RWR 4015
Traffic Simulation for Planning Applications

Dr. Ahmad Mohammadi
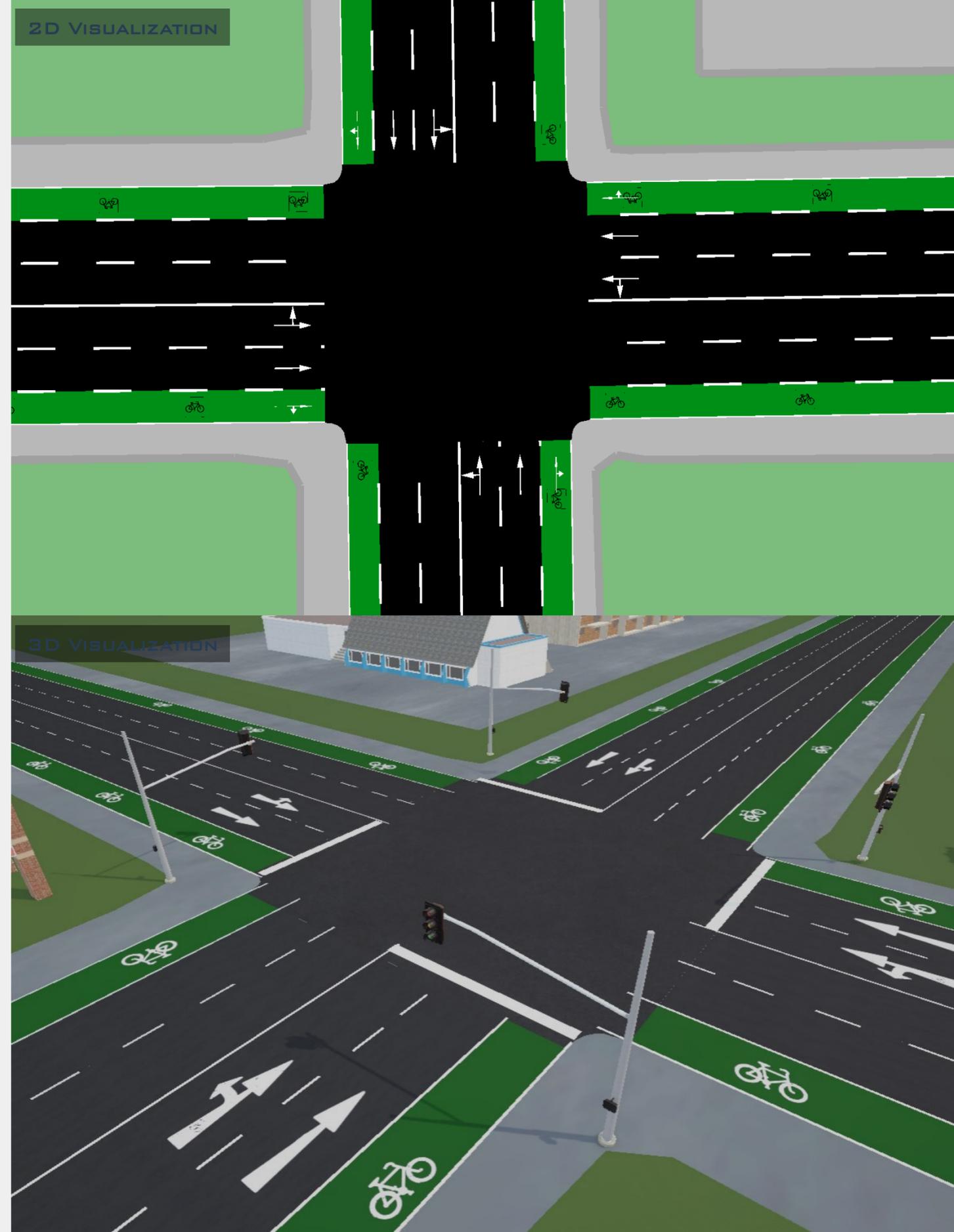
Week 3 | Hands-on:
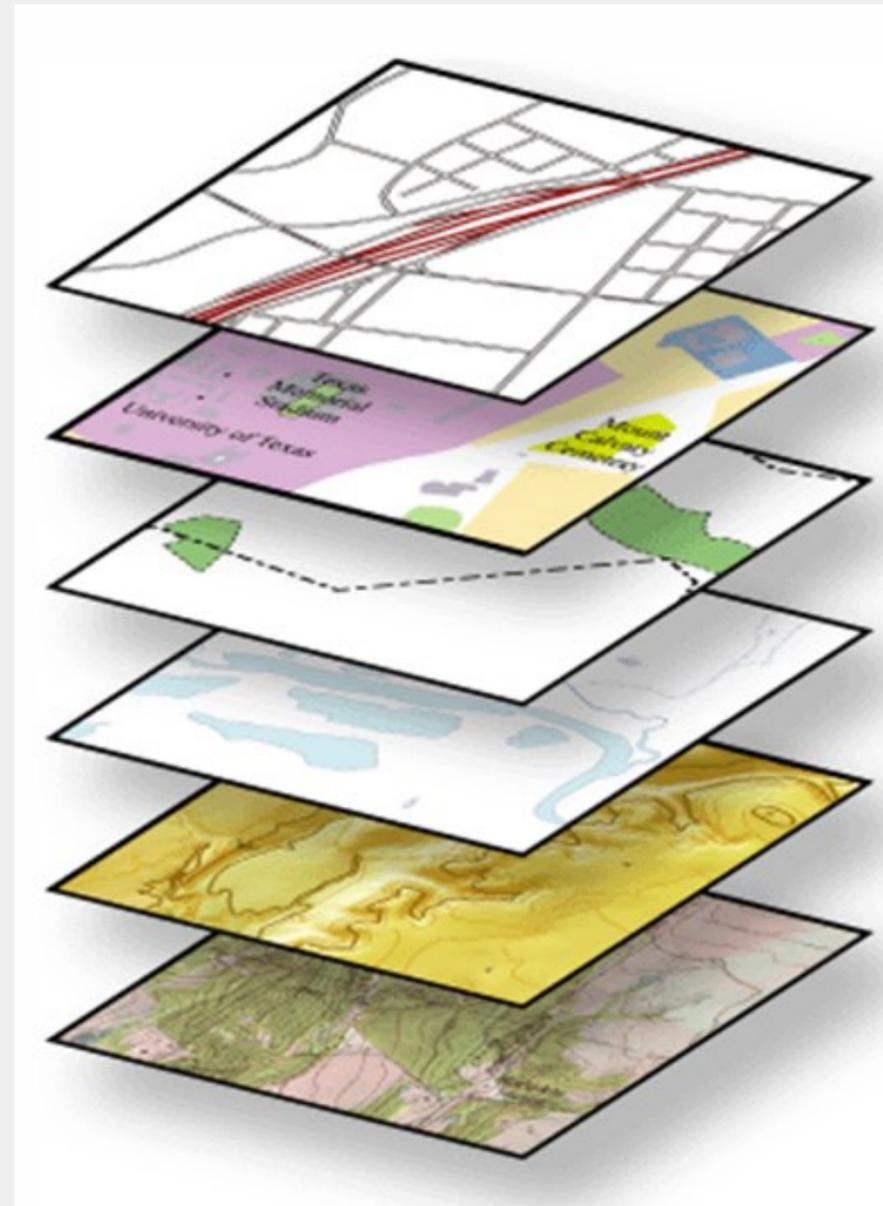**Network Modelling with GIS**

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**

QGIS → Aerial Output for SUMO

Introducing GIS

Roads

Land Use

Boundaries

Water

Elevation

Imagery

Example: Network Modelling Study
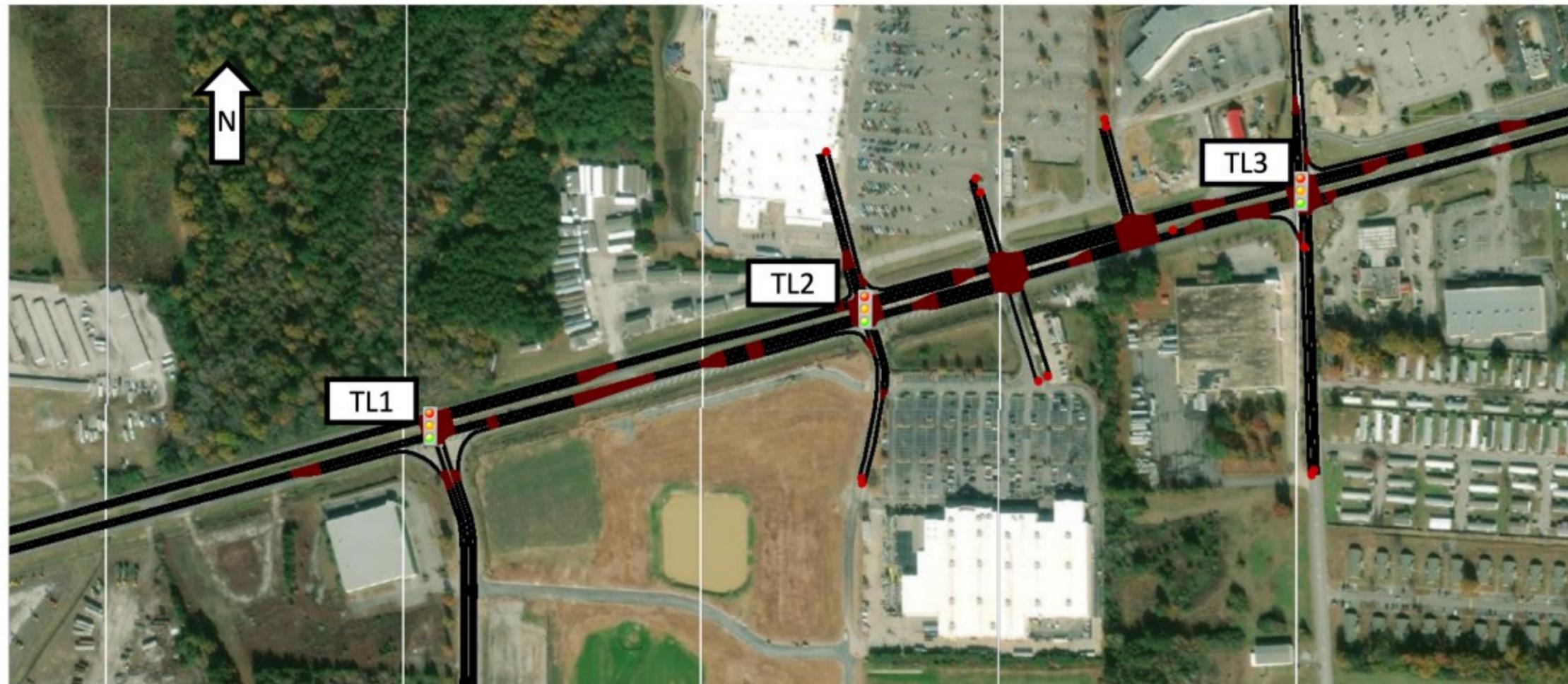
Figure 2.1: SUMO model of the simulated network including three intersections.

Schrader, M., & Bittle, J. (2024). A Global Sensitivity Analysis of Traffic Microsimulation Input Parameters on Performance Metrics. *IEEE Transactions on Intelligent Transportation Systems*.
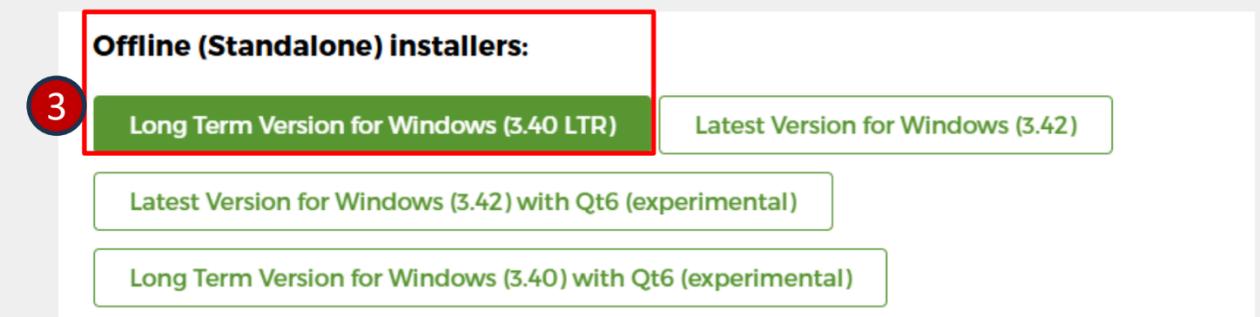
GIS Software
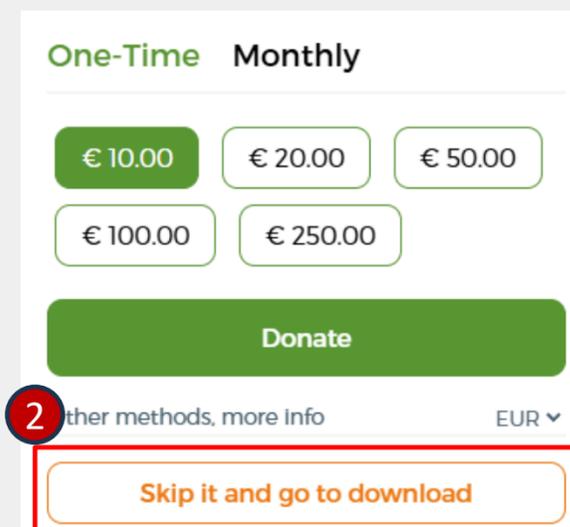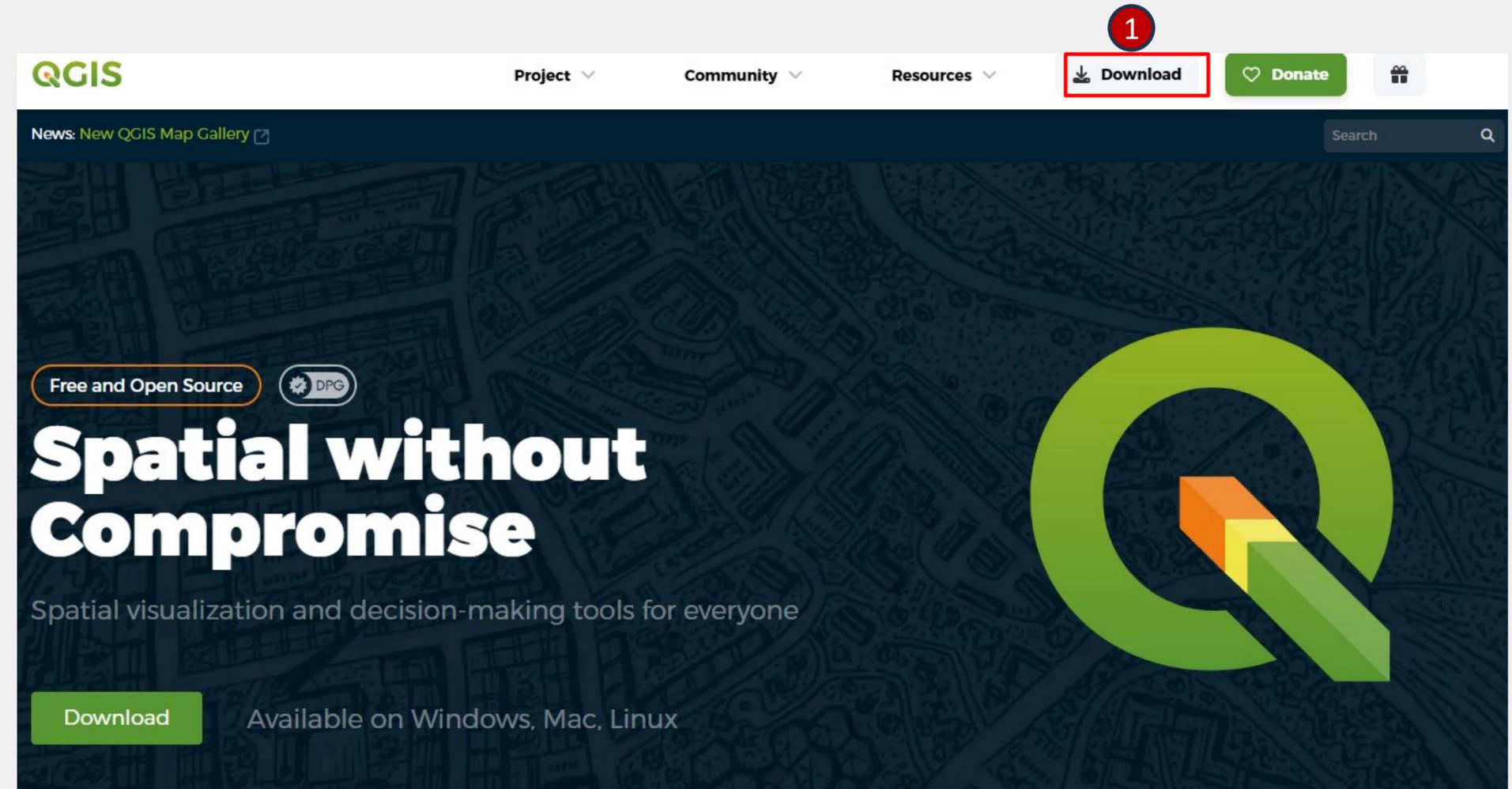
ArcGIS Pro

QGIS

Google Earth Pro

Open Source and Free

Installing QGIS

1. QGIS.ORG and Download

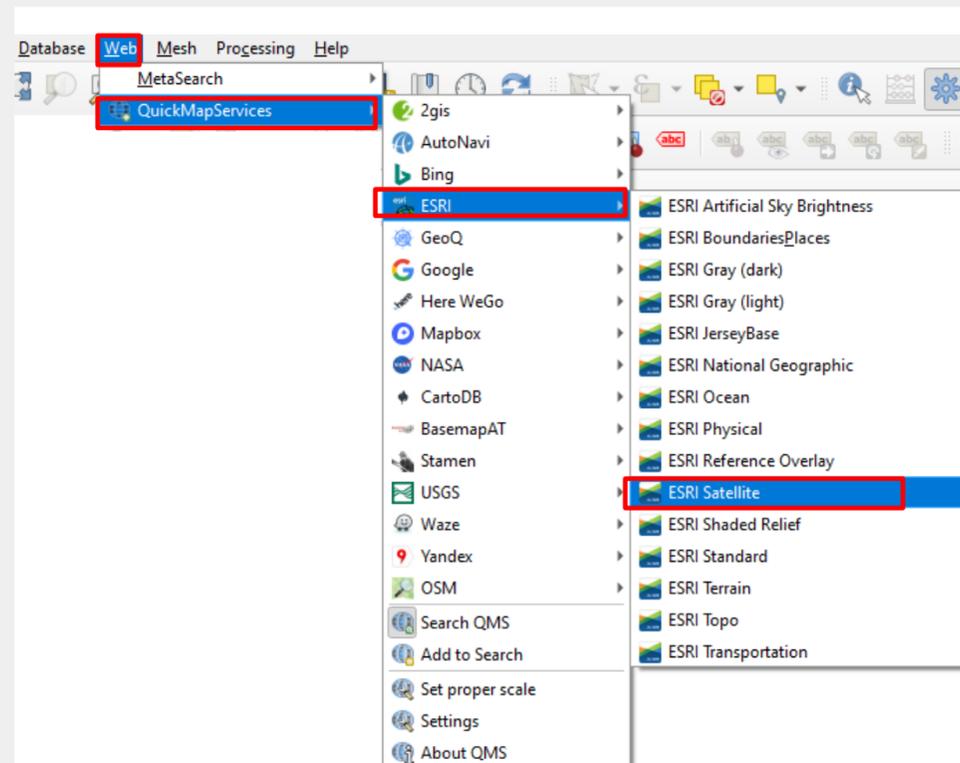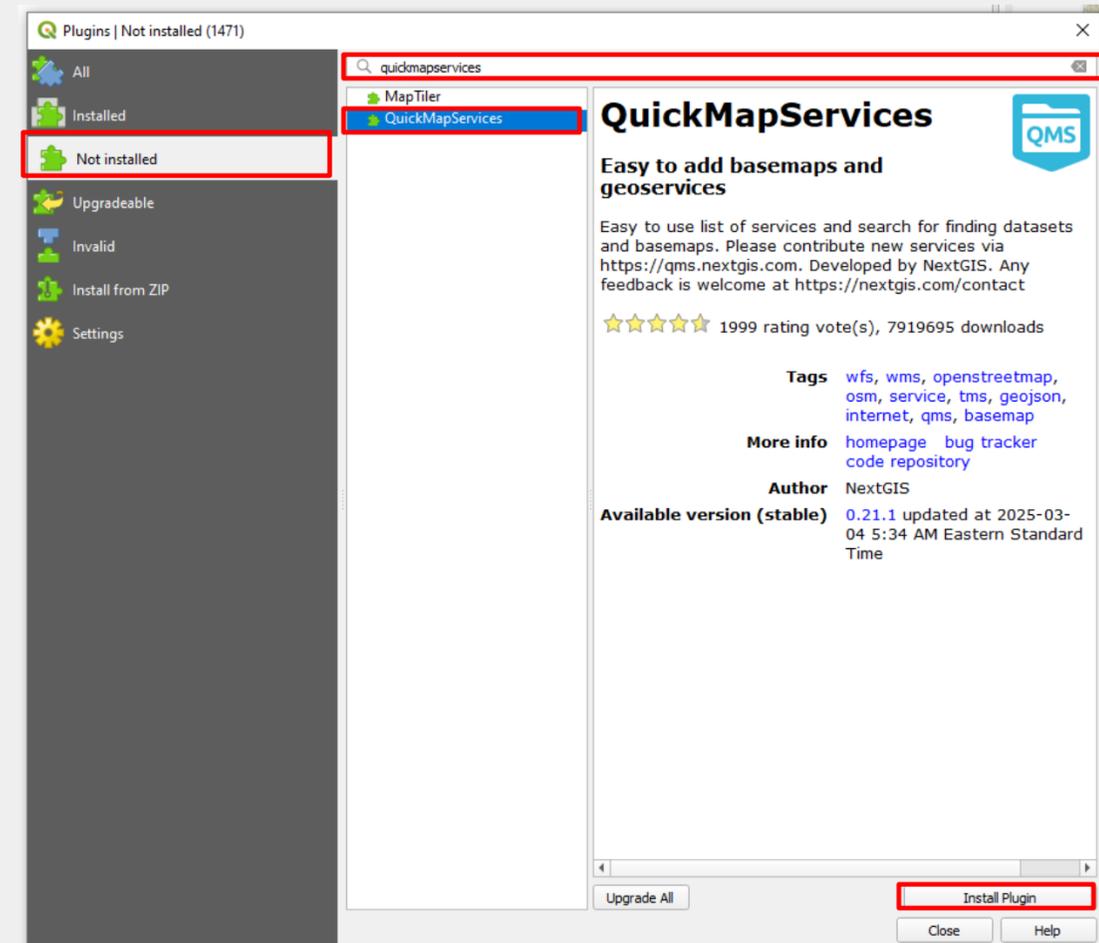2. Skip It and Go to Download
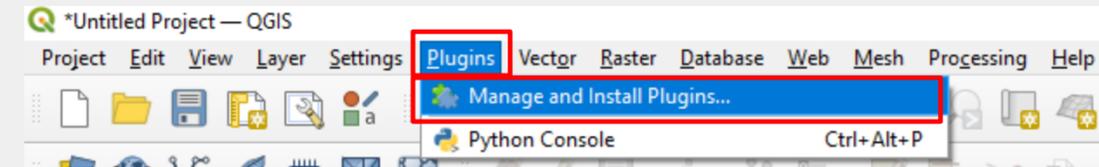
3. Long Term Version for Windows

Map Services

1. Menu bar → Plugins → Manage and Install Plugins

2.Not installed → on Search Bar → QuickMapServices →
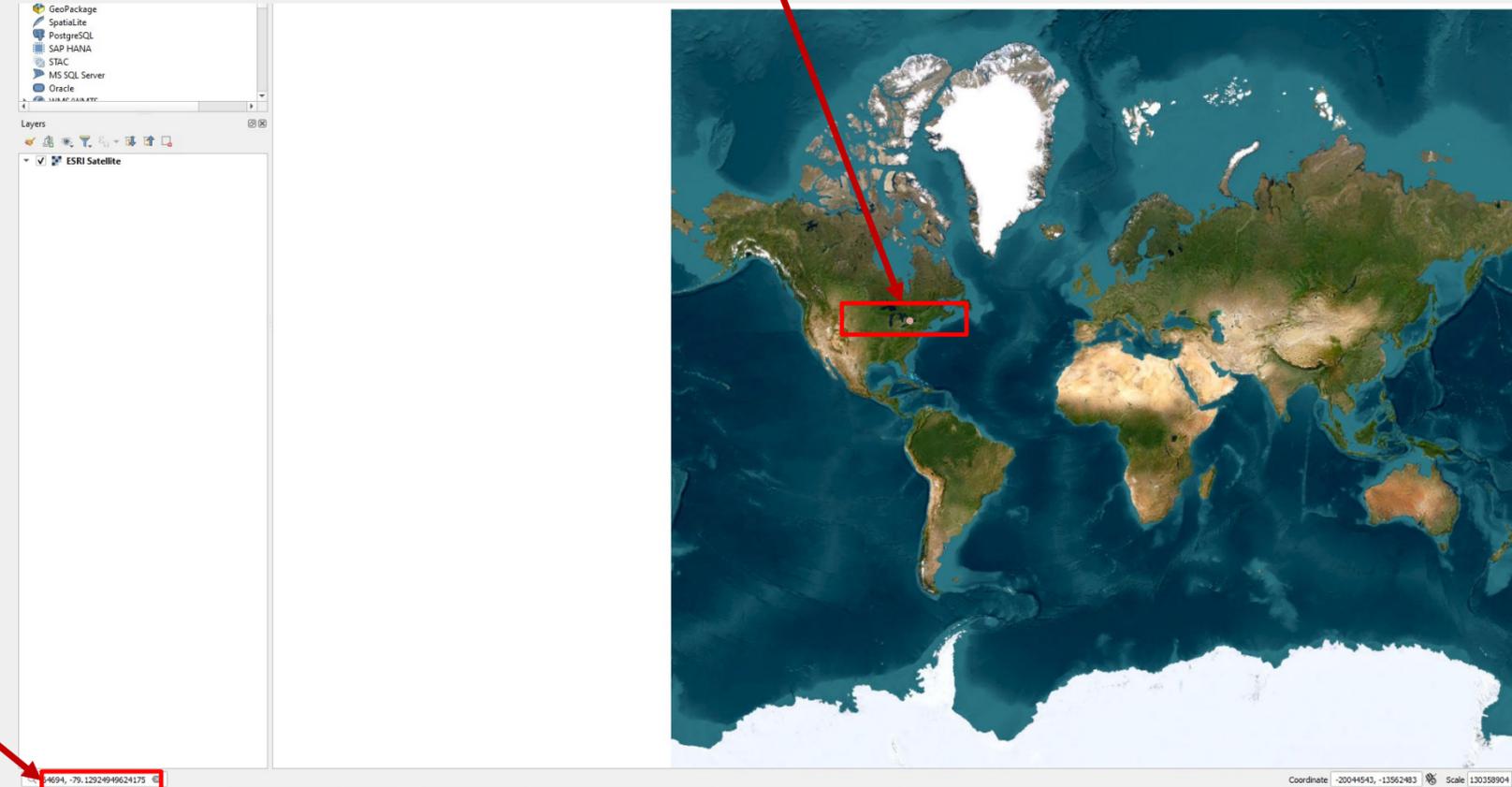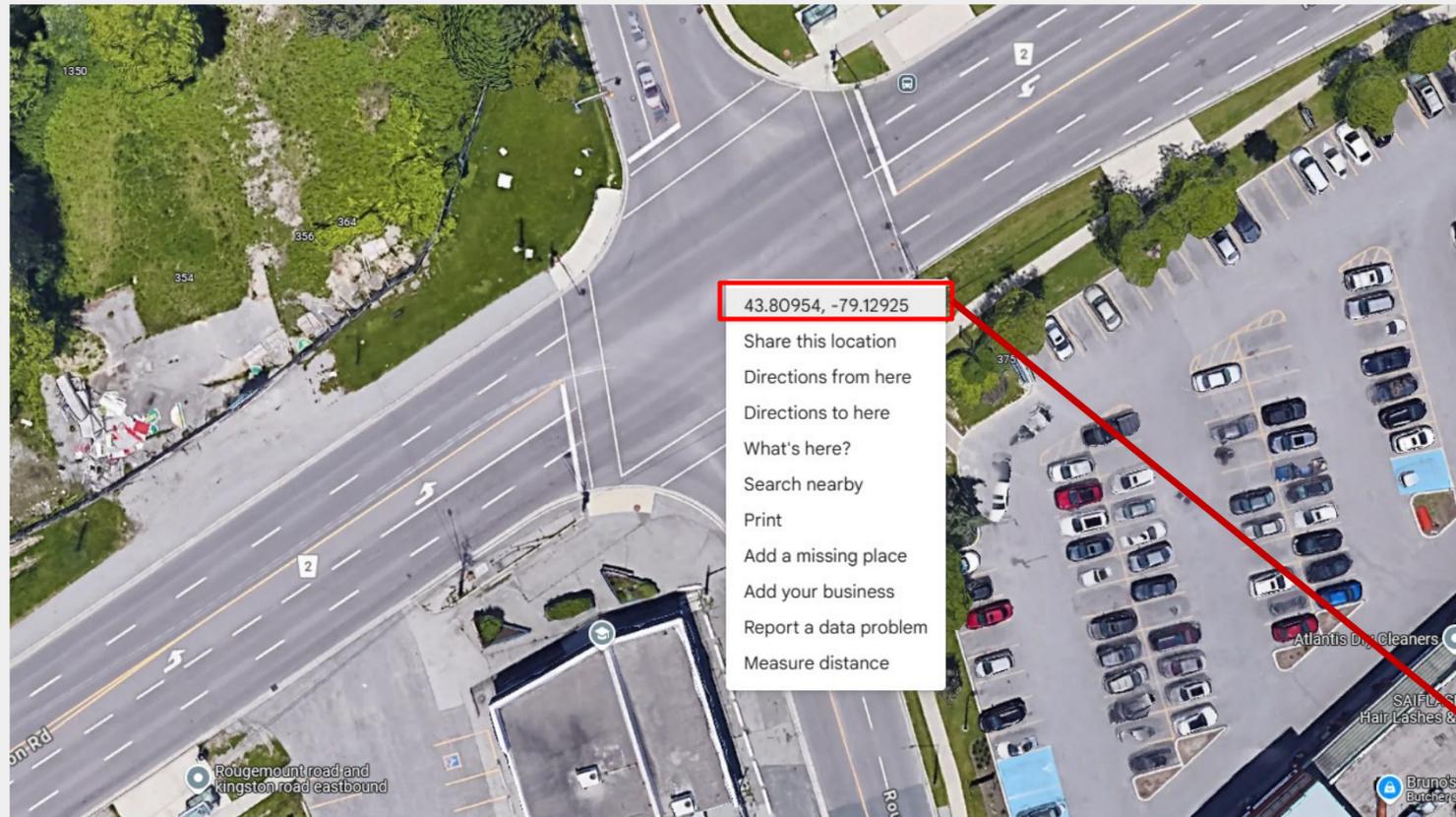
Install Plugin

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

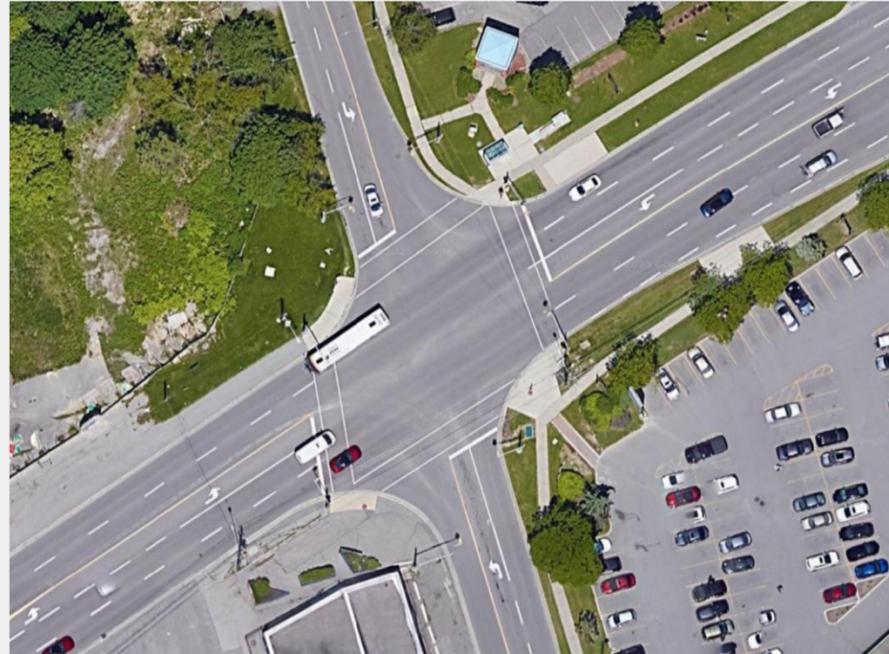**4. Select the Box and Press Enter to Reappear the Red Dot**

Imagery Map and Georeferencing

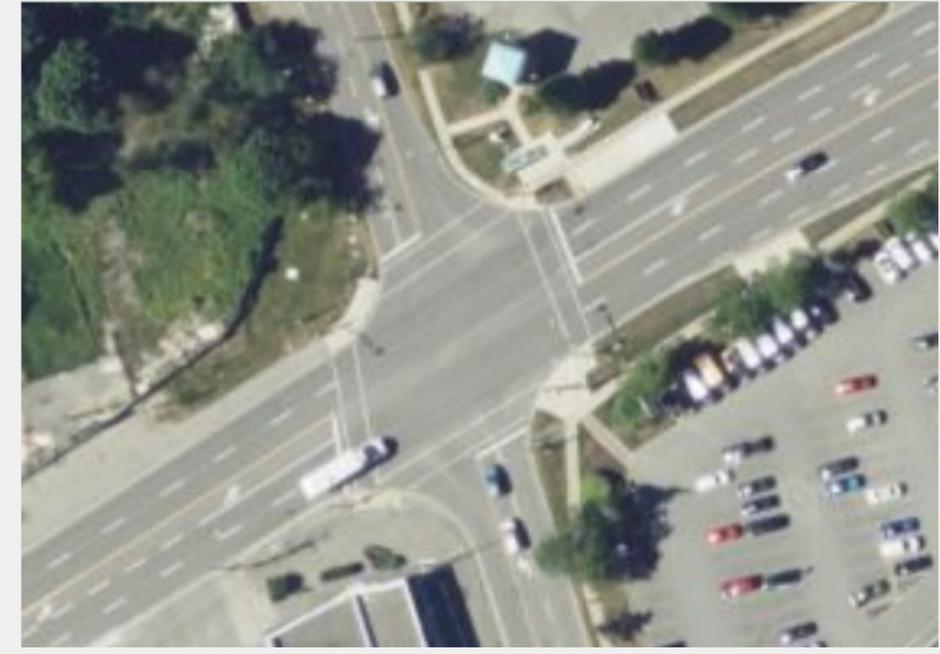**5. Try Different Map Provider like Google Map, Bing**
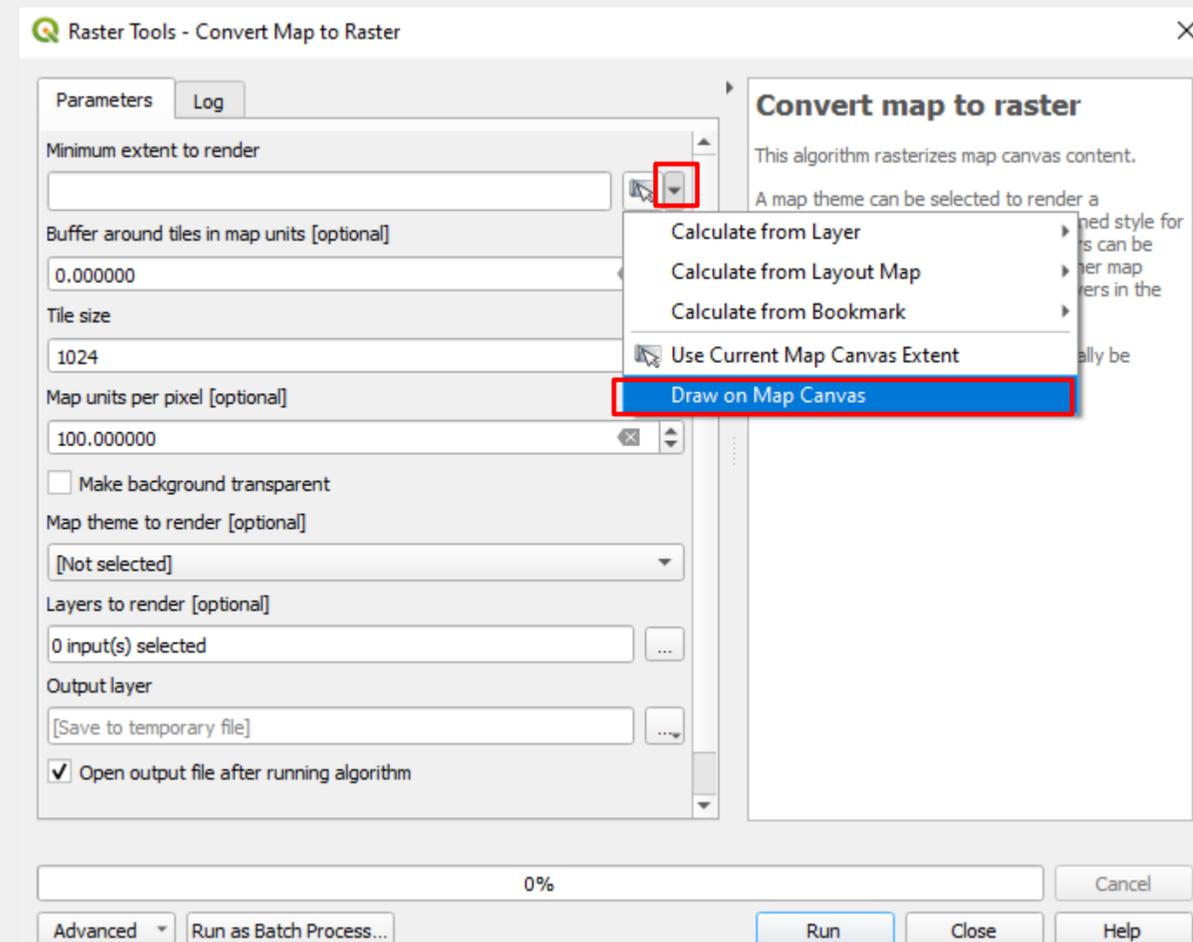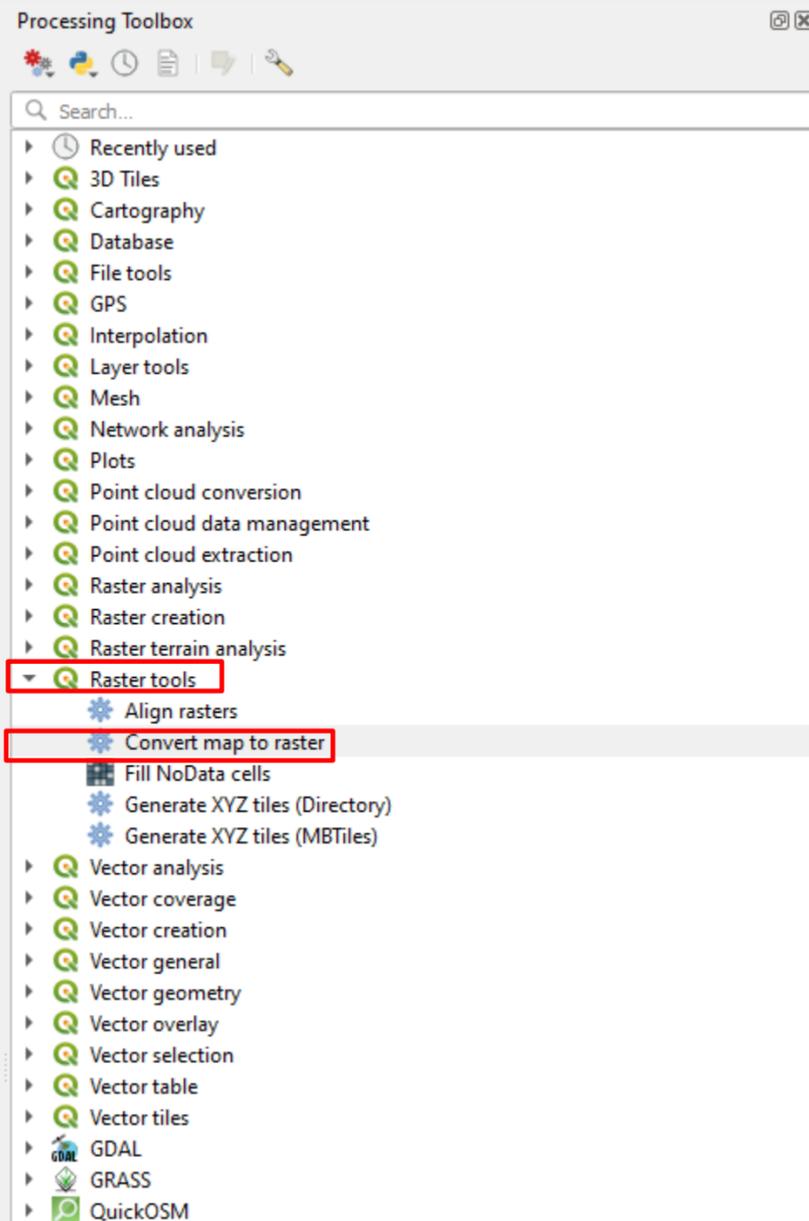
ESRI

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"

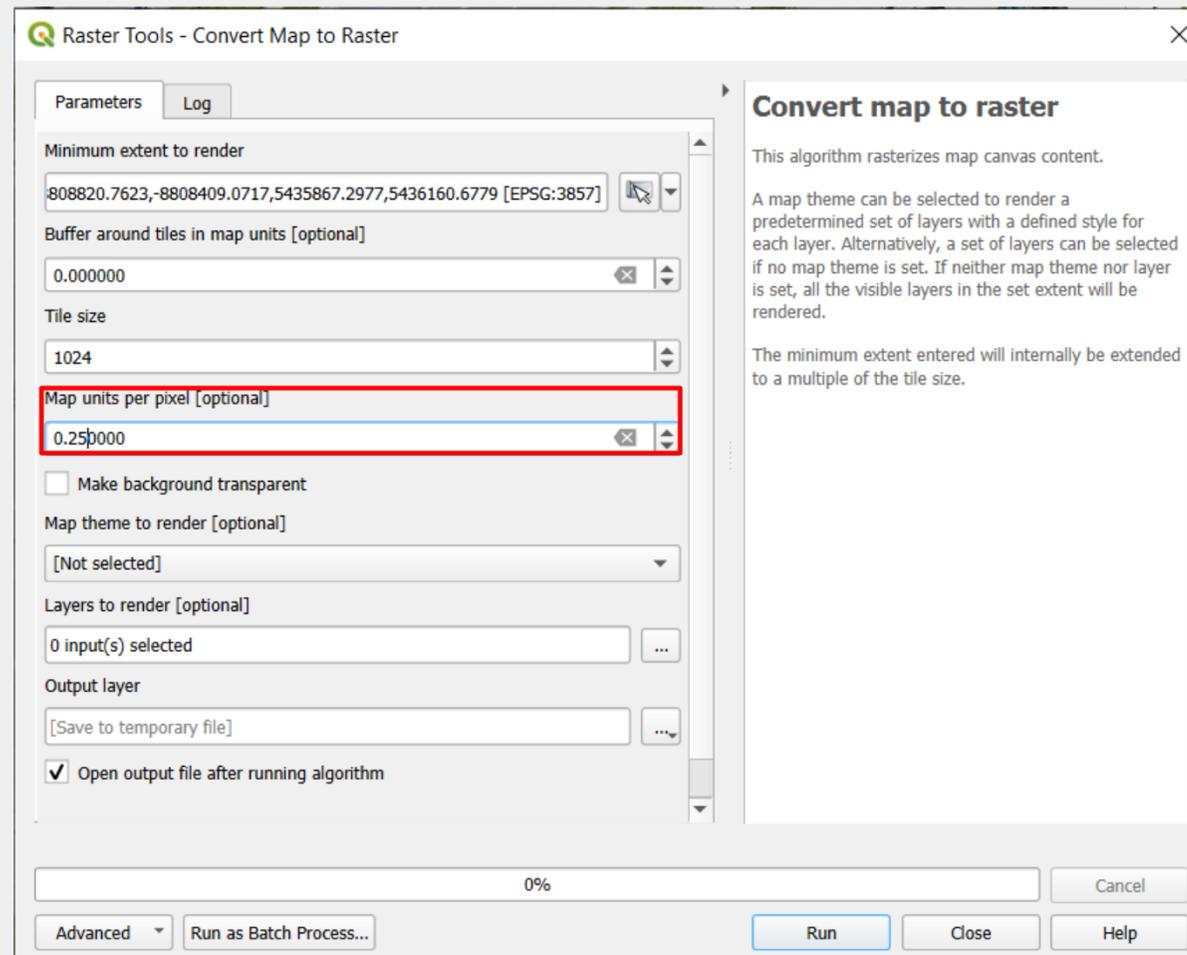# Imagery Map and Georeferencing

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

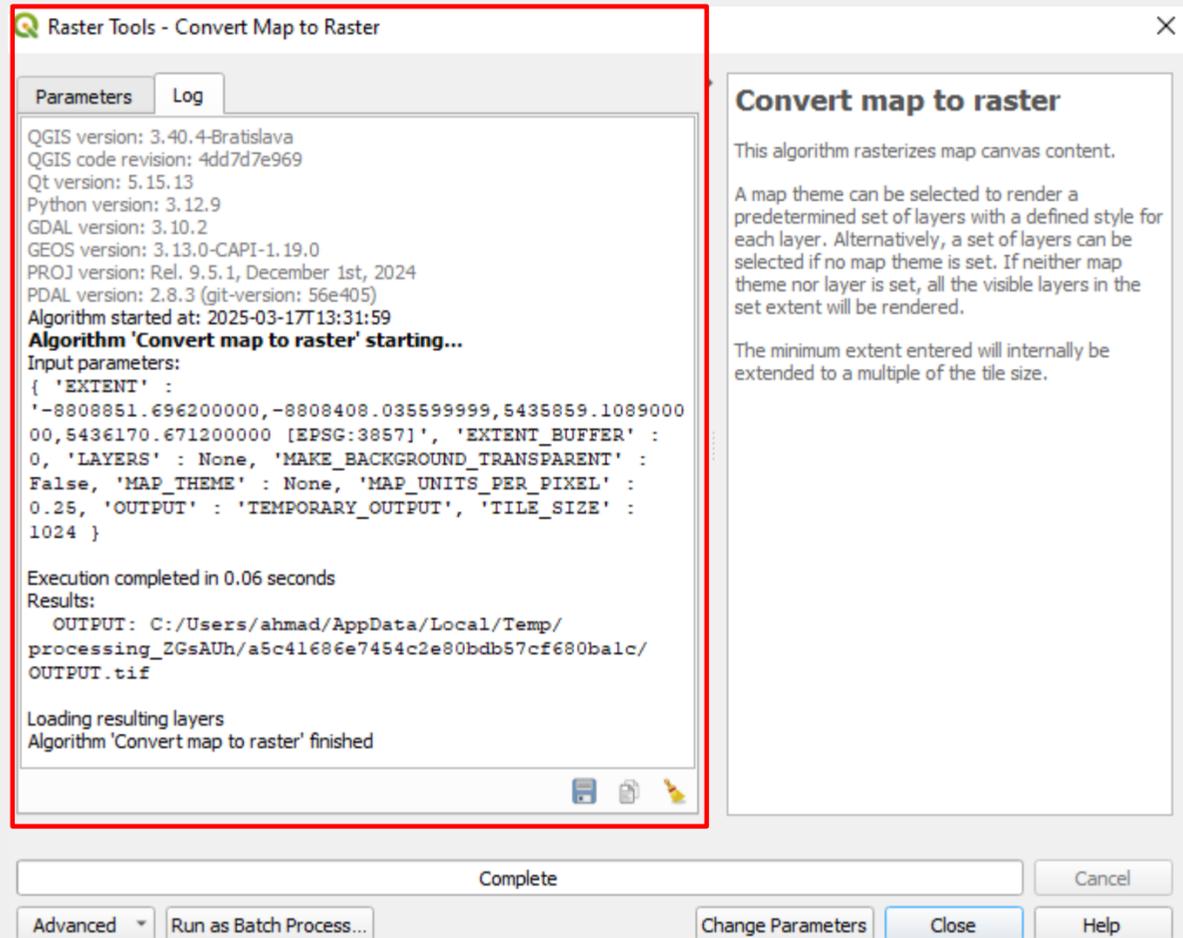0.25 (≈ 25 cm/pixel, nice aerial detail)

0.5 (50 cm/pixel)

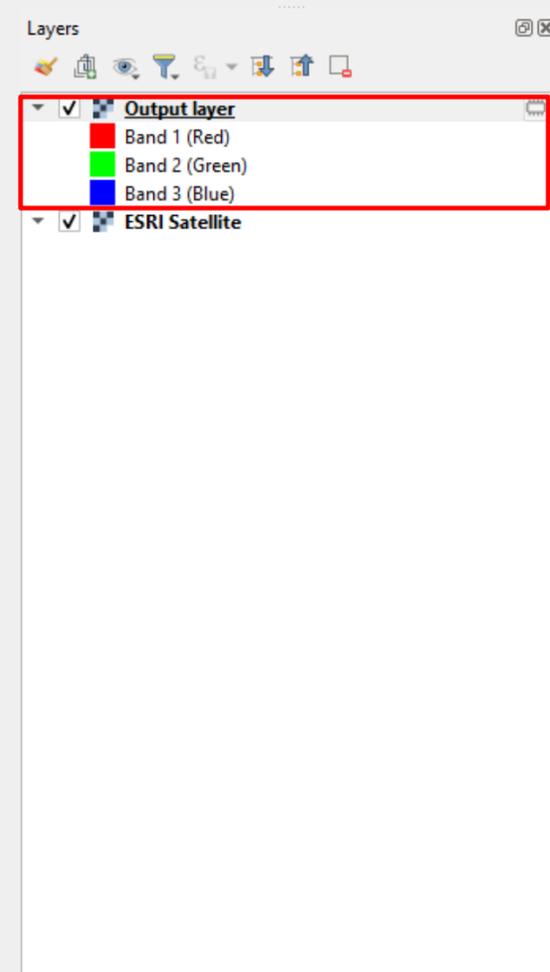1.0 (1 m/pixel, lighter file)

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

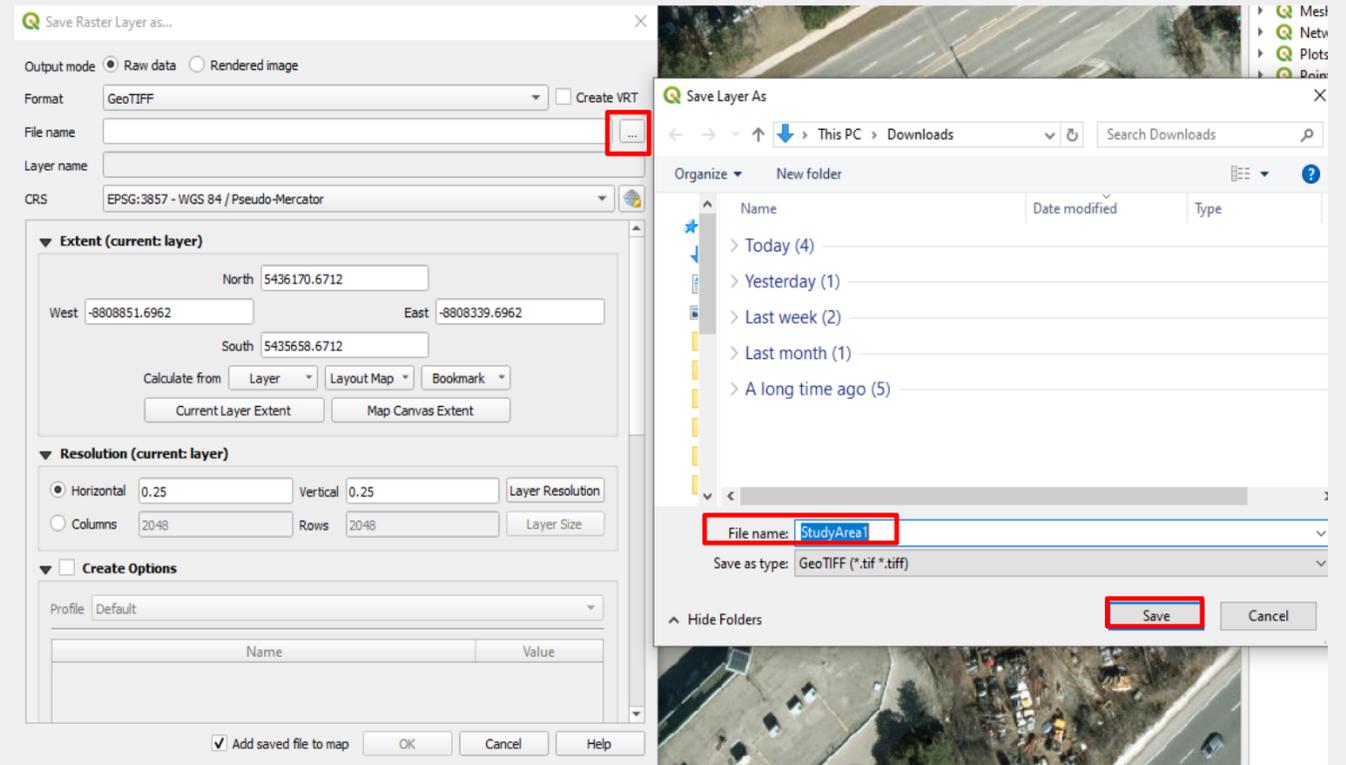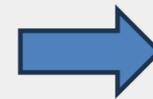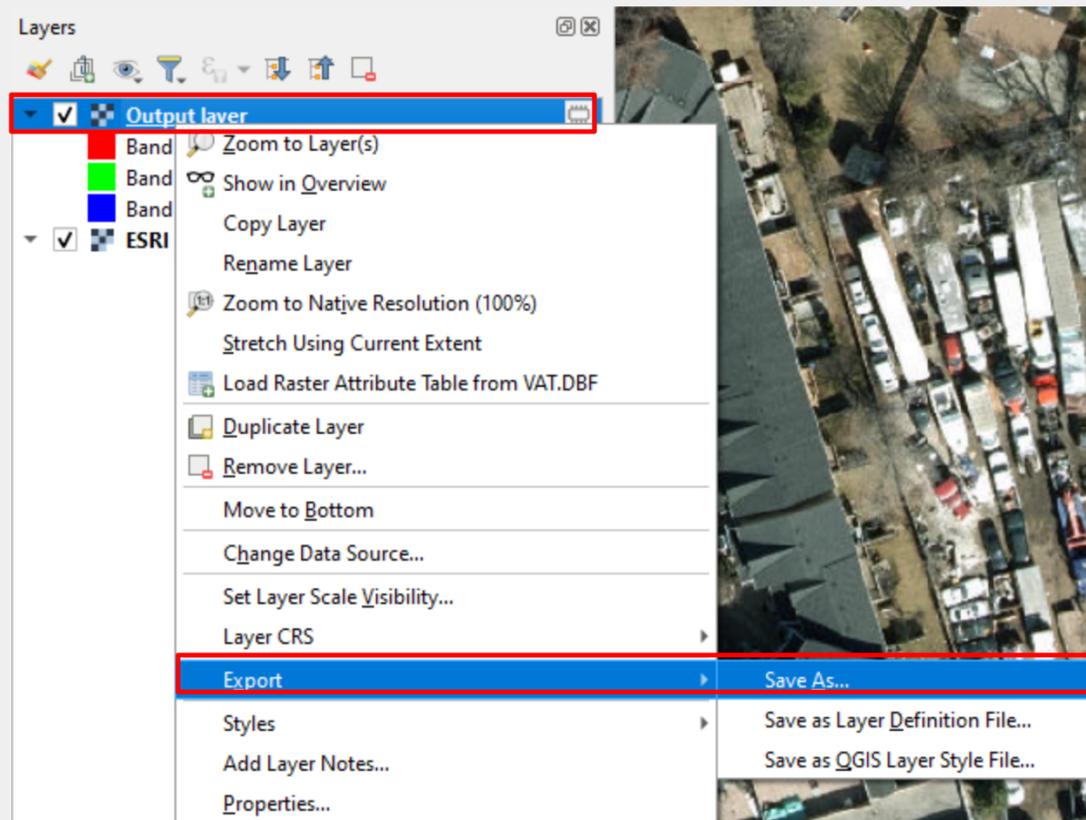❑ You should see the resulting layers as shown on the right.

Imagery Map and Georeferencing

9. In the "Layers" panel

❑ **Right Click on "Output Layer" → Export →**

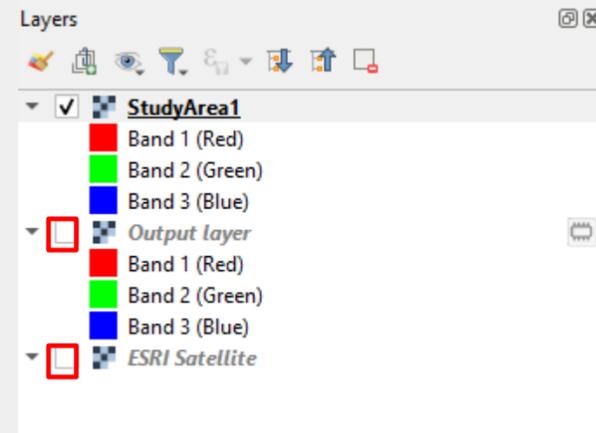   **Save As**

10. Save Raster Layers as

❑ **Click Three Dots**

❑ **Pick a File Name and a Directory → Save**

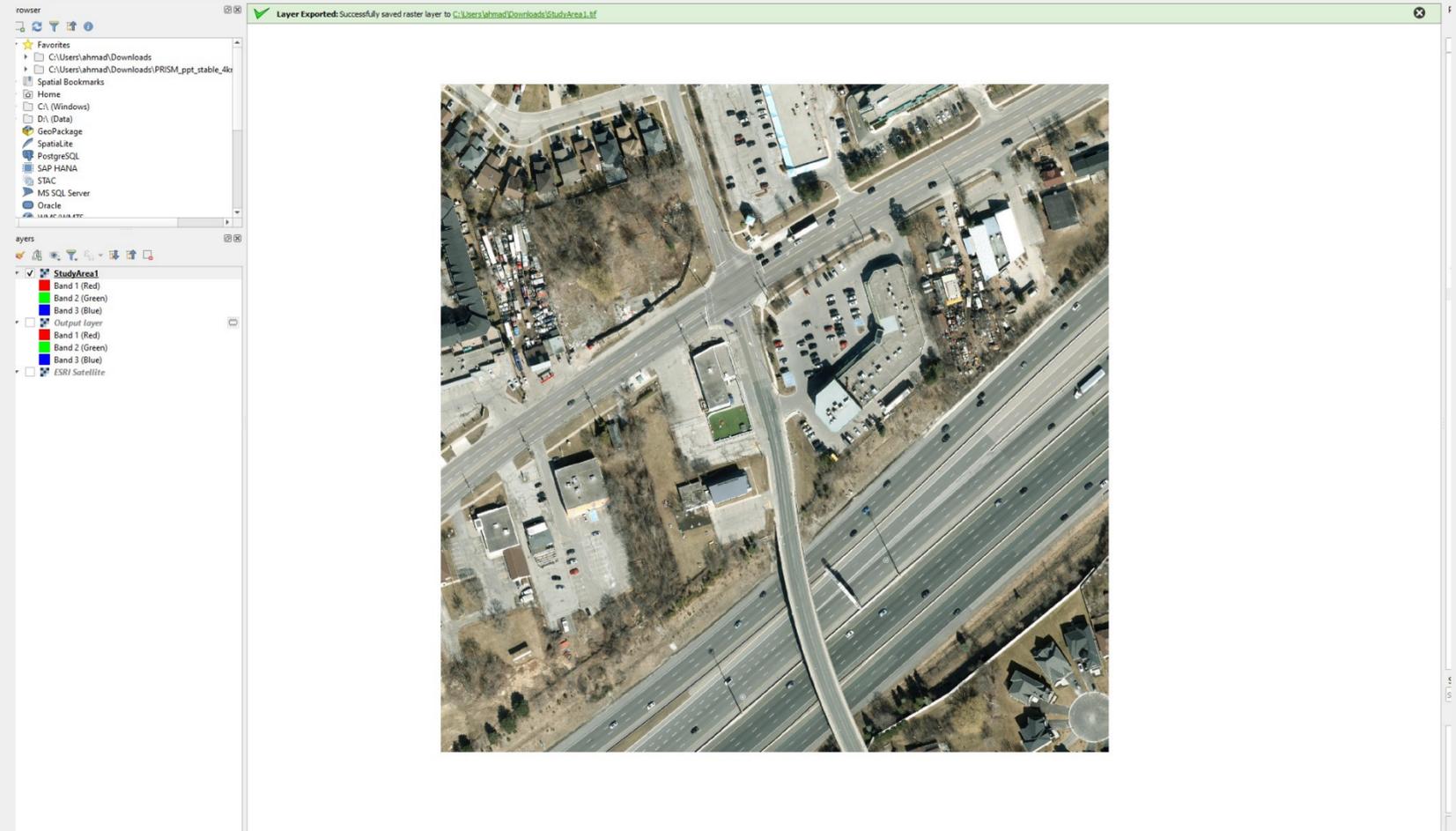# Imagery Map and Georeferencing

8. In the "Layers" panel

❑ **Deselect Output layer and ESRI Satellite**

9. Your Study Area1 is Just an Image Now ☺

Zoom Out a Bit

Imagery Map and Georeferencing
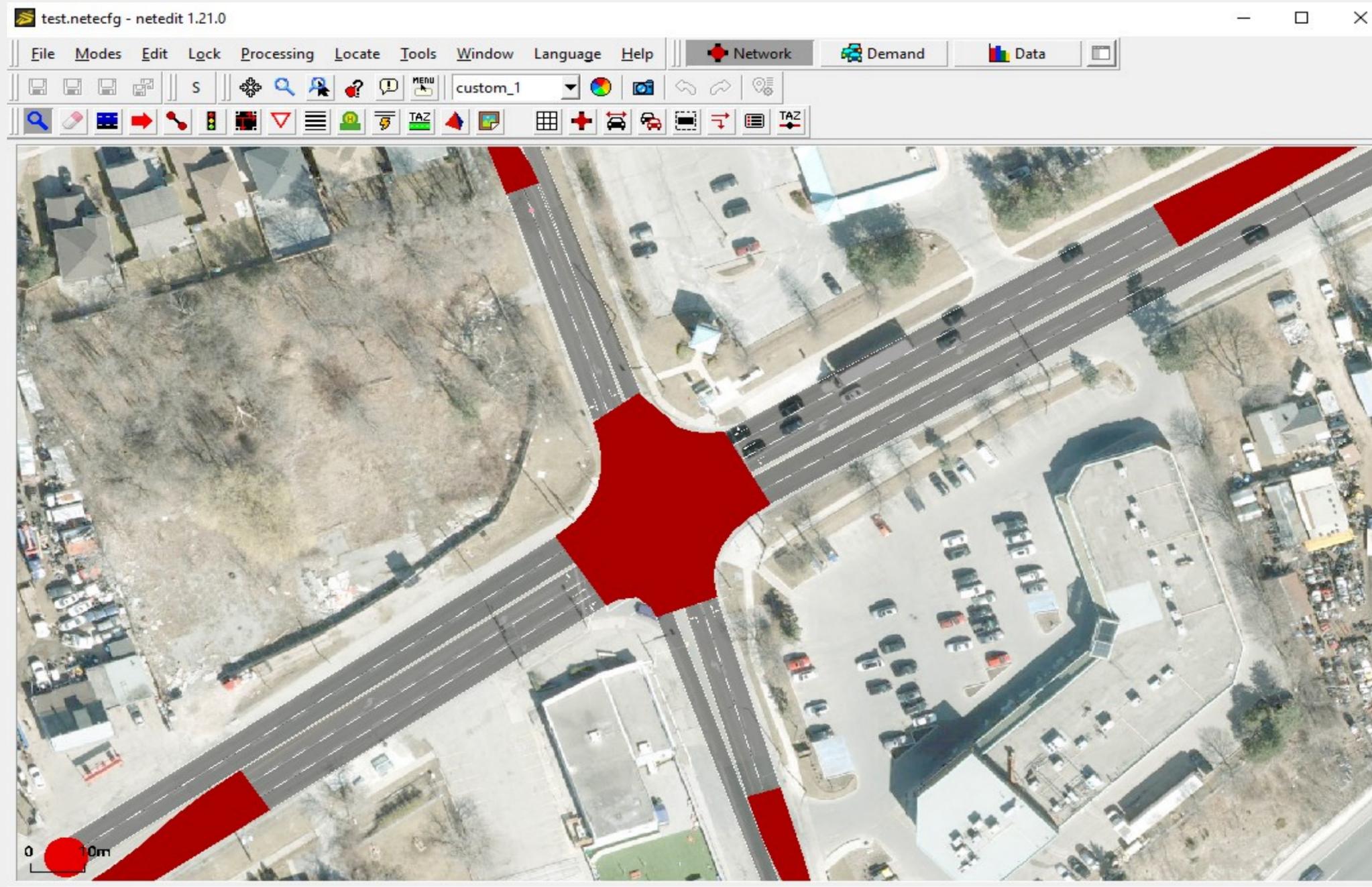
4. Main Menu → Select "Measure"

❑ **Measure Width and Height of Image by Clicking on ❶ ❷ ❸ → Record these measurements in a text file.**

SUMO Road on Top of GIS

Import a Network from OpenStreetMap into SUMO

SUMO

OpenStreetMap