

RWR 4015

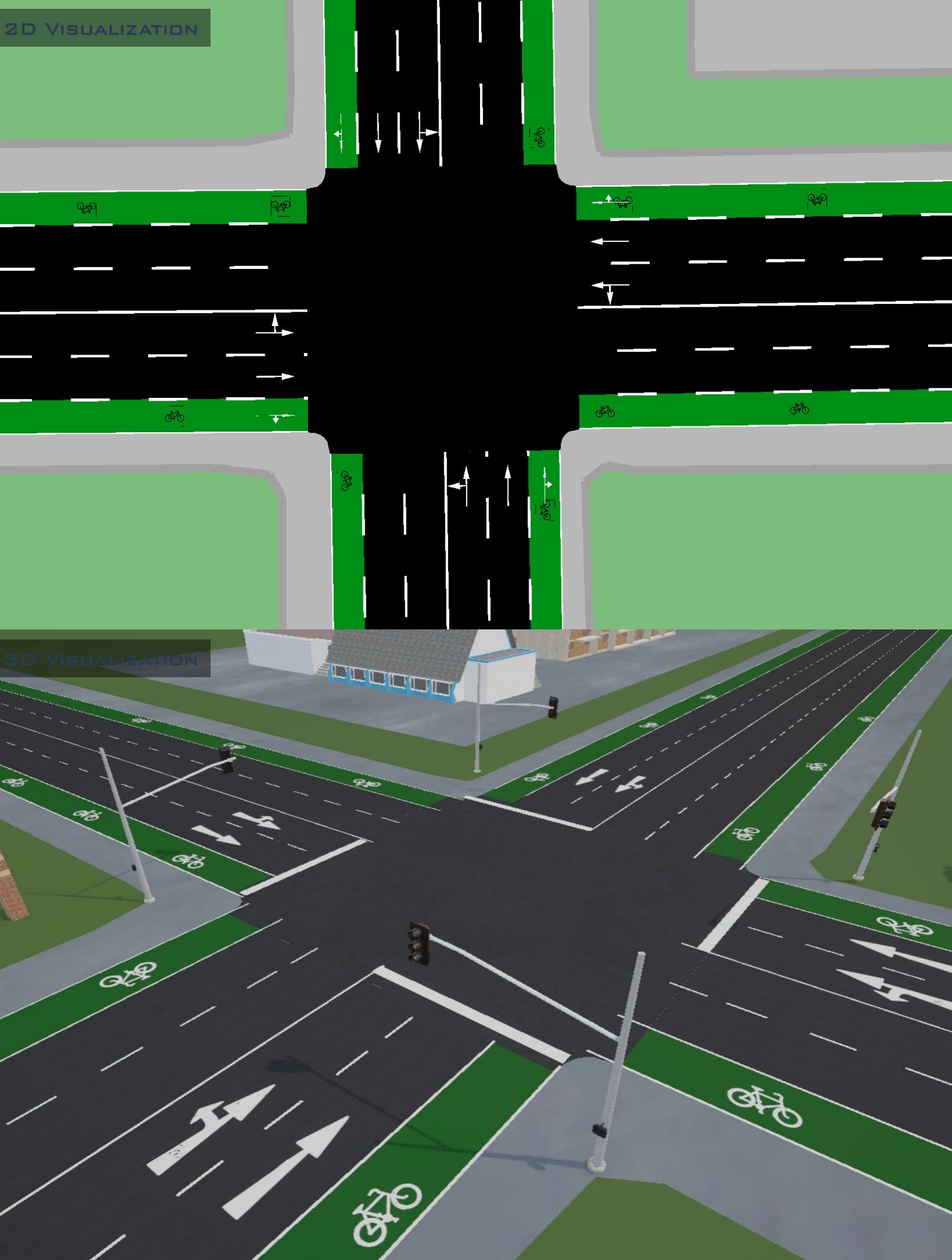
Traffic Simulation for Planning Applications

Dr. Ahmad Mohammadi

Week 3 | Hands-on:
Network Modelling with GIS

Fall 2026

RoadwayVR

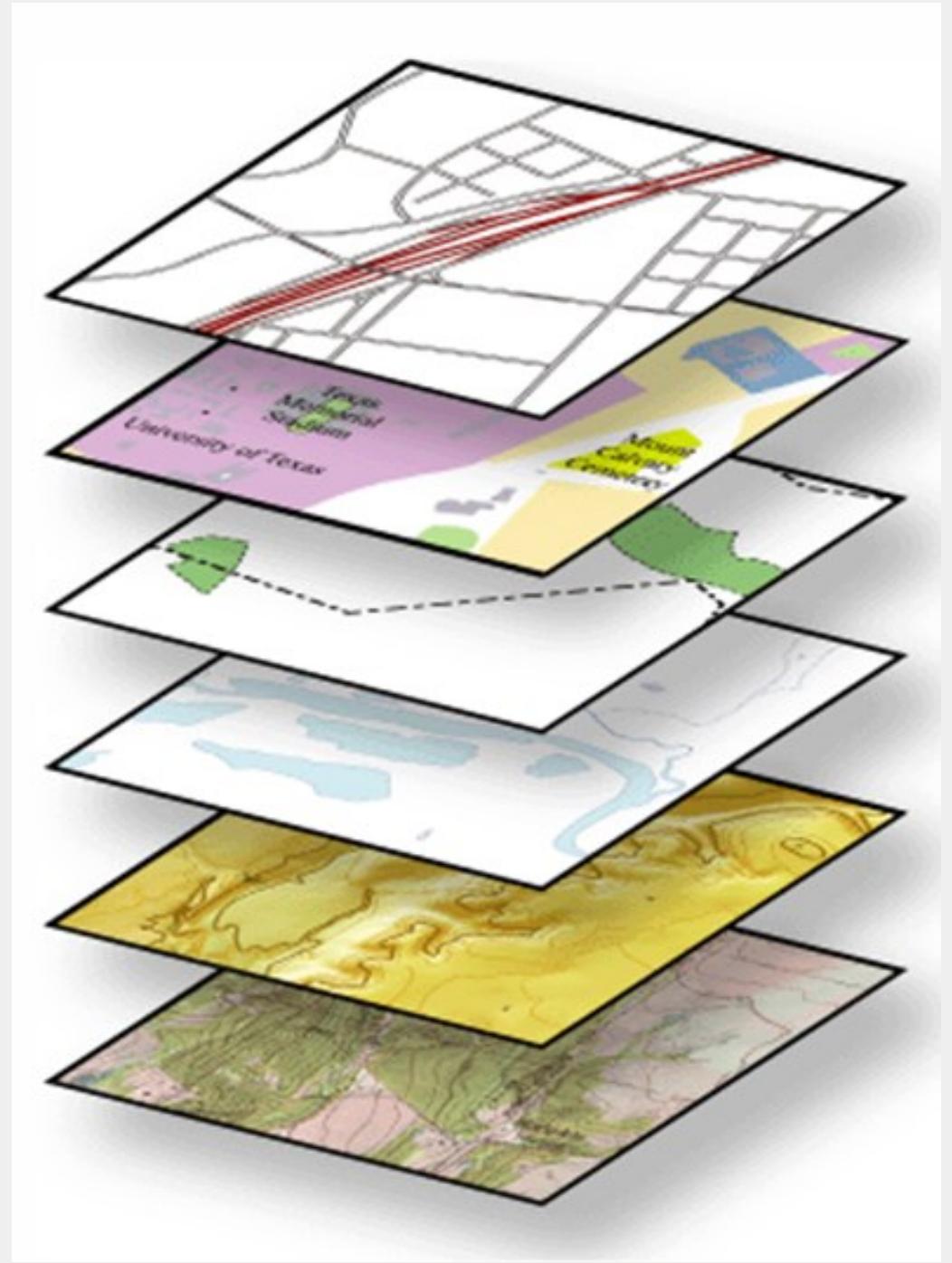


Agenda

- Geographic Information System (GIS)
- GIS Software
- Download and Installing QGIS Software – Open Source and Free
- Map Services
- Imagery Map and Georeferencing
- Create a Road Network on Top of GIS
- Import a Road Network from OpenStreetMap into SUMO



Introducing GIS



Roads

Land Use

Boundaries

Water

Elevation

Imagery

Reference:

<https://desktop.arcgis.com/en/arcmap/latest/map/projections/what-are-map-projections.htm>

Example: Network Modelling Study

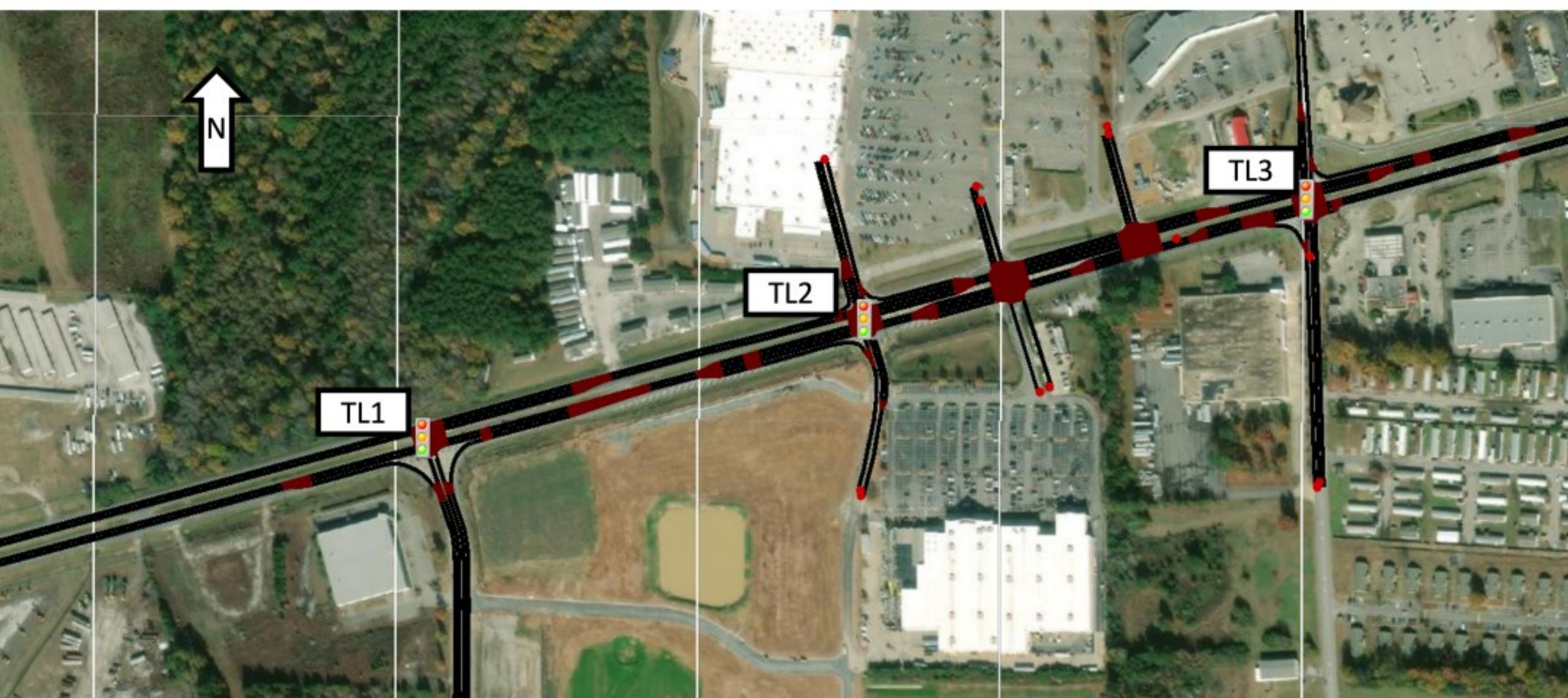


Figure 2.1: SUMO model of the simulated network including three intersections.

GIS Software



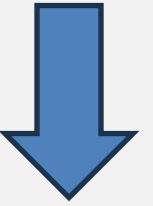
ArcGIS Pro



QGIS



Google Earth Pro



Open Source and Free

Installing QGIS

1. QGIS.ORG and Download

2. Skip It and Go to Download

3. Long Term Version for Windows

The screenshot shows the QGIS website homepage. At the top right, there is a red box around the "Download" button, with a red circle containing the number "1" above it. Below the header, the main banner features the text "Spatial without Compromise" and "Spatial visualization and decision-making tools for everyone". A large green "QGIS" logo is on the right. In the center, there are "Download" and "Available on Windows, Mac, Linux" buttons. At the bottom, there's a donation section with "One-Time" and "Monthly" options and a "Donate" button. A red box surrounds the "Skip it and go to download" button, with a red circle containing the number "2" below it. To the right, a red box surrounds the "Long Term Version for Windows (3.40 LTR)" button, with a red circle containing the number "3" to its left.

1

2

3

QGIS

Project ▾ Community ▾ Resources ▾

News: New QGIS Map Gallery

Free and Open Source DPG

Spatial without Compromise

Spatial visualization and decision-making tools for everyone

Download Available on Windows, Mac, Linux

One-Time Monthly

€ 10.00 € 20.00 € 50.00

€ 100.00 € 250.00

Donate

2 Other methods, more info EUR ▾

Skip it and go to download

Offline (Standalone) installers:

- 3 Long Term Version for Windows (3.40 LTR)
- Latest Version for Windows (3.42)
- Latest Version for Windows (3.42) with Qt6 (experimental)
- Long Term Version for Windows (3.40) with Qt6 (experimental)

Search

Donate

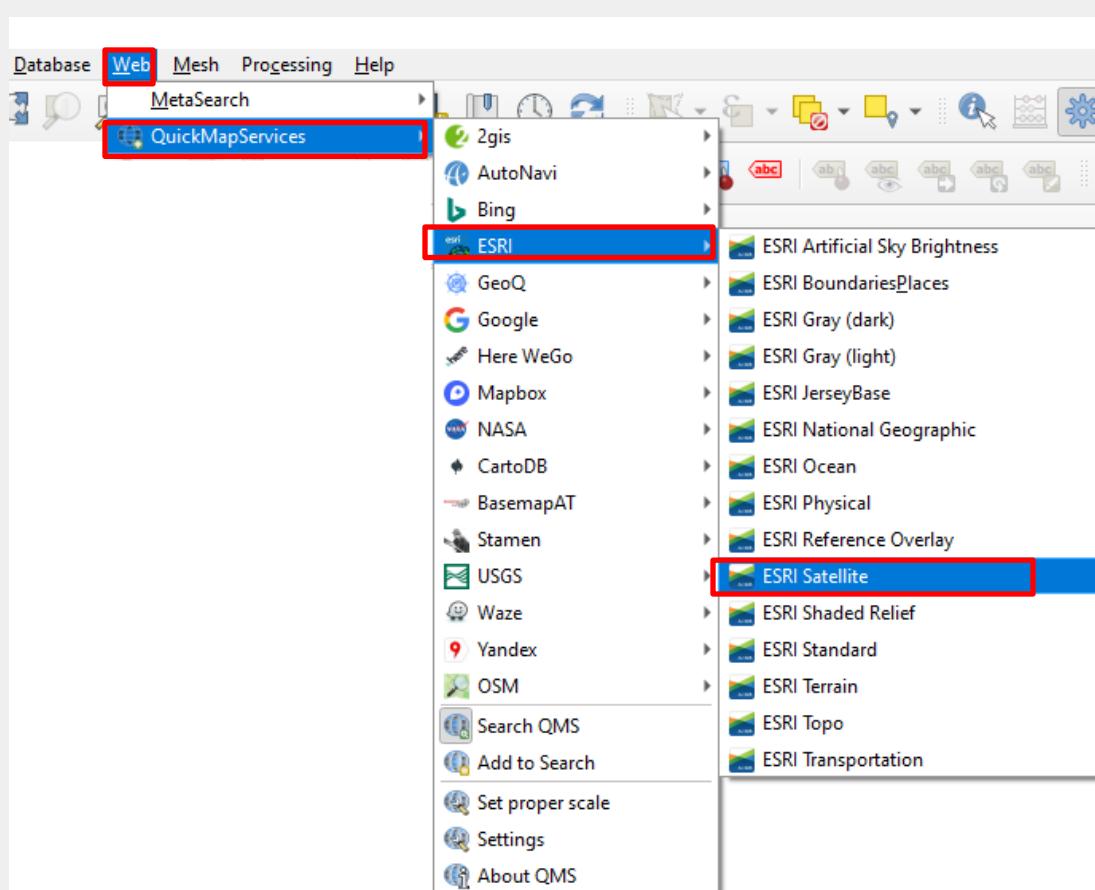
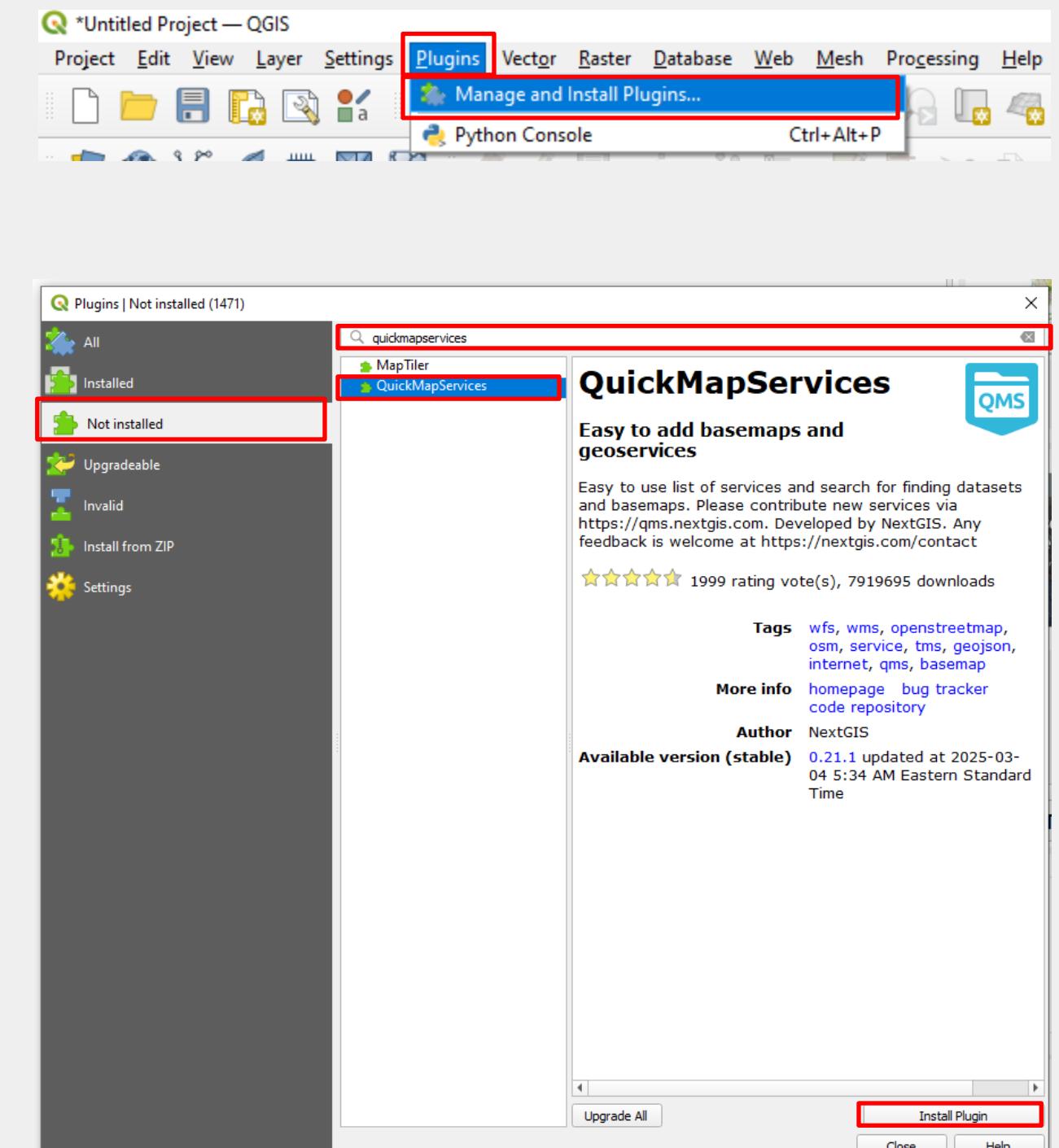
Map Services

1. Menu bar → Plugins → Manage and Install Plugins

2. Not installed → on Search Bar → QuickMapServices →

Install Plugin

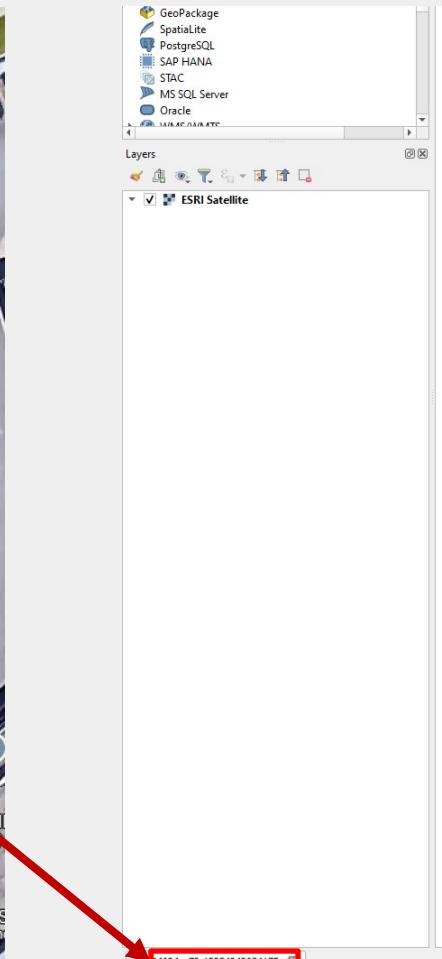
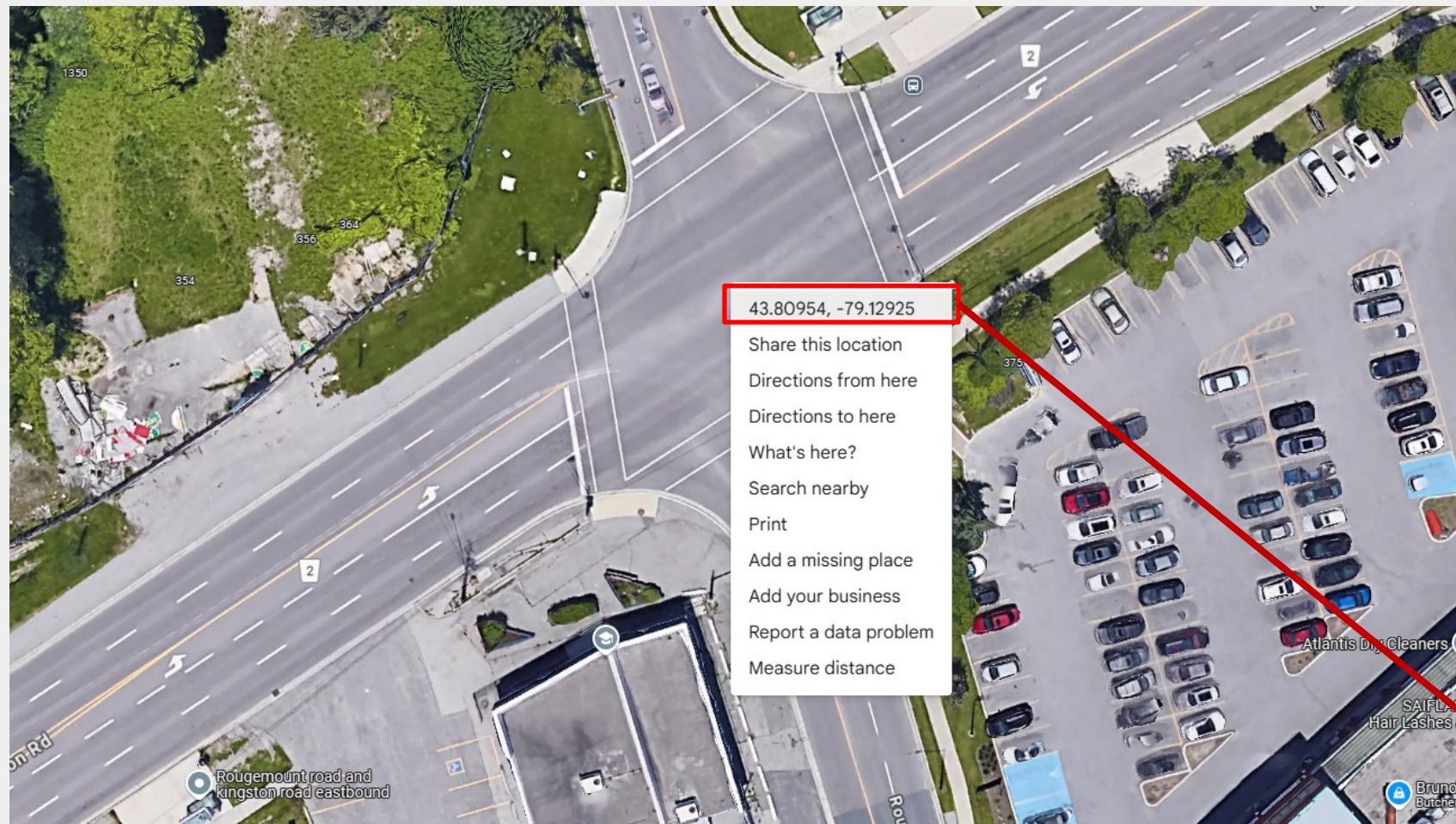
3. Main Manu → QuickMapServices → ESRI → ESRI Satelite



Imagery Map and Georeferencing

4. Zoom In to an Intersection With High Resolution Imagery by ESRI

5. Alternatively, Find an Intersection in Google Map → Right Click → Copy and Paste the Coordinate into QGIS Status Bar → Type to Locate → Press “Enter”, It shows a Red Dot on Top of Map → Zoom In



Imagery Map and Georeferencing

4. Select the Box and Press Enter to Reappear the Red Dot



Imagery Map and Georeferencing

5. Try Different Map Provider like Google Map, Bing

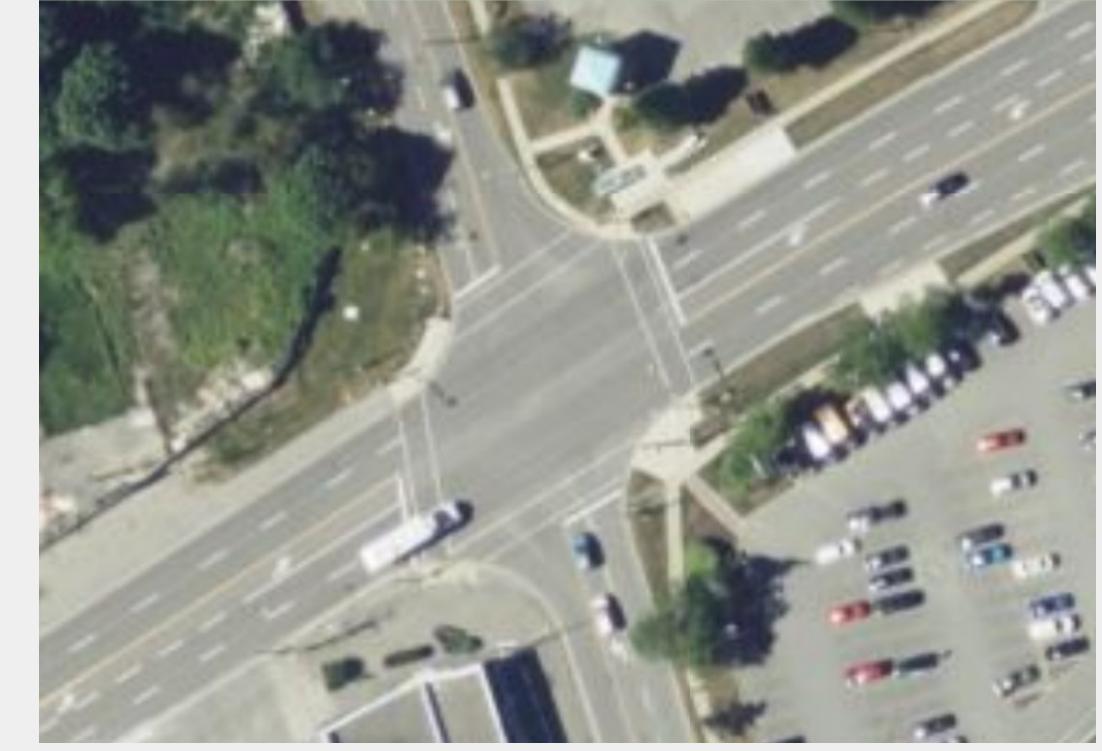
ESRI



Google Map

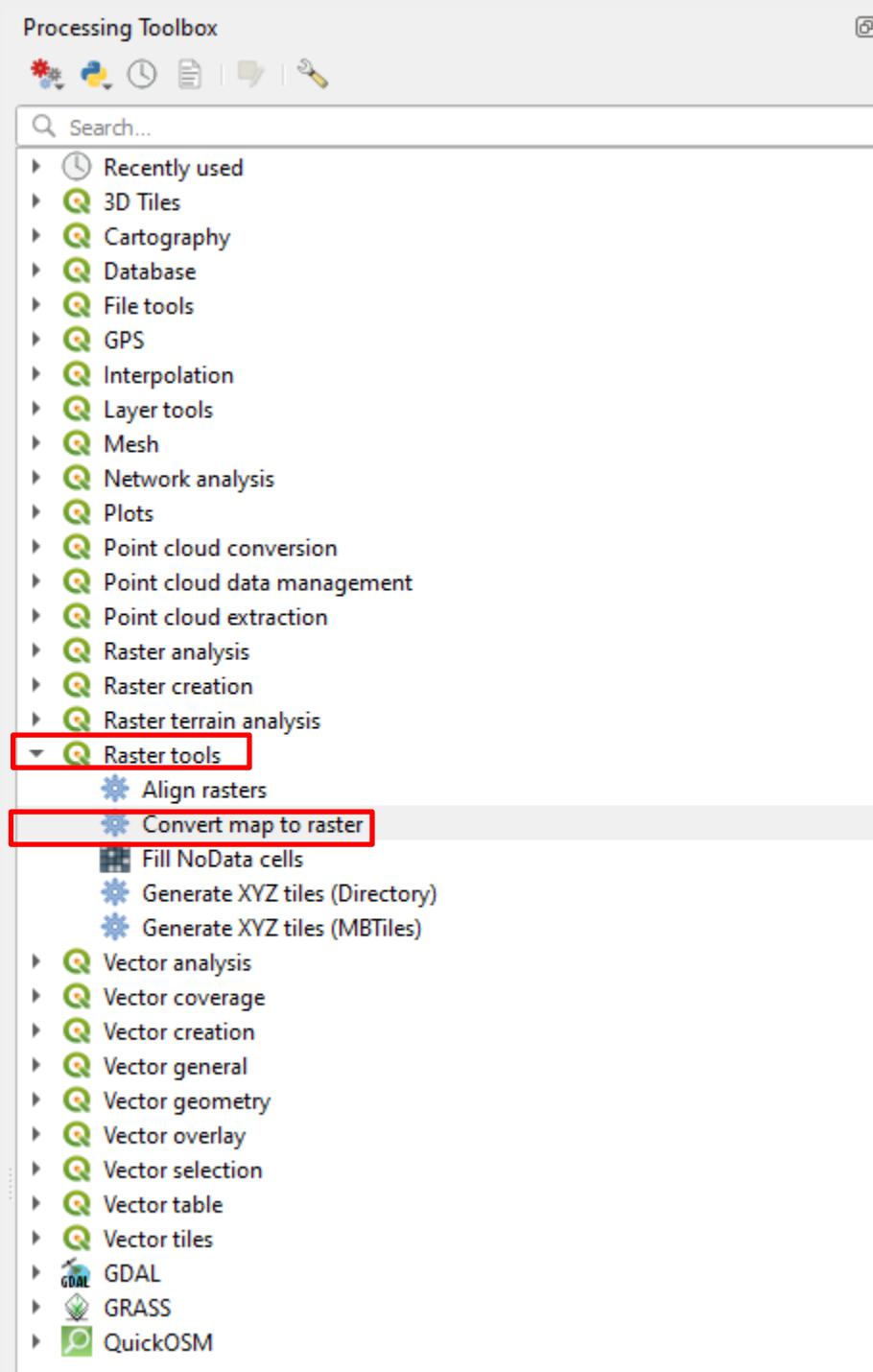


Bing

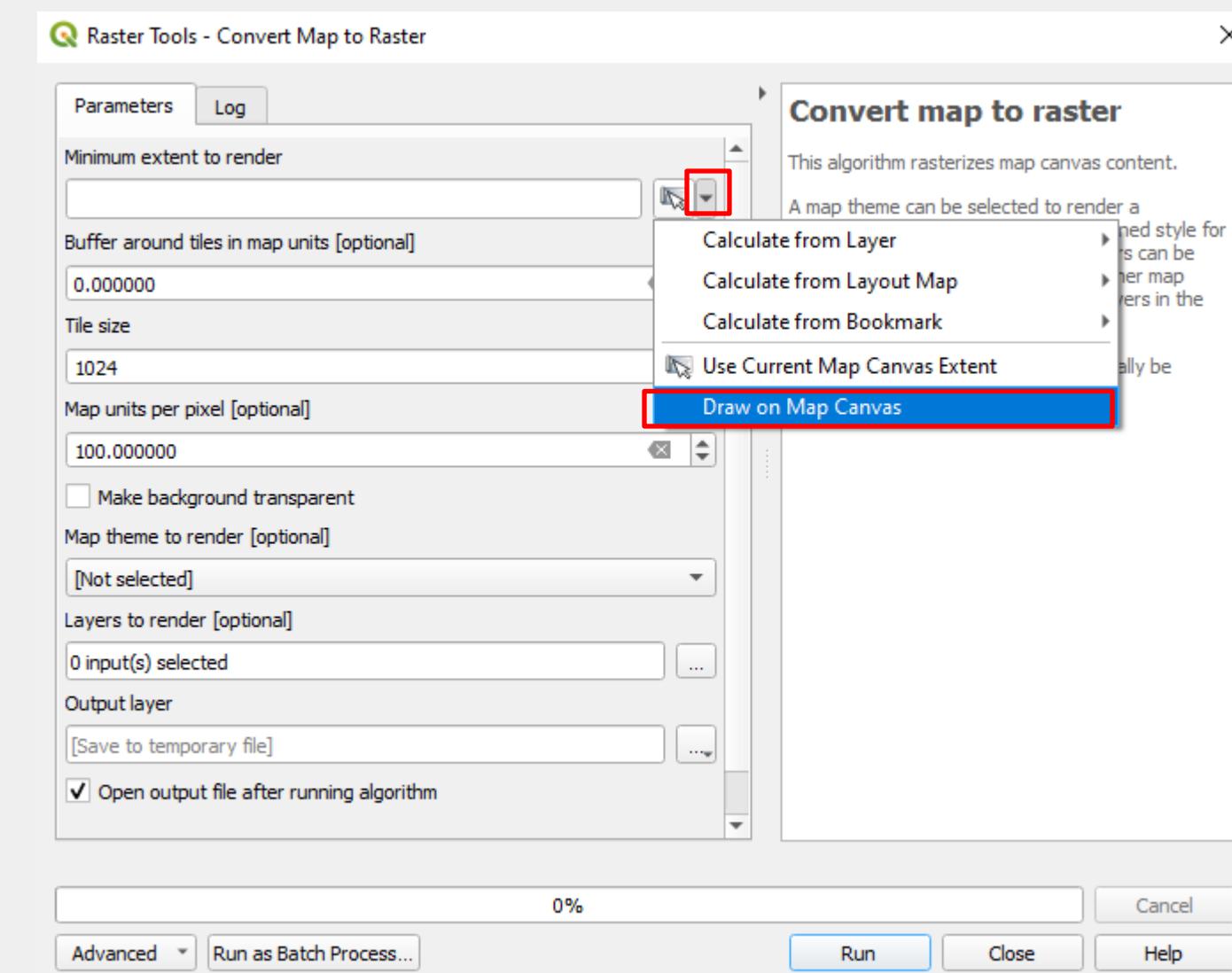


Imagery Map and Georeferencing

4. On The Right Side → Processing Toolbox → Convert Map To Raster



5. Select Arrow → Click the Arrow → Select “Draw on Map Canvas”



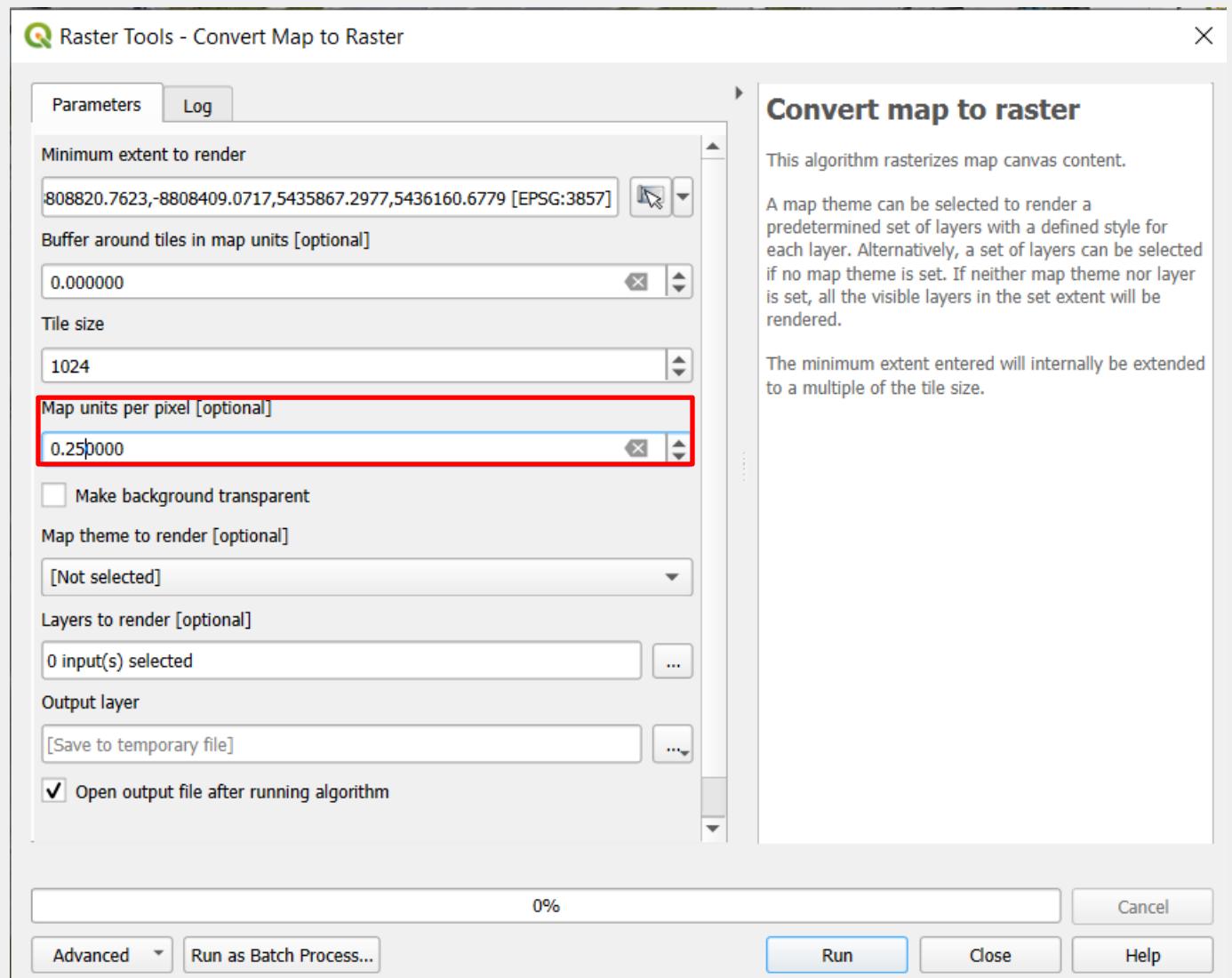
Imagery Map and Georeferencing

6. Change “Map units per pixel” from 100 to something small:

0.25 (\approx 25 cm/pixel, nice aerial detail)

0.5 (50 cm/pixel)

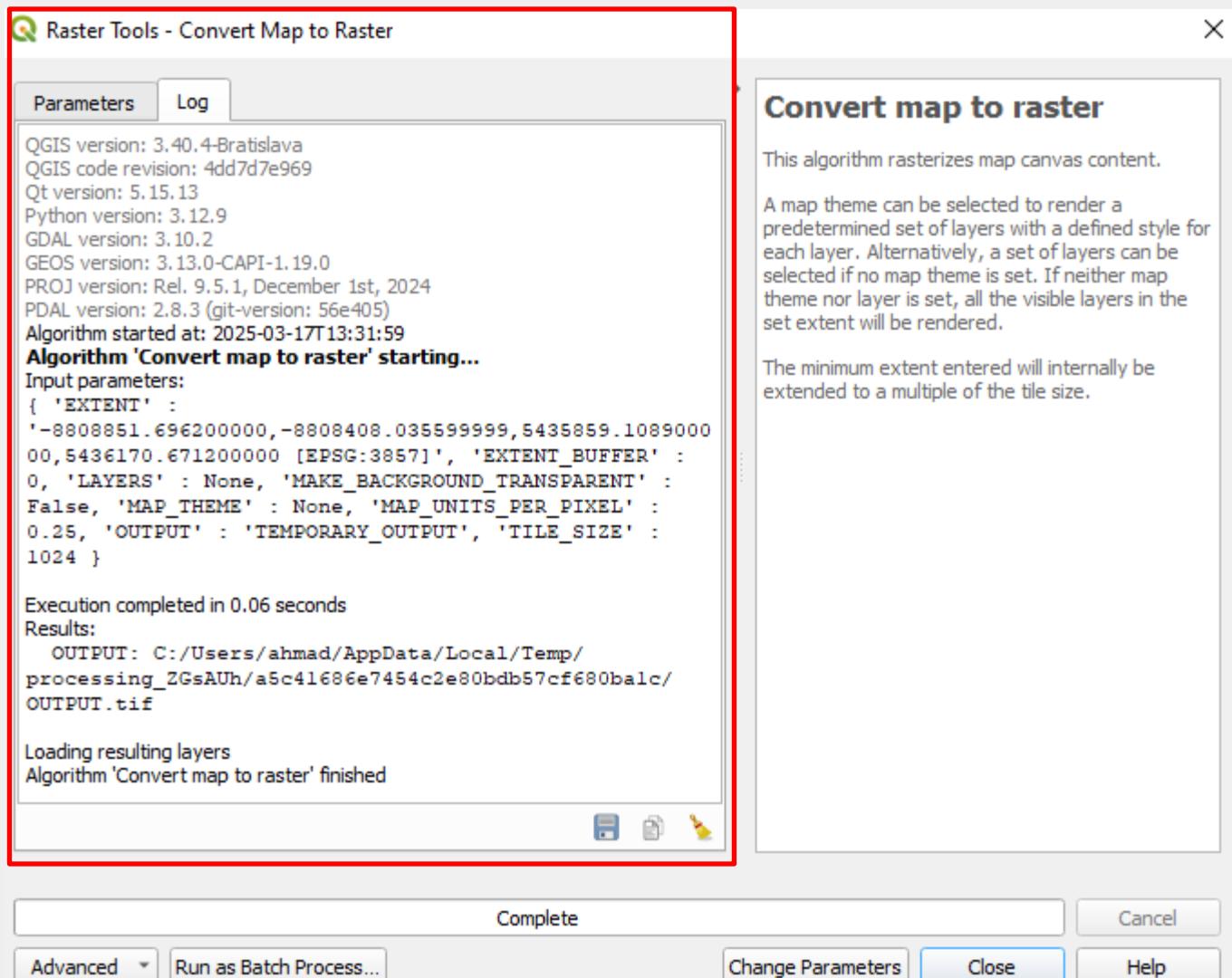
1.0 (1 m/pixel, lighter file)



Imagery Map and Georeferencing

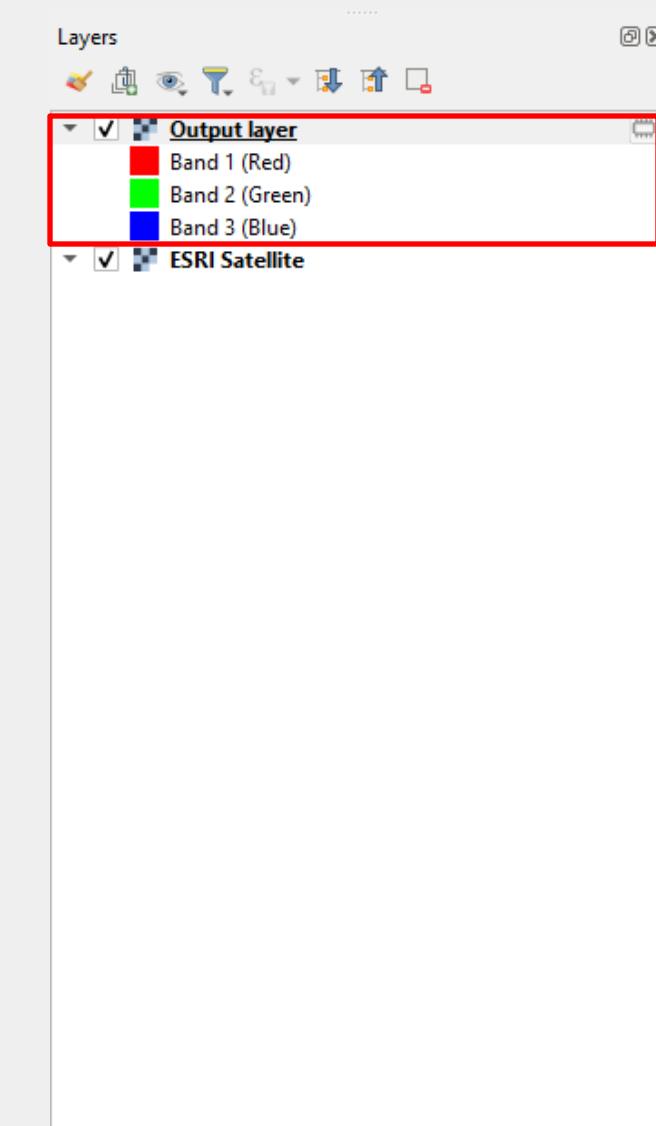
7. In the “Raster Tools” window

- You should see output similar to the screenshot on the left.



8. In the “Layers” panel

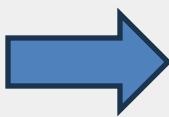
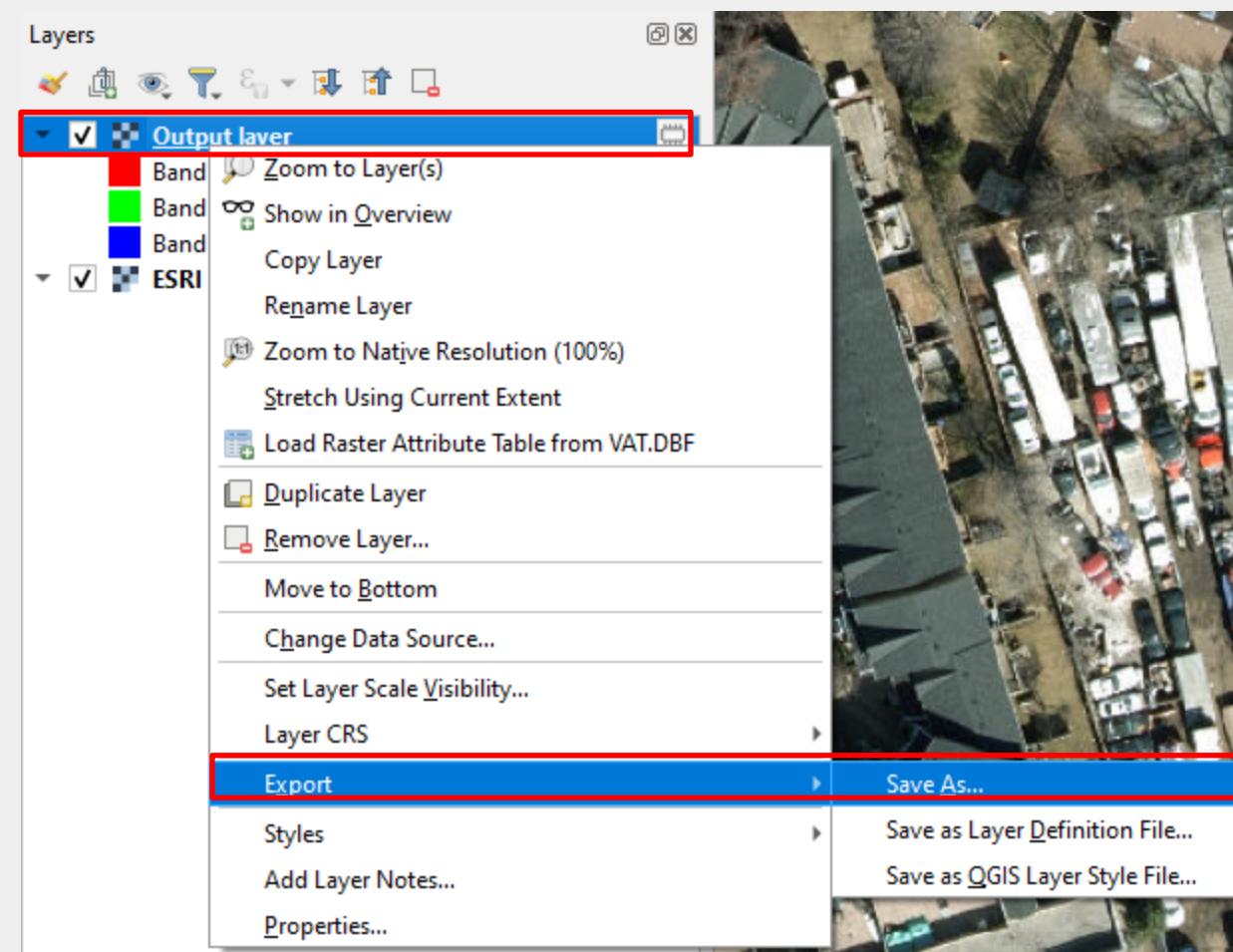
- You should see the resulting layers as shown on the right.



Imagery Map and Georeferencing

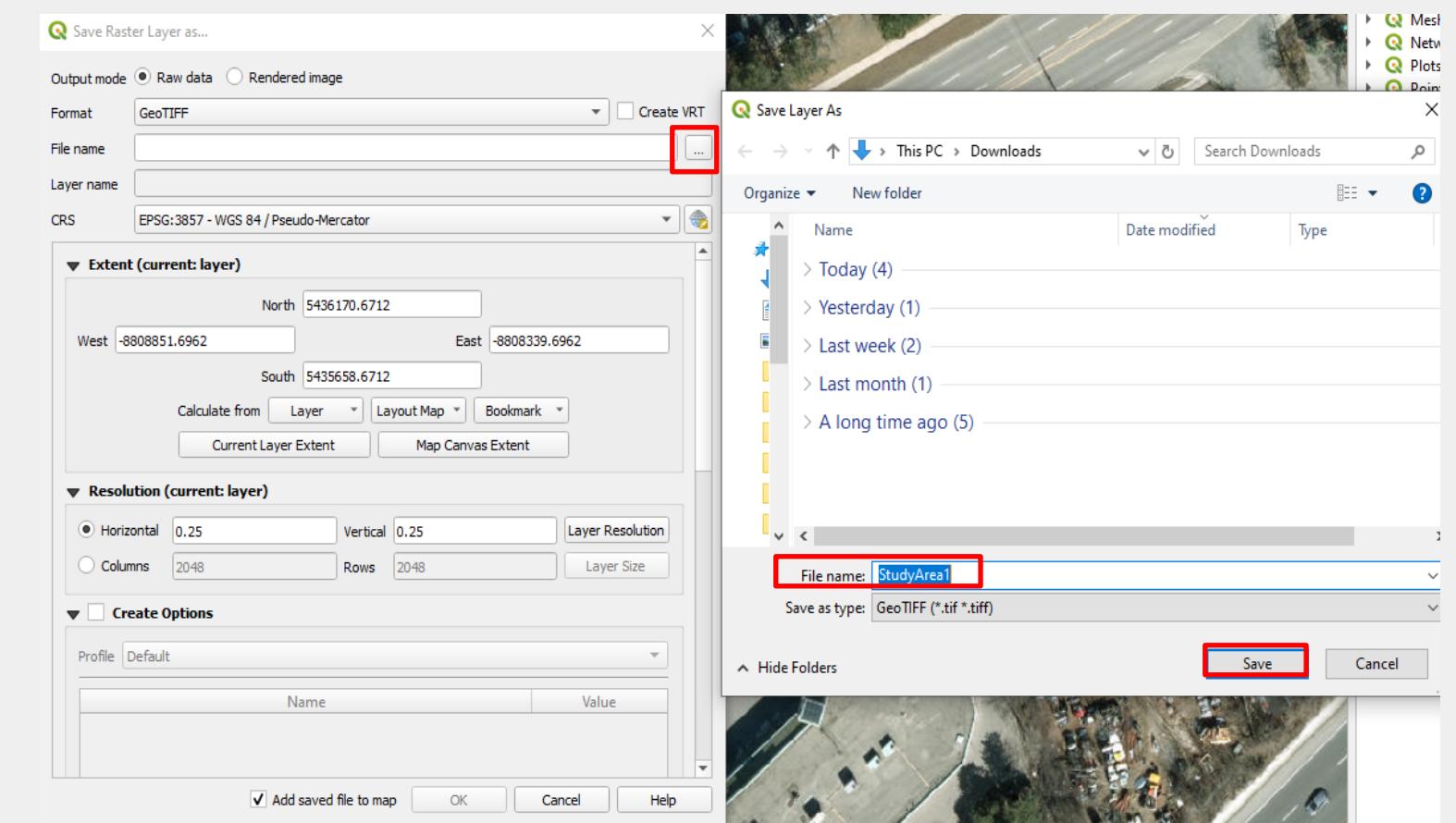
9. In the “Layers” panel

- Right Click on “Output Layer” → Export → Save As



10. Save Raster Layers as

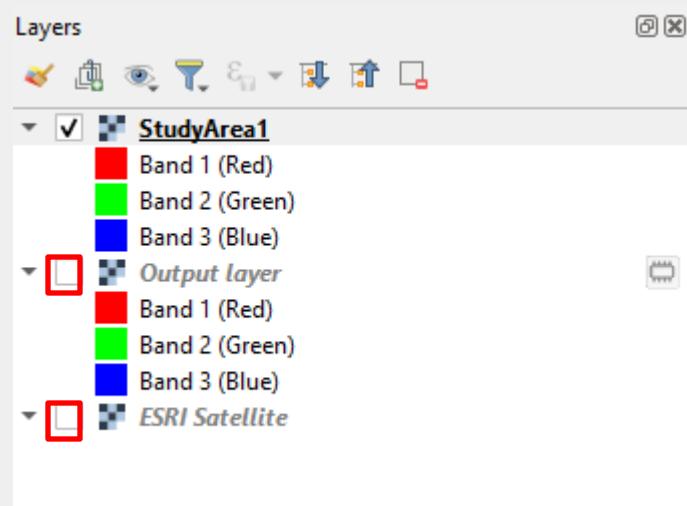
- Click Three Dots
- Pick a File Name and a Directory → Save



Imagery Map and Georeferencing

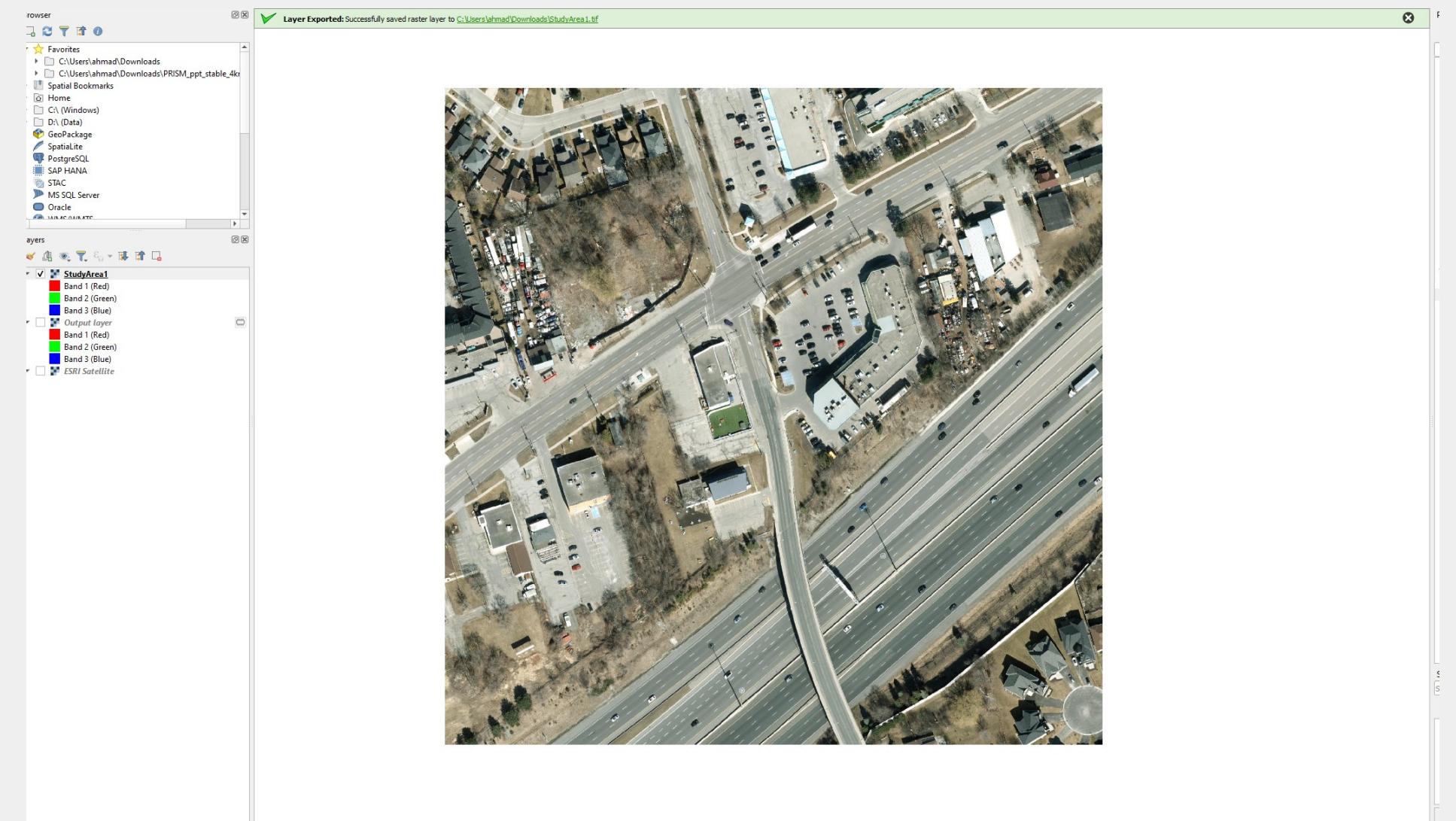
8. In the “Layers” panel

- Deselect Output layer and ESRI Satellite



9. Your Study Areal is Just an Image Now ☺

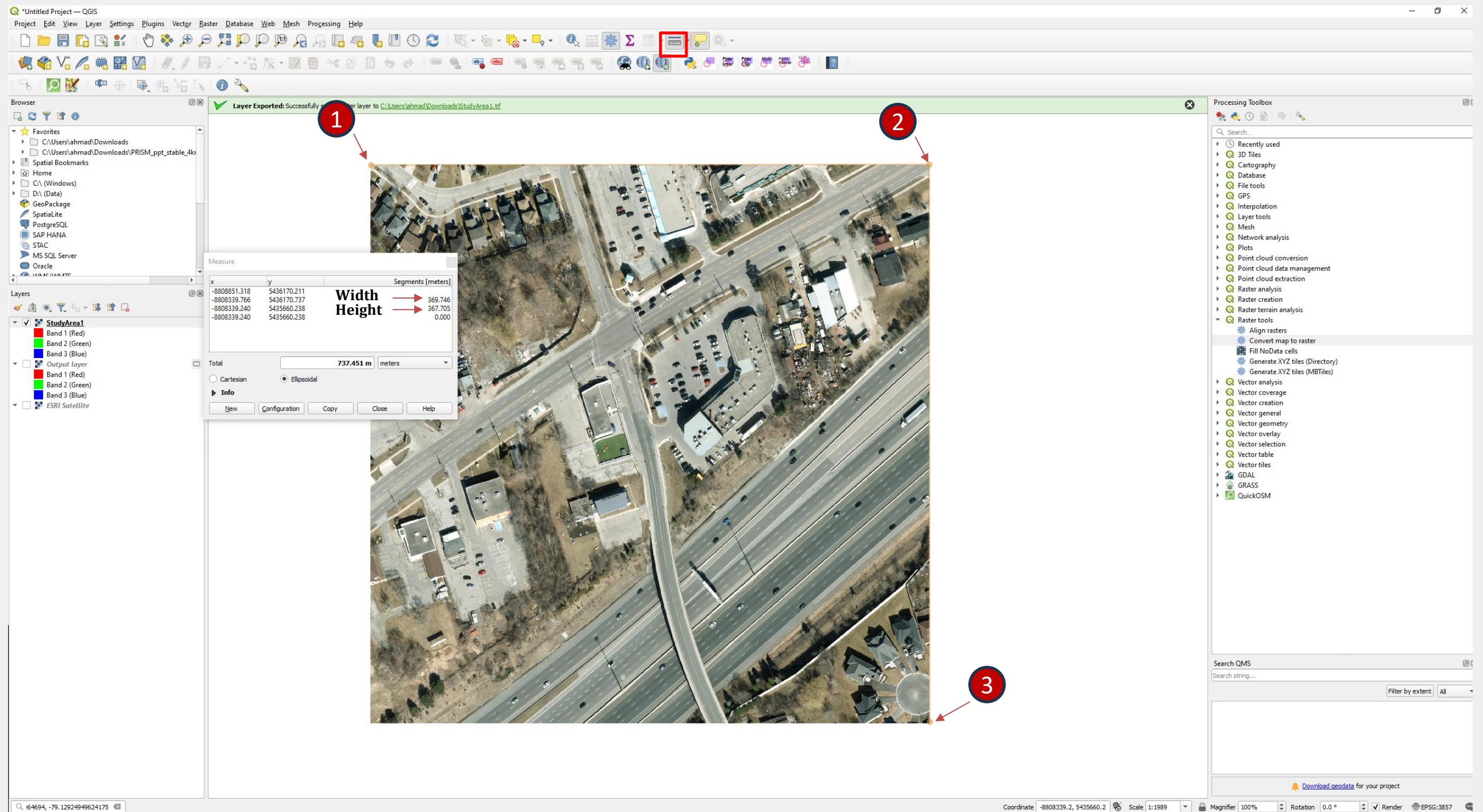
Zoom Out a Bit



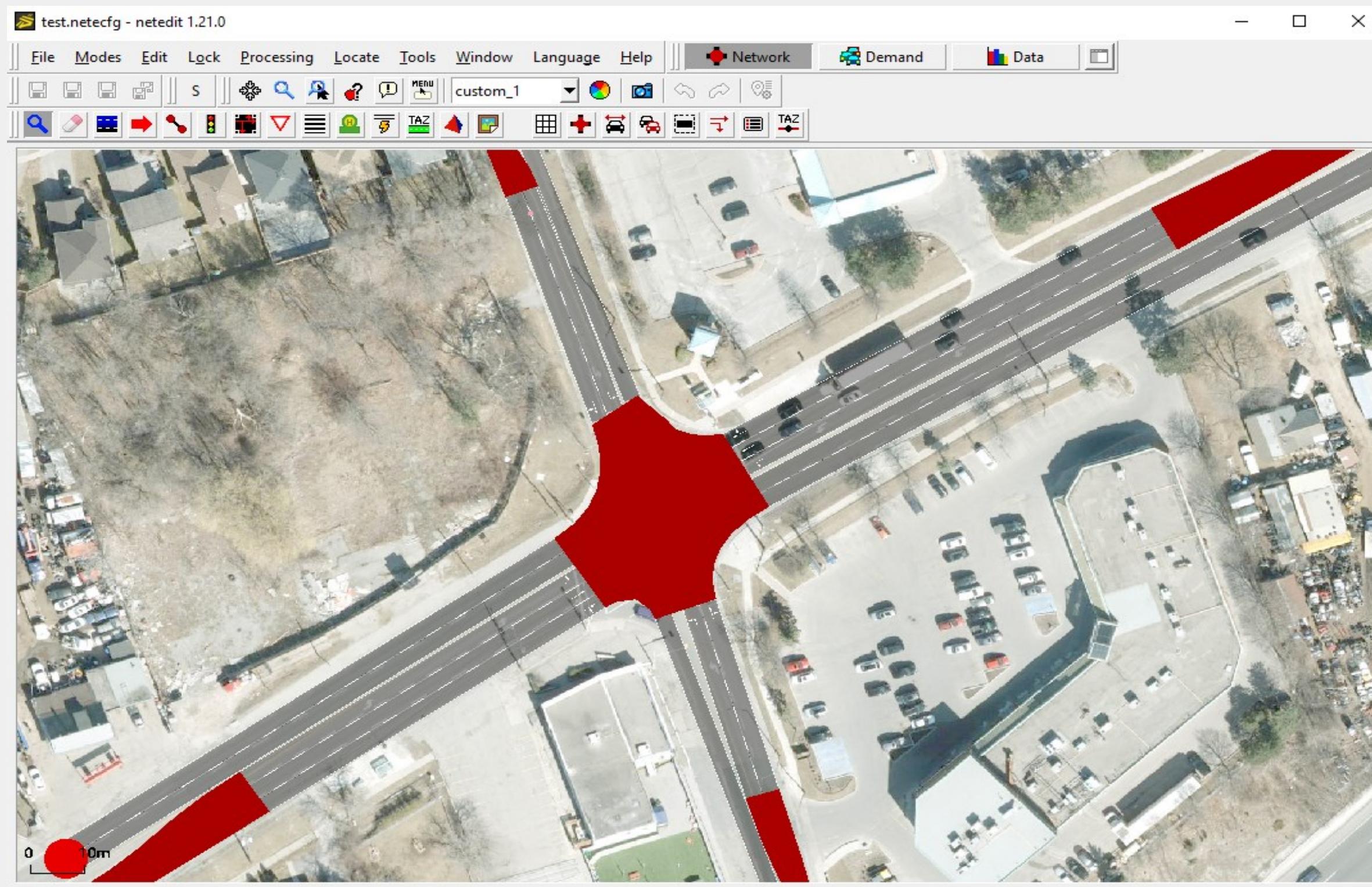
Imagery Map and Georeferencing

4. Main Menu → Select “Measure”

□ Measure Width and Height of Image by Clicking on ① ② ③ → Record these measurements in a text file.

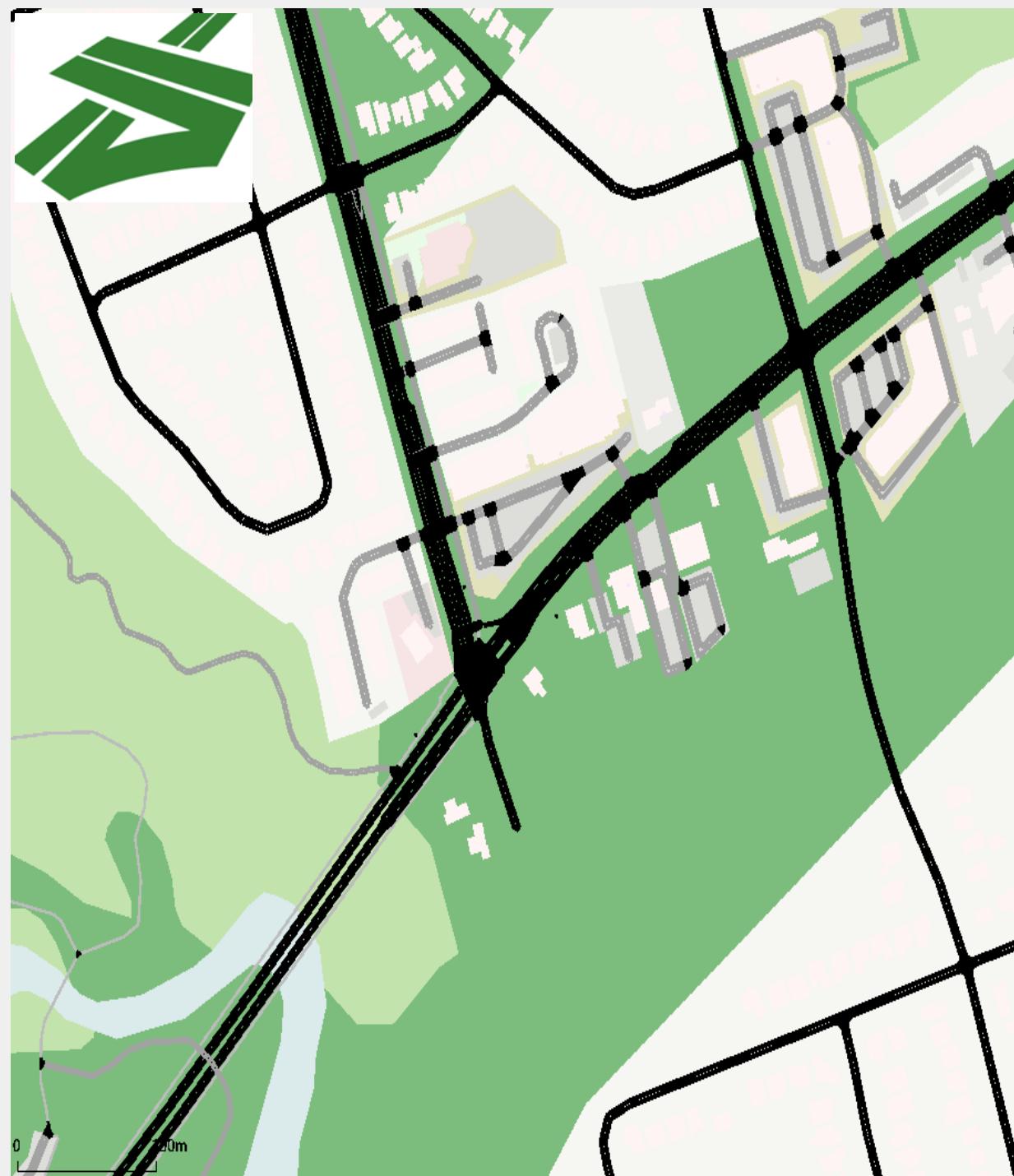


SUMO Road on Top of GIS



Import a Network from OpenStreetMap into SUMO

SUMO



OpenStreetMap

