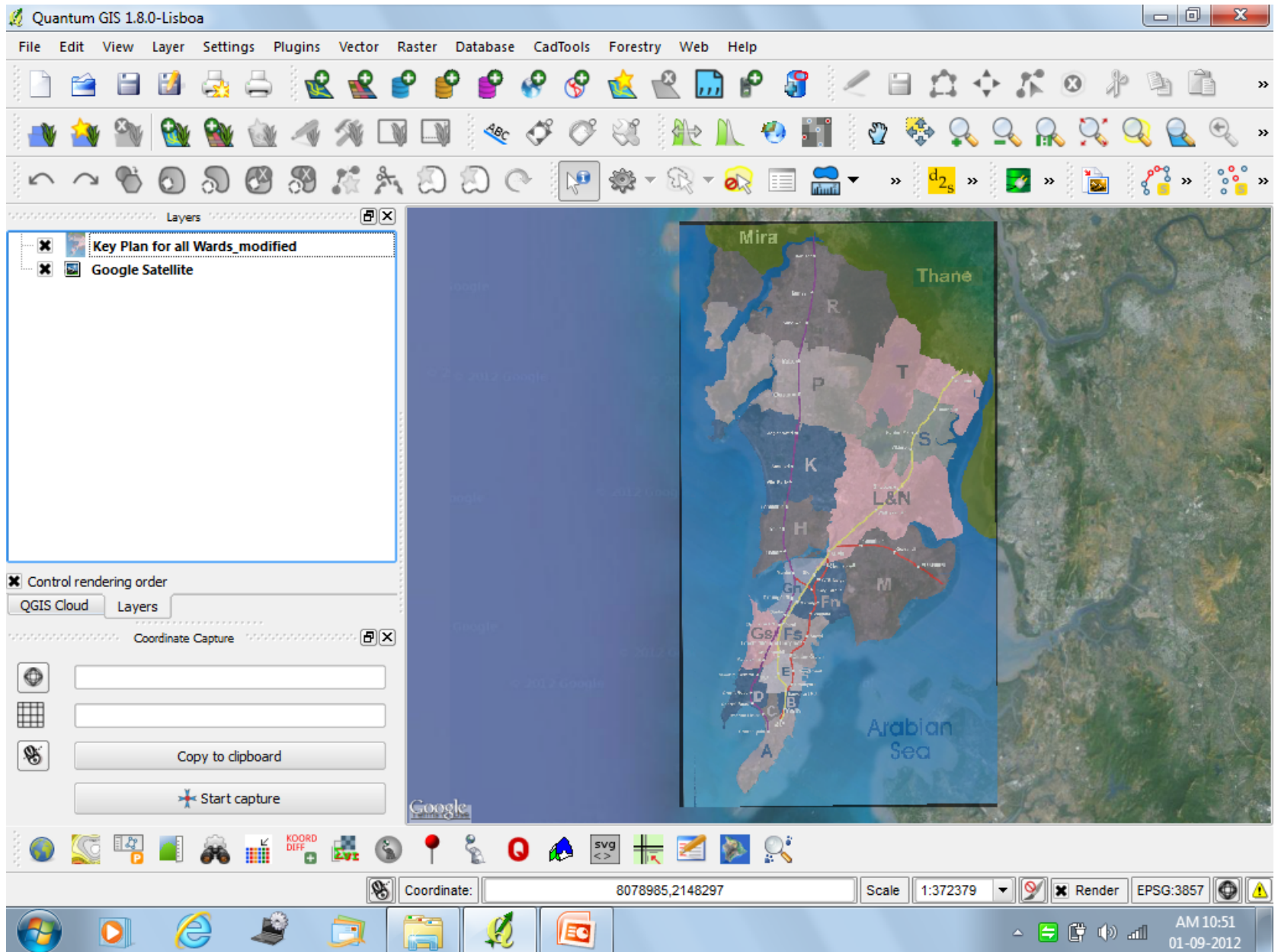
Open QGIS and load a Vector or Raster data which is already Geo-referenced. Click on 'Plugins' and then 'OpenLayers' and select Google Satellite. This will put a Google Earth layer below your Geo-referenced Raster or Vector layer. If 'OpenLayers' is not installed then click on 'Fetch' and install it. Also ensure that 'Coordinate Capture' icon is checked.



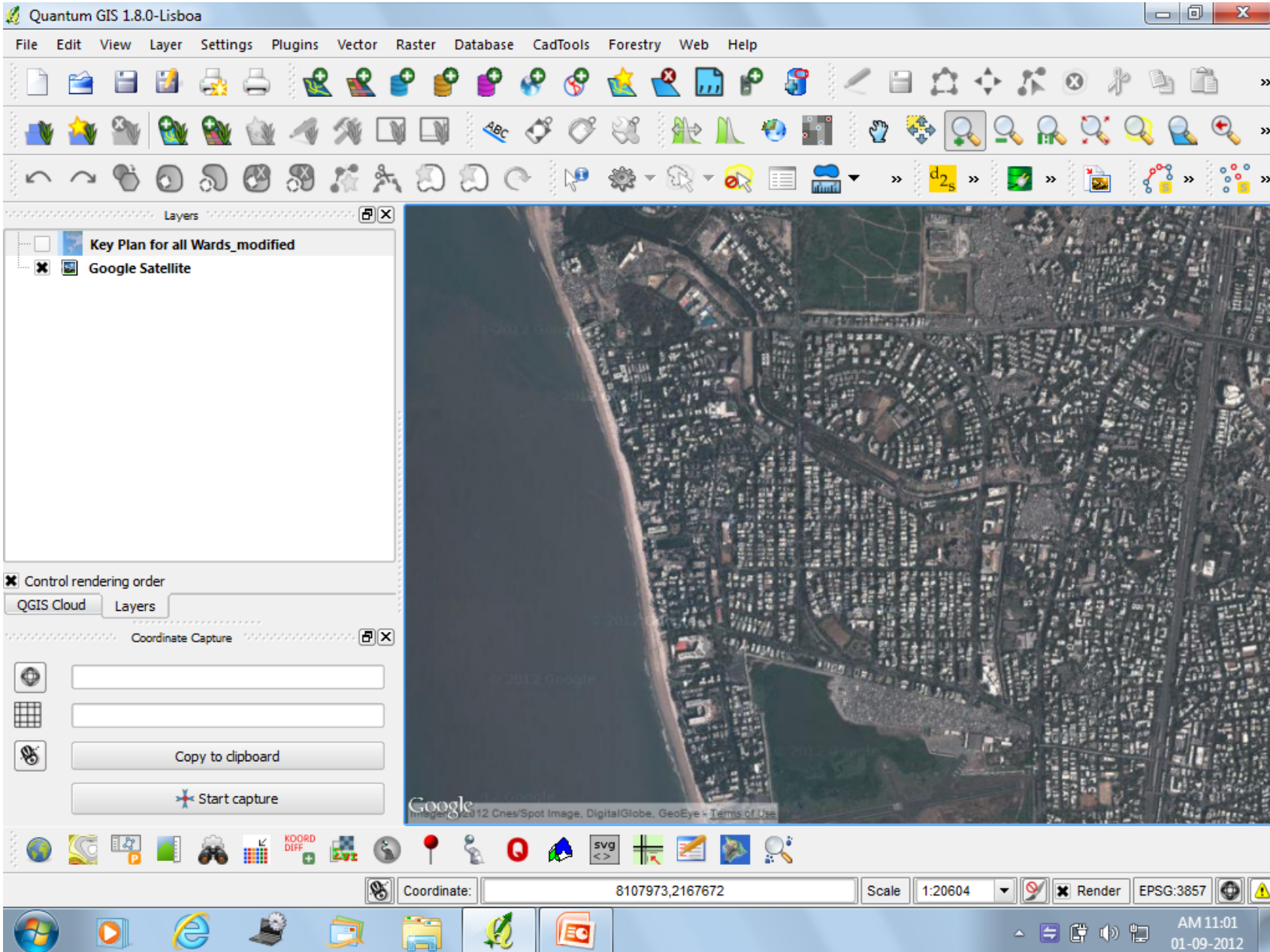
Click on 'View', then 'Panels' and click on 'Coordinate Capture'. This will ensure a Coordinate Capture panel will get enabled under Layer Legend box.



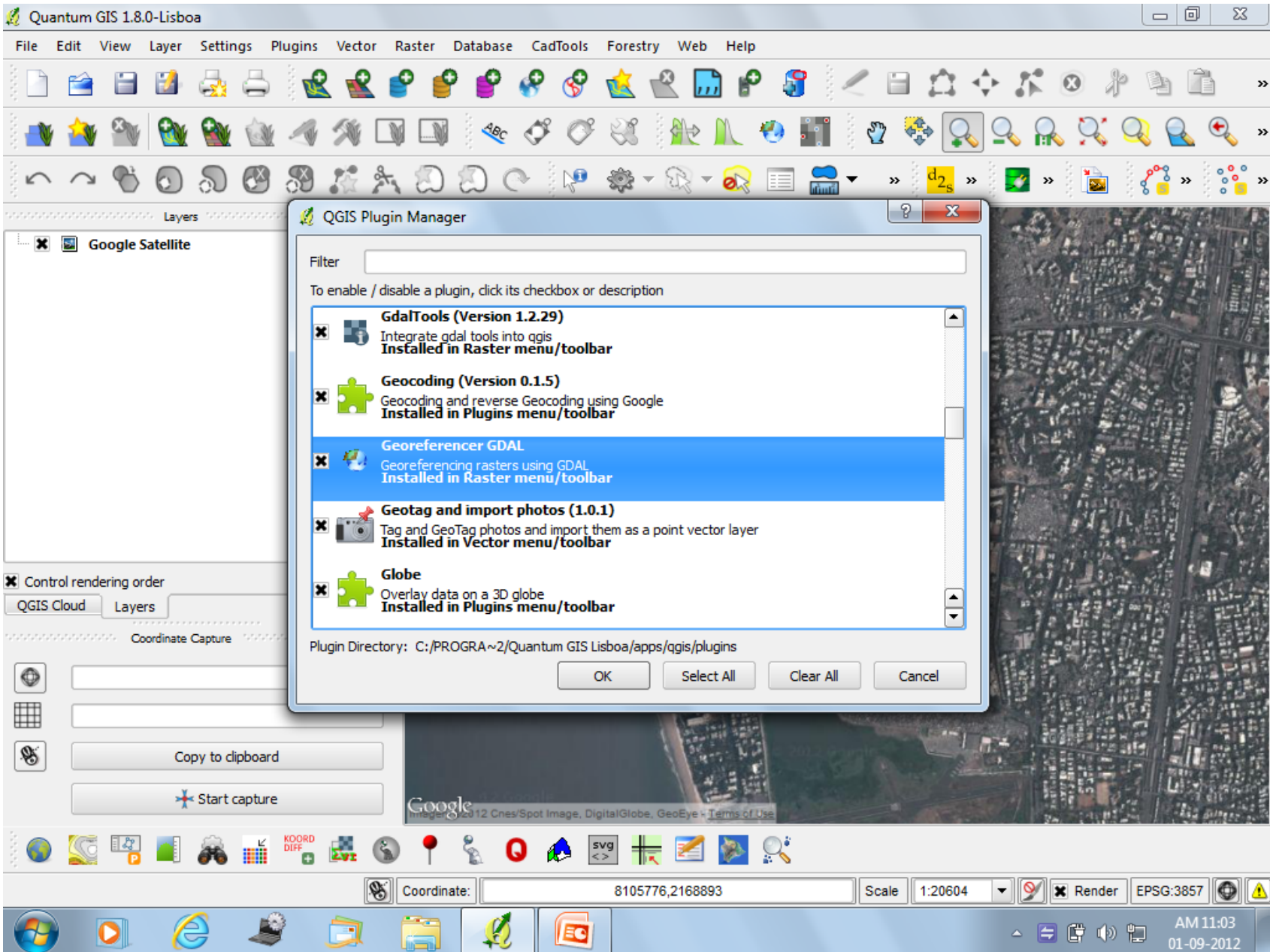
The Coordinate Capture panel will now be shown under Layer Legend box.



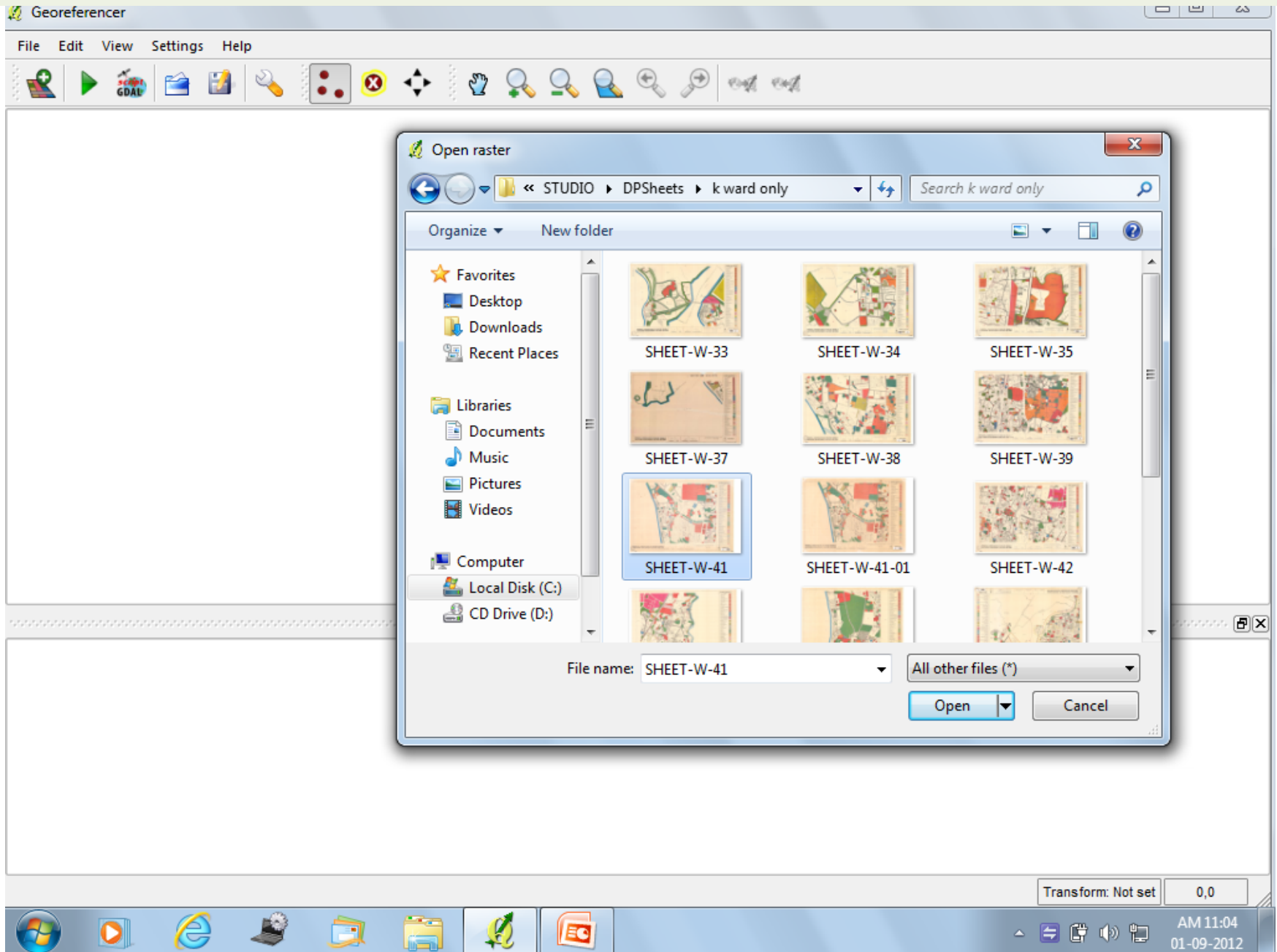
Now you can close the loaded Geo-referenced Raster or Vector so that only the Google Earth layer below is visible.



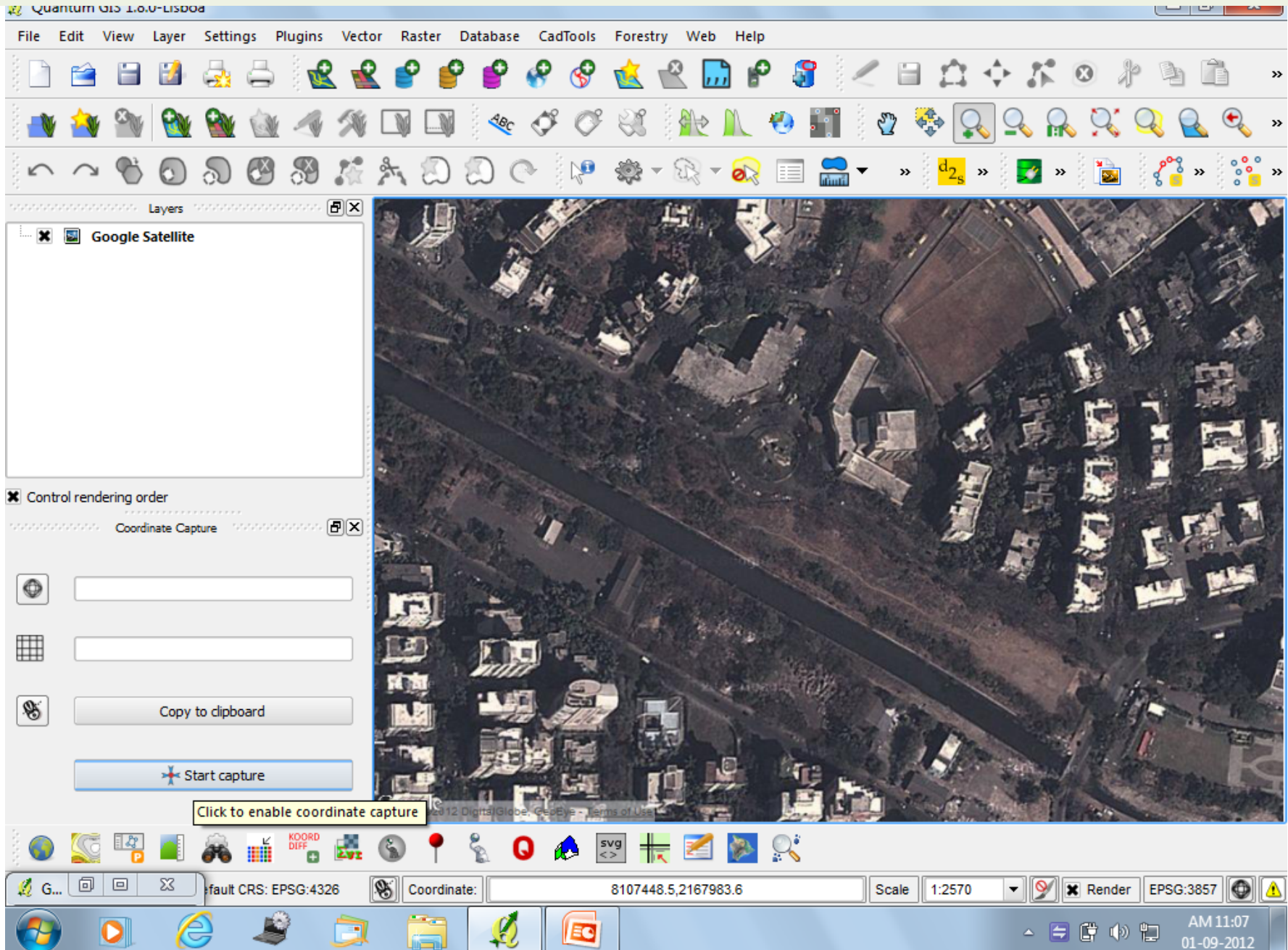
Click on 'Plugins' then 'Manage Plugins' and make sure 'Georeferencer GDAL' is checked. This will ensure that its icon is there in the QGIS toolbar.



Click on the 'Georeferencer' icon in the toolbar and the 'Georeferencer Window' opens. Click on 'Open Raster' and select the JPEG map you want to georeference. And click 'Open'.



Minimise the Georeferencer Window and zoom to an area from where you want to pick the first point.



Maximise the Georeferencer Window and click on 'Add Point'. The cursor turns into a '+' sign. Click on a point in the map.

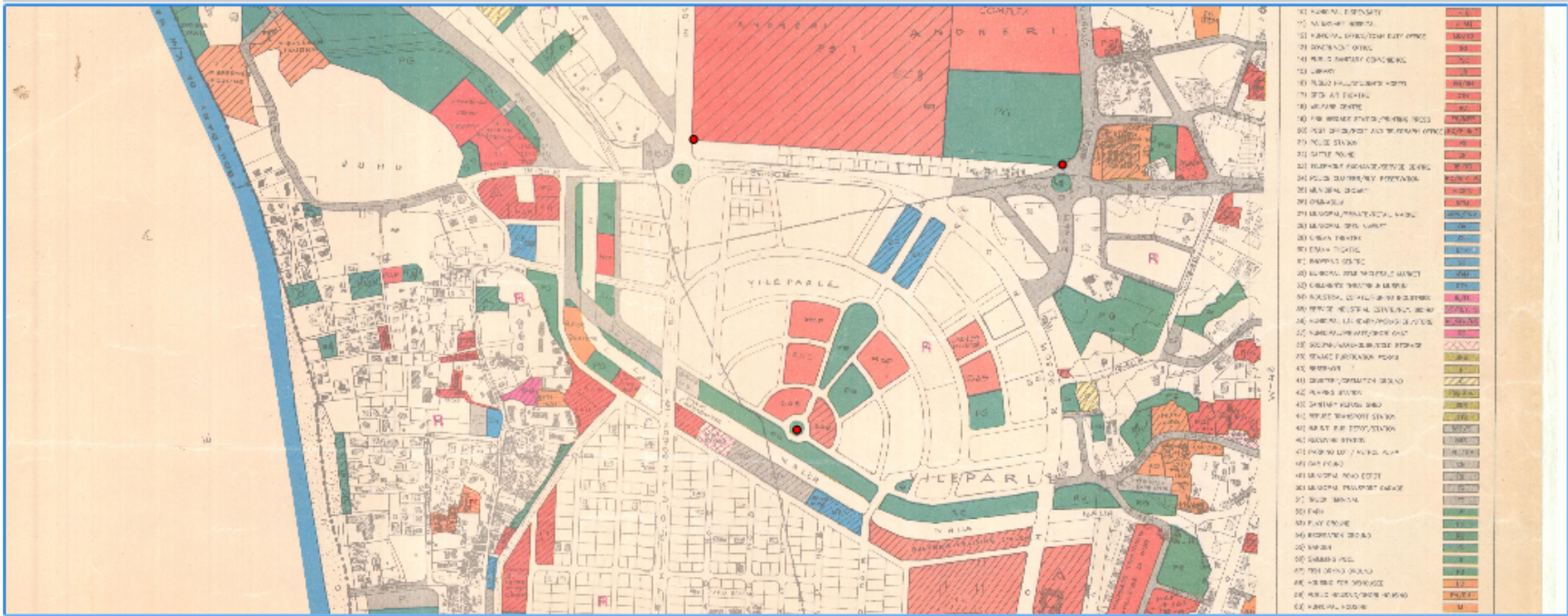
The screenshot shows the 'Georeferencer - SHEET-W-41.jpg' application window. The title bar includes standard window controls. The menu bar contains 'File', 'Edit', 'View', 'Settings', and 'Help'. The toolbar features icons for opening files, saving, and various map navigation tools. A tooltip labeled 'Add point' is positioned over a red button in the toolbar. The main map area displays a detailed street map of Vile Parle, with colored overlays: red for residential zones (labeled 'SAB'), green for parks (labeled 'PG'), and blue for water bodies (labeled 'NALIA'). Other labels include 'VILE PARLE', 'BANKERS TRAINING COLLEGE', and 'LADIES HOSTEL'. Below the map is a 'GCP table' section, which is currently empty. The status bar at the bottom shows 'Add point' on the left, 'Transform: Not set' and '4342,-2696' on the right, and a Windows taskbar at the very bottom with the system clock showing 'AM 11:08 01-09-2012'.

After you add a point on the map, enter the Lat Long for that point and click ok. Locate atleast 5 such points and make sure that they are spread out.

The screenshot shows the Georeferencer application window titled "Georeferencer - SHEET-W-41.jpg". The main area displays a map of Vile Parle, Mumbai, with various colored zones (red, green, blue, yellow) and labels like "VILE PARLE", "NALLA", "BANKER'S TRAINING COLLEGE", and "LADIES HOSTEL". A red dot is placed on the map. Below the map is a "GCP table" with the following data:

on/off	id	srcX	srcY	dstX	dstY	dX[pixels]	dY[pixels]	residual[pixels]
<input checked="" type="checkbox"/>	0	5763.48	3714.47	72.83	19.11	0.00	0.00	0.00

At the bottom right of the window, the status bar shows "Transform: Not set" and "5754,-3742". The Windows taskbar at the very bottom shows the system clock as "AM 11:09" and "01-09-2012".

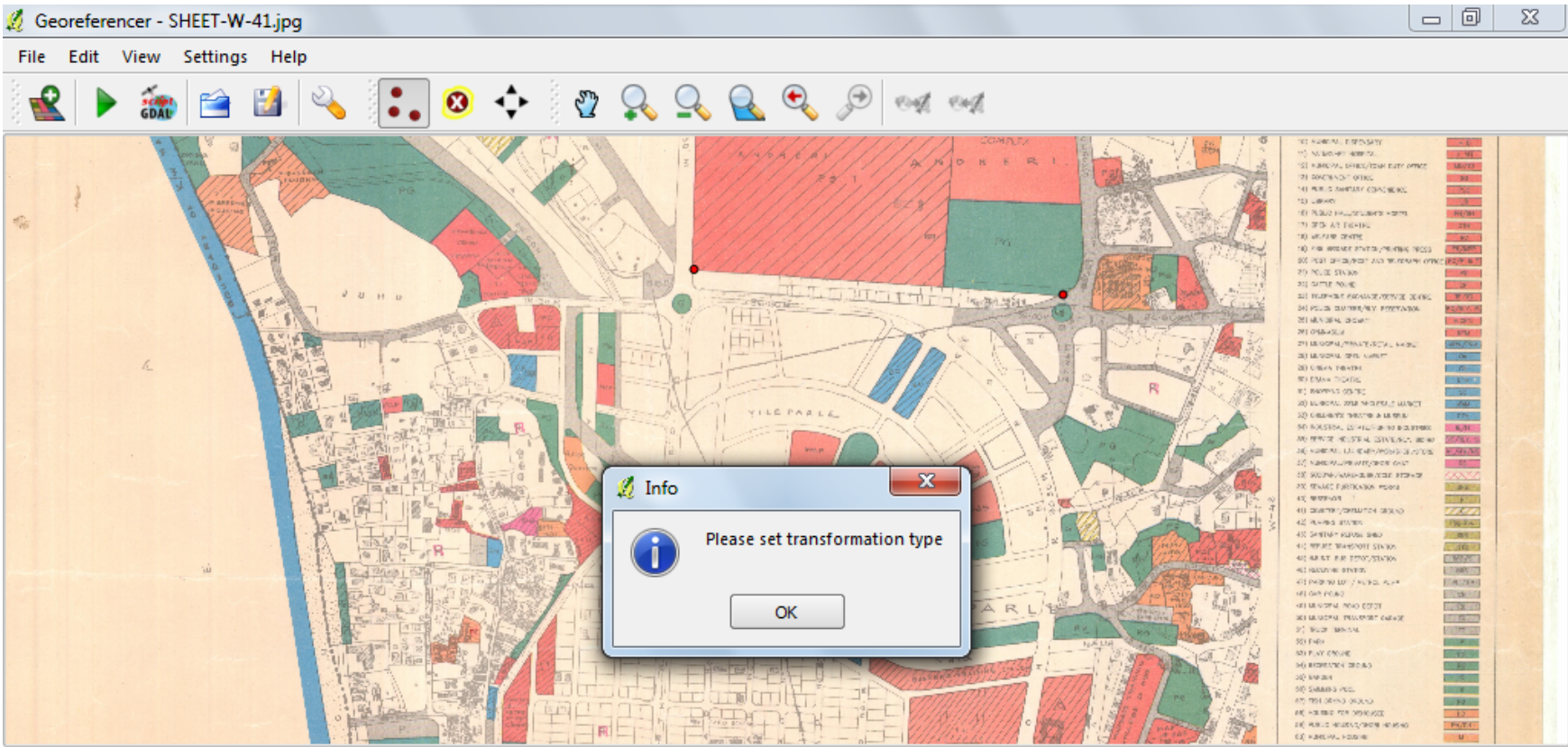


GCP table

on/off	id	srcX	srcY	dstX	dstY	dX[pixels]	dY[pixels]	residual[pixels]
<input checked="" type="checkbox"/>	0	5763.48	3714.47	72.83	19.11	0.00	0.00	0.00
<input checked="" type="checkbox"/>	1	5152.32	1996.44	72.83	19.12	0.00	0.00	0.00
<input checked="" type="checkbox"/>	2	3015.54	891.83	72.83	19.12	0.00	0.00	0.00
<input checked="" type="checkbox"/>	3	3875.69	5790.13	72.83	19.10	0.00	0.00	0.00
<input checked="" type="checkbox"/>	4	5808.75	6086.66	72.83	19.10	0.00	0.00	0.00
<input checked="" type="checkbox"/>	5	7334.37	2145.84	72.83	19.12	0.00	0.00	0.00

Transform: Not set 4600,-3205

After you are done adding all the points click on 'Georeference' that will ask you to set the 'Transformation Type'. Click 'Ok' and select the settings.



GCP table

on/off	id	srcX	srcY	dstX	dstY	dX[pixels]	dY[pixels]	residual[pixels]
✗	0	5763.48	3714.47	72.83	19.11	0.00	0.00	0.00
✗	1	5152.32	1996.44	72.83	19.12	0.00	0.00	0.00
✗	2	3015.54	891.83	72.83	19.12	0.00	0.00	0.00
✗	3	3875.69	5790.13	72.83	19.10	0.00	0.00	0.00
✗	4	5808.75	6086.66	72.83	19.10	0.00	0.00	0.00
✗	5	7334.37	2145.84	72.83	19.12	0.00	0.00	0.00

Transform: Not set 2472,-1249

Save the georeferenced output file at a preferred location, save file type as 'geotiff' and click on 'save.'

The screenshot shows the QGIS Georeferencer interface. The main window is titled "Georeferencer - SHEET-W-41.jpg". The "Transformation settings" dialog is open, showing "Transformation type: Polynomial 1" and "Resampling method: Linear". A "Save raster" dialog is also open, showing the file path "STUDIO \DPSheets \k ward only" and the file name "SHEET-W-41_modified". The "Save as type" is set to "GeoTIFF (*.tif *.tiff *.TIF *.TIFF)".

on/off	id	sn
✗	0	576
✗	1	515
✗	2	301
✗	3	387
✗	4	580
✗	5	733

Transform: Not set 2472,-1249

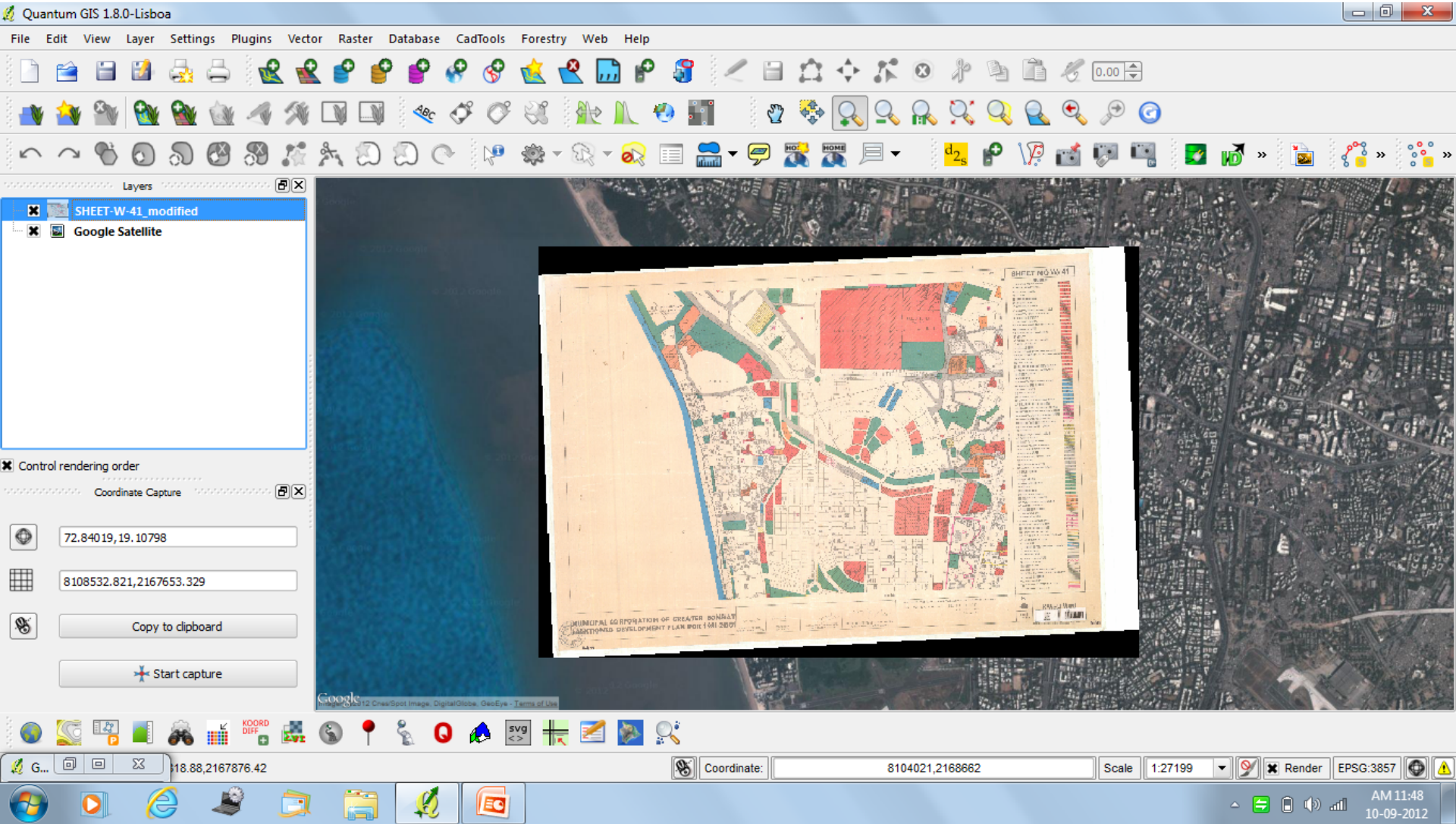
Make sure you CRS is WGS84 and click 'Ok'. Check on 'Load in QGIS when Done' and click 'Ok'. You will see the progress bar of georeferencing as it happens. After it finishes, minimise the Georeferencer Window.

The screenshot shows the QGIS Georeferencer window. The main map area displays a georeferenced image of a river and surrounding land. A dialog box titled 'qgis' is open, showing a list of coordinate reference systems. The 'WGS 84' system is selected. Below the dialog, a table shows the transformation parameters for the georeferencing process.

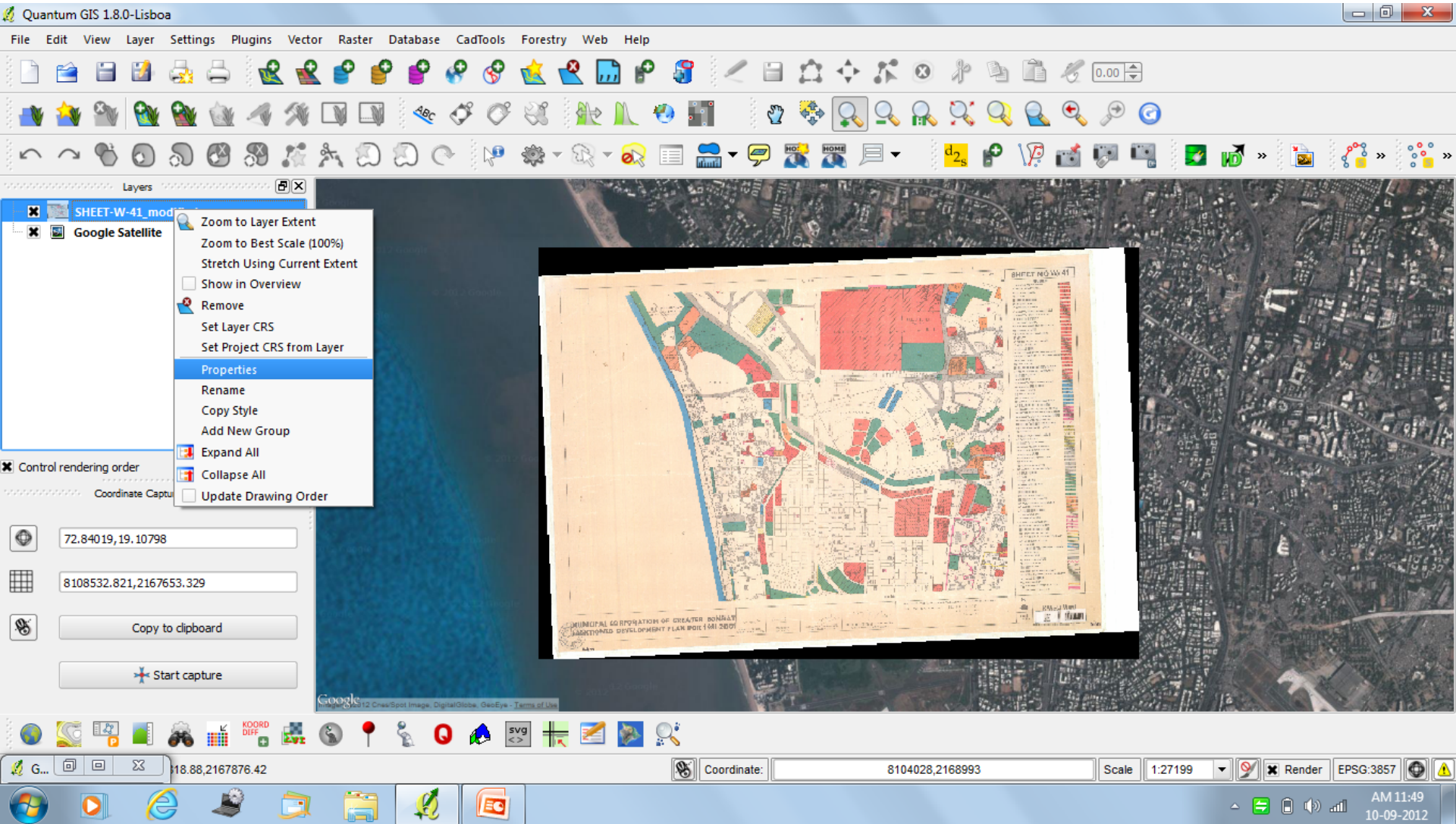
on/off	id	srcX	srcY	dstX				
✗	0	5763.48	3714.47	72.83				
✗	1	5152.32	1996.44	72.83				
✗	2	3015.54	891.83	72.83				
✗	3	3875.69	5790.13	72.83				
✗	4	5808.75	6086.66	72.83	19.10			
✗	5	7334.37	2145.84	72.83	19.12	0.00	0.00	0.00

Transform: Not set | 2472,-1249

Now you can see the Georeferenced Rater map in the main window.



Right Click on the Raster layer and click on 'Properties'.



Change the Transparency to the desired level and click 'Ok'.

Layer Properties - SHEET-W-41_modified

Style Colormap Transparency General Metadata Pyramids Histogram

Global transparency

None 39% Full

No data value

-32768

Custom transparency options

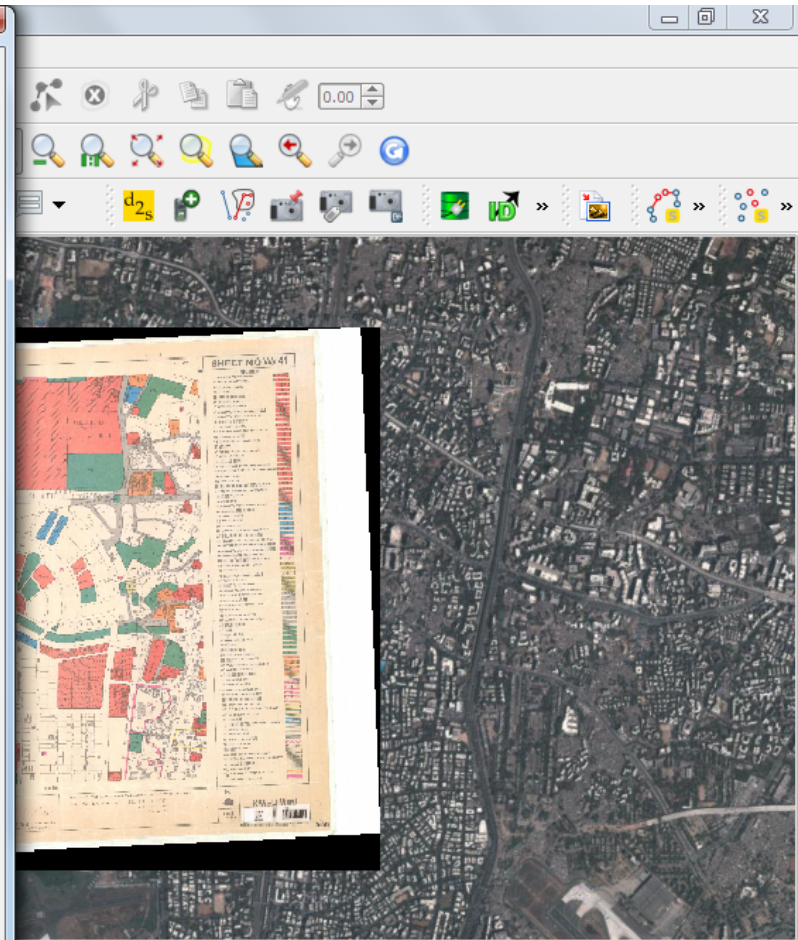
Transparency band Not Set

Transparent pixel list

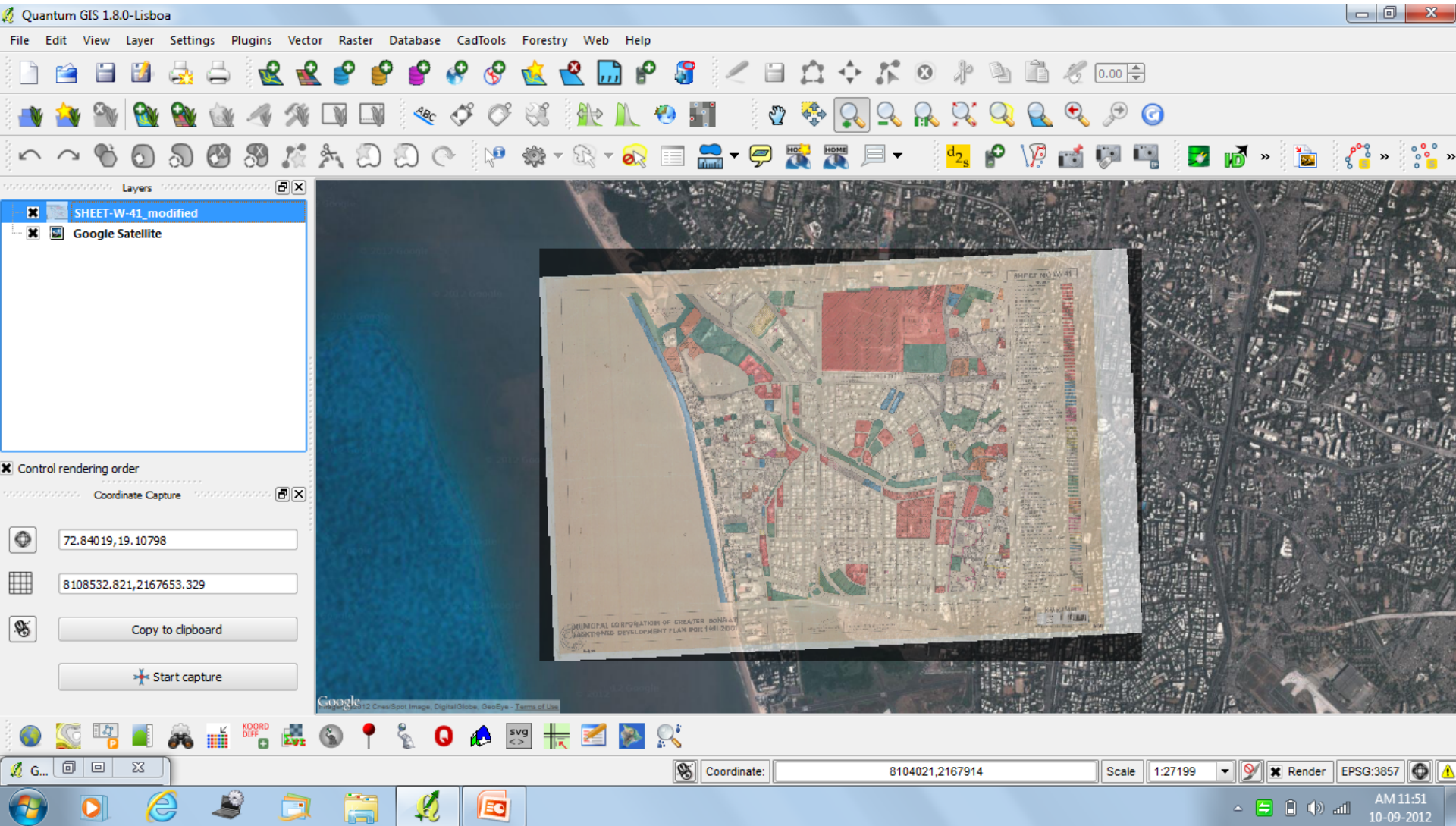
	Red	Green	Blue	Percent Transparent
1	-32768.00	-32768.00	-32768.00	100.00

Restore Default Style Save As Default Load Style ... Save Style ...

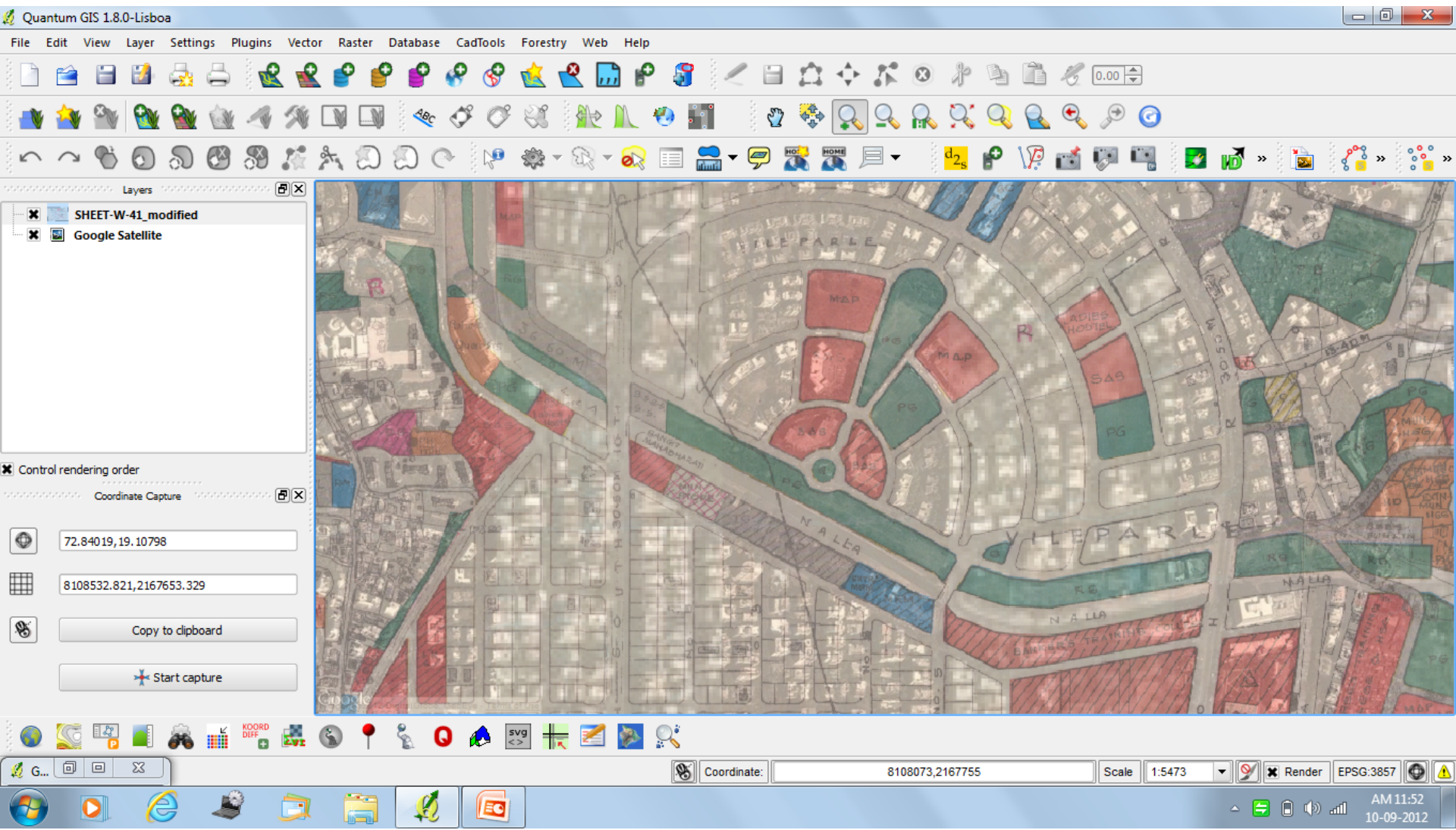
OK Cancel Apply Help



Now you can see both the map and the Google Earth layer under it.



Now you can zoom to certain areas on the map to check if the Georeferencing has happened correctly.



If you are satisfied with the level of accuracy maximise the Georeferencer window click on 'File' and then 'Save GCP Points as'.

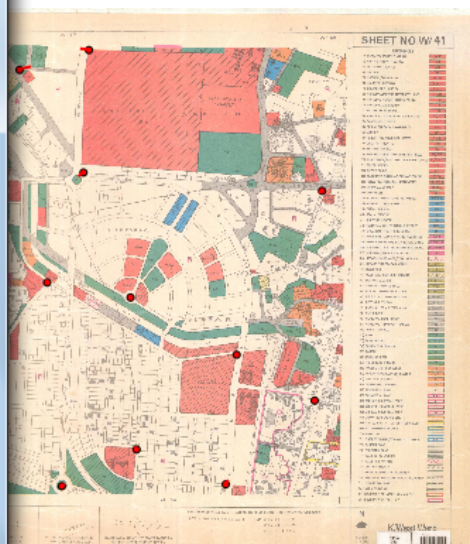
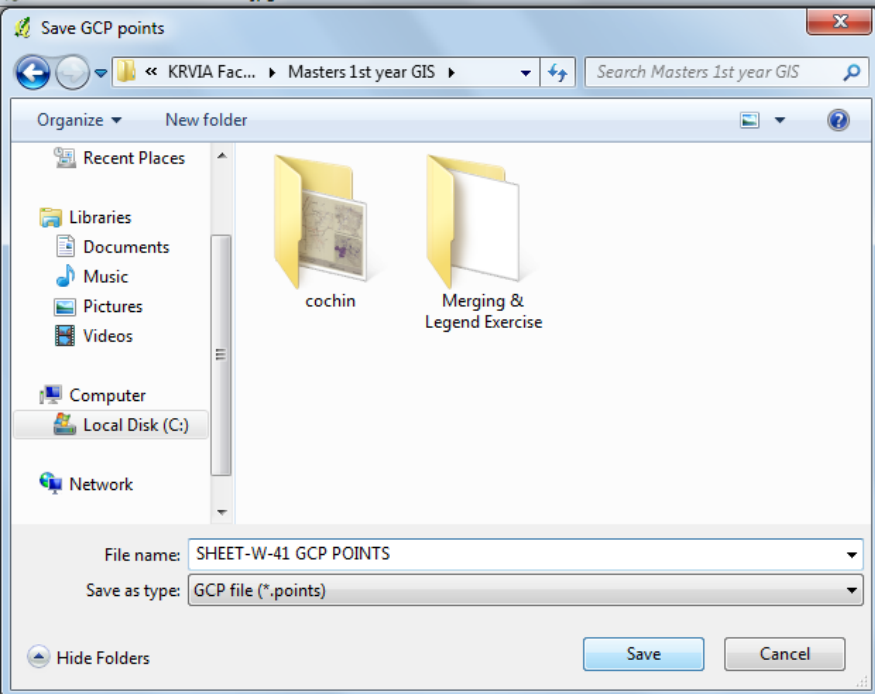
The screenshot shows the Georeferencer application window titled "Georeferencer - SHEET-W-41.jpg". The window contains a map of a city area with several red dots representing Ground Control Points (GCPs). The map is titled "SHEET NO W-41" and "MUNICIPAL CORPORATION OF GREATER BOMBAY SANCTIONED DEVELOPMENT PLAN FOR 1981-2001". The application's menu bar includes "File", "Edit", "View", "Settings", and "Help". The "File" menu is open, showing options: "Open raster (Ctrl+O)", "Start georeferencing (Ctrl+G)", "Generate GDAL script (Ctrl+C)", "Load GCP points (Ctrl+L)", "Save GCP points as... (Ctrl+S)", and "Quit (Ctrl+Q)". Below the map is a "GCP table" with the following data:

on/off	id	srcX	srcY	dstX	dstY	dX[pixels]	dY[pixels]	residual[pixels]
<input checked="" type="checkbox"/>	0	5770.27	3708.81	72.83	19.11	6.45	-0.95	6.52
<input checked="" type="checkbox"/>	1	5233.81	529.67	72.83	19.12	-86.99	-7.44	87.30
<input checked="" type="checkbox"/>	2	4341.70	784.55	72.83	19.12	138.13	-29.10	141.17
<input checked="" type="checkbox"/>	3	5164.41	2103.63	72.83	19.12	-42.31	47.21	63.39
<input checked="" type="checkbox"/>	4	2586.46	2367.29	72.82	19.12	-0.01	-16.36	16.36
<input checked="" type="checkbox"/>	5	4697.57	3516.69	72.83	19.11	-2.10	-6.81	7.13
<input checked="" type="checkbox"/>	6	4885.26	6131.47	72.83	19.10	31.18	-8.20	32.24
<input checked="" type="checkbox"/>	7	5846.11	5660.52	72.83	19.11	-4.47	-10.73	11.63

At the bottom of the window, there is a status bar with the text "Save GCP points as...", "Transform: Polynomial 1 Mean error: 60.7035", and "-6229,236". The Windows taskbar at the bottom shows the system clock as "AM 11:54 10-09-2012".

Save the GCP file type at a preferred location so that you can load them again for future reference.

Georeferencer - SHEET-W-41.jpg



GCP table

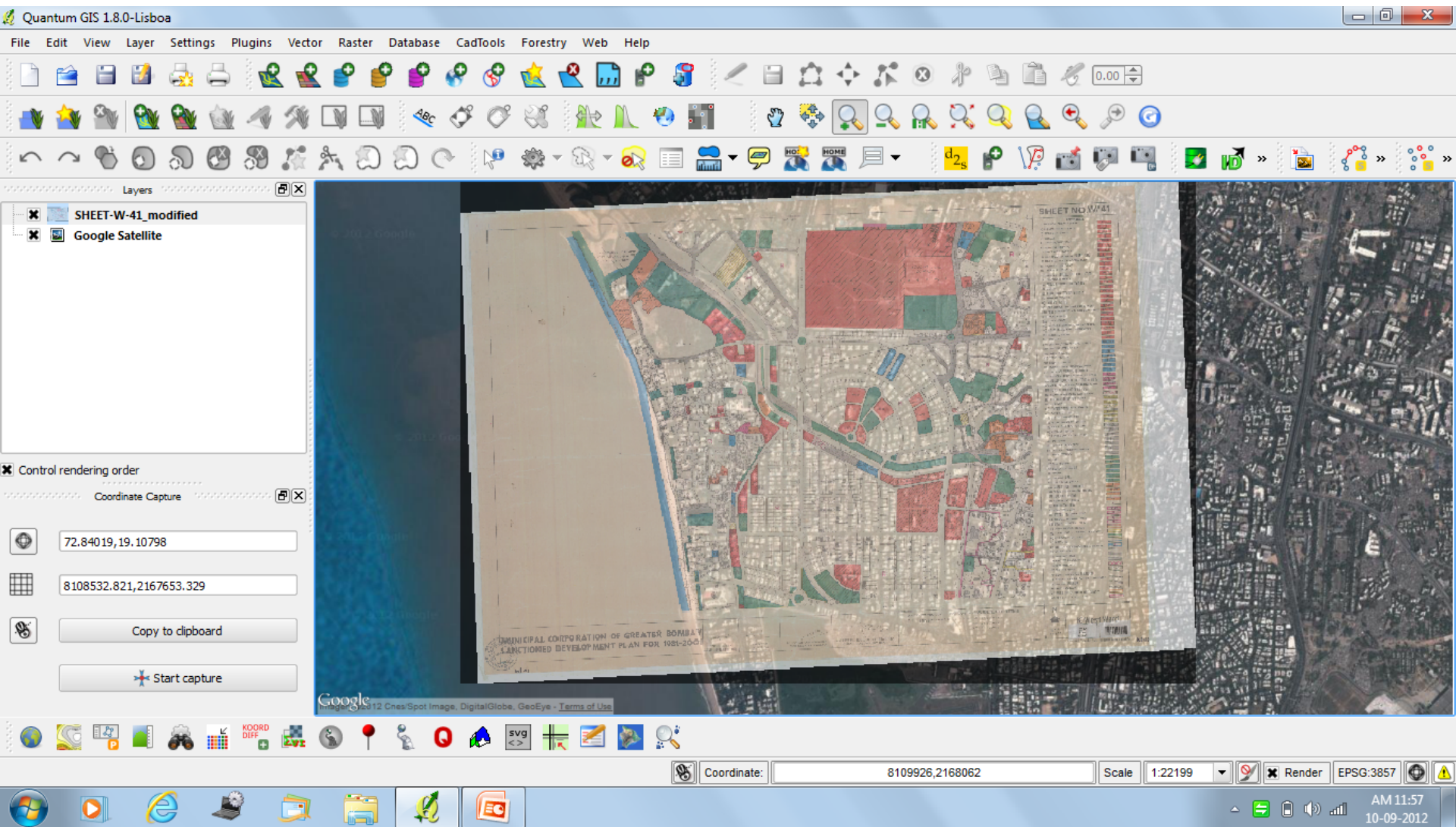
on/off	id	srcX	srcY	dstX	dstY	dX[pixels]	dY[pixels]	residual[pixels]
X	0	5770.27	3708.81	72.83	19.11	6.45	-0.95	6.52
X	1	5233.81	529.67	72.83	19.12	-86.99	-7.44	87.30
X	2	4341.70	784.55	72.83	19.12	138.13	-29.10	141.17
X	3	5164.41	2103.63	72.83	19.12	-42.31	47.21	63.39
X	4	2586.46	2367.29	72.82	19.12	-0.01	-16.36	16.36
X	5	4697.57	3516.69	72.83	19.11	-2.10	-6.81	7.13
X	6	4885.26	6131.47	72.83	19.10	31.18	-8.20	32.24
X	7	5846.11	5660.52	72.83	19.11	-4.47	-10.73	11.63

Transform: Polynomial 1 Mean error: 60.7035 -4904,236



AM 11:55
10-09-2012

After saving the GCP points close the Georeferencer window to return to your main window of QGIS.



The Georeferenced raster can now be used for multiple purposes such as:-

- Overlaying it with real conditions to understand disparity.**
- Calculating Areas or Linear Distances.**
- Creating new vector layers based on the georeferenced map.**
- Finding out geographic coordinates of desired places on the map.**