



# Digital transformation

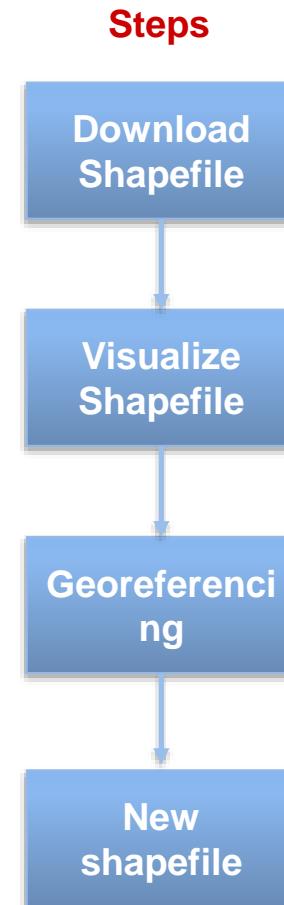
## 100-page GIS Crash Course - Let's Make a Map -

Hiro Yokoi  
July 2019



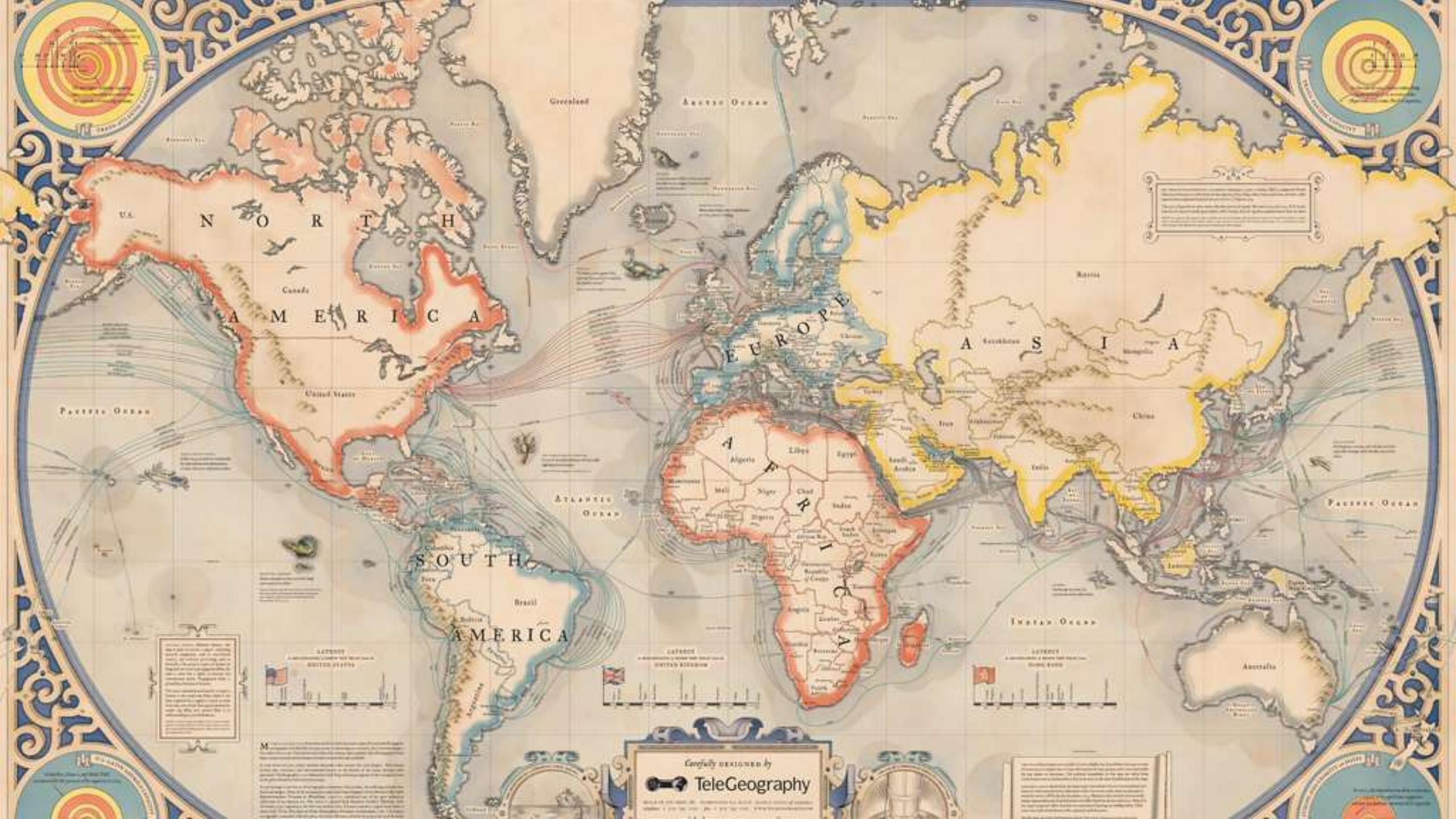
# Today's Objective

- To understand basic features of GIS
- To familiarize QGIS
  - How to download basemap
  - How to visualize geospatial data
  - How to georeferenced paper/PDF map
  - How to create a new shapefile
- To manually collect GPS information



# Today's menu

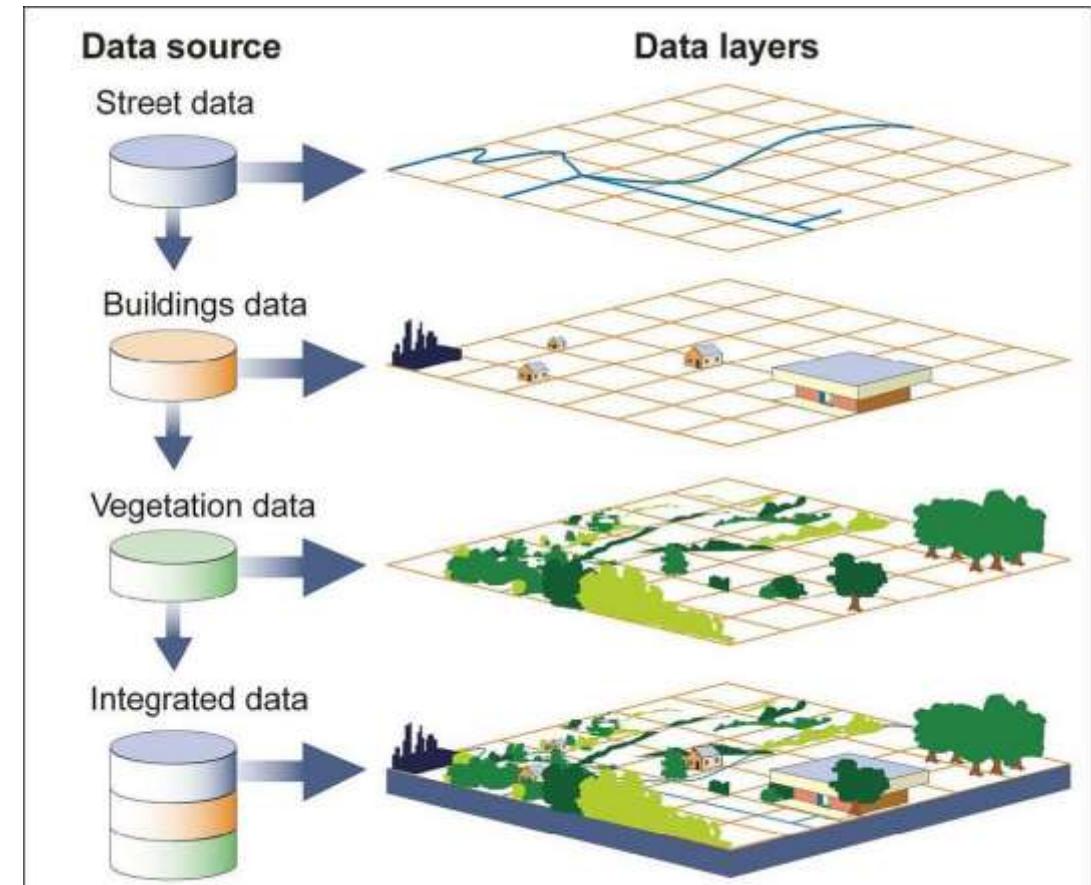
- Fundamental GIS and Geospatial Data
- Where to get project map and geospatial data?
- QGIS Initial Setup
- Visualize Administration Boundary in QGIS
- Georeferencing paper/PDF map
- Create a new shapefile



# What is GIS?

- The Geographic Information Systems (GIS) is a technological field that incorporates geographical features with tabular data in order to map, analyze, and assess real-world problems.
- GIS? Geospatial? - GIS refers more narrowly to the traditional definition of using layers of geographic data to produce spatial analysis and derivative maps. Geospatial is more broadly used to refer to all technologies and applications of geographic data.

<https://www.gislounge.com/what-is-gis/>



Source: GAO.

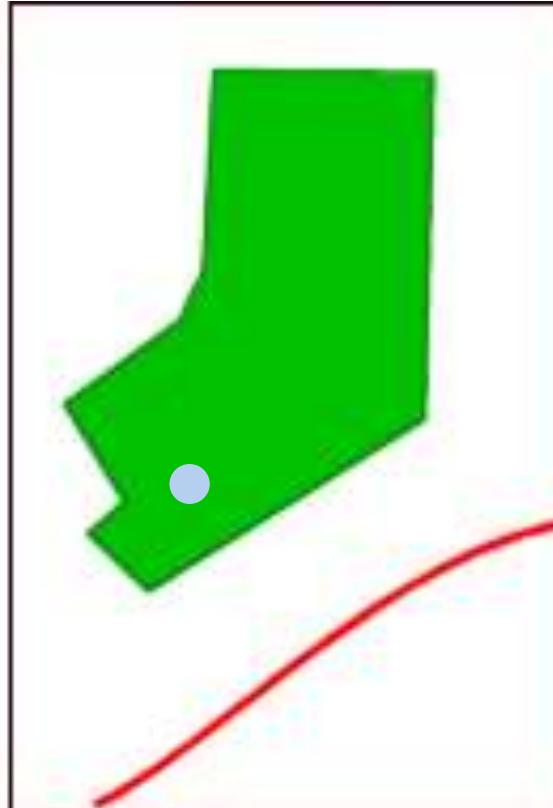
# Why QGIS? - Cost, GUI, OS compatibility

Software	Supplier	Purpose	Cost	GUI (Graphical user interface)	OS
ArcGIS 	ESRI	Comprehensive GIS analysis	Expensive (\$800 - \$6,000) (Free for WB PC)	Easy	PC
QGIS 	Open Source	Comprehensive GIS analysis	Free	Easy	PC, Mac
Python 	Open Source	Geospatial Visualization, Spatial Statistics	Free	Difficult for non-programming user	PC, Mac
R 	Open Source	Geospatial Visualization, Spatial Statistics	Free	Difficult for non-programming user	PC, Mac
Google Earth Engine 	Google	Satellite Data Analysis (RS)	Free	Difficult for non-programming user	PC, Mac

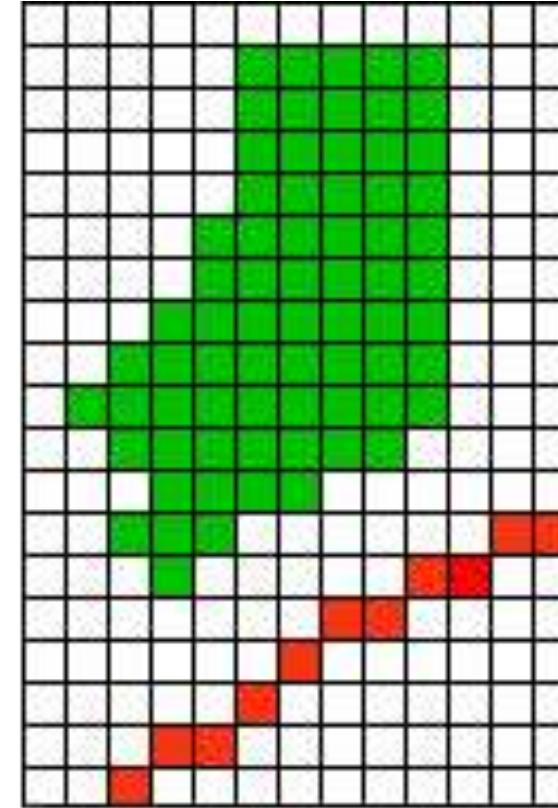
## We have two data types - Vector data and Raster Data



**Real World**



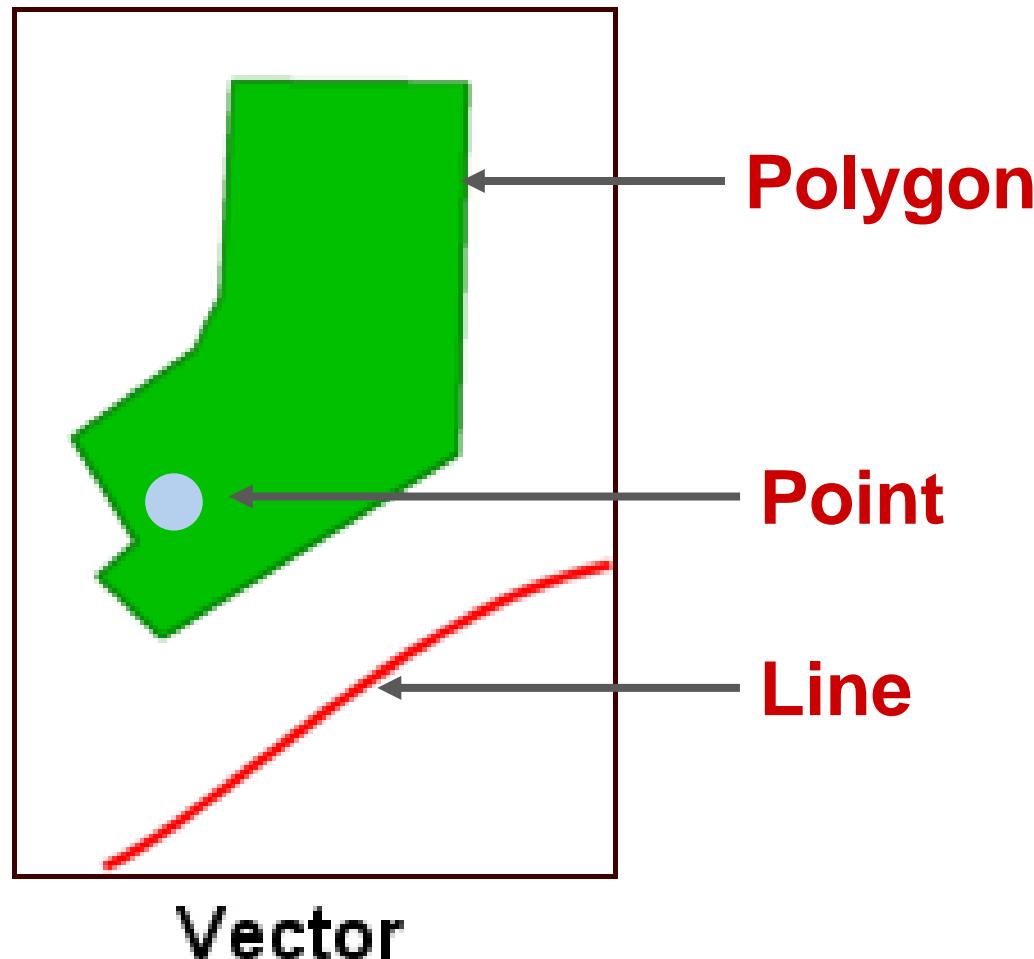
**Vector**



**Raster**

<http://www.geography.hunter.cuny.edu/>

## Vector Data has three types – Point, Line, Polygon



# Vector Data is usually Shapefile or Geodatabase.

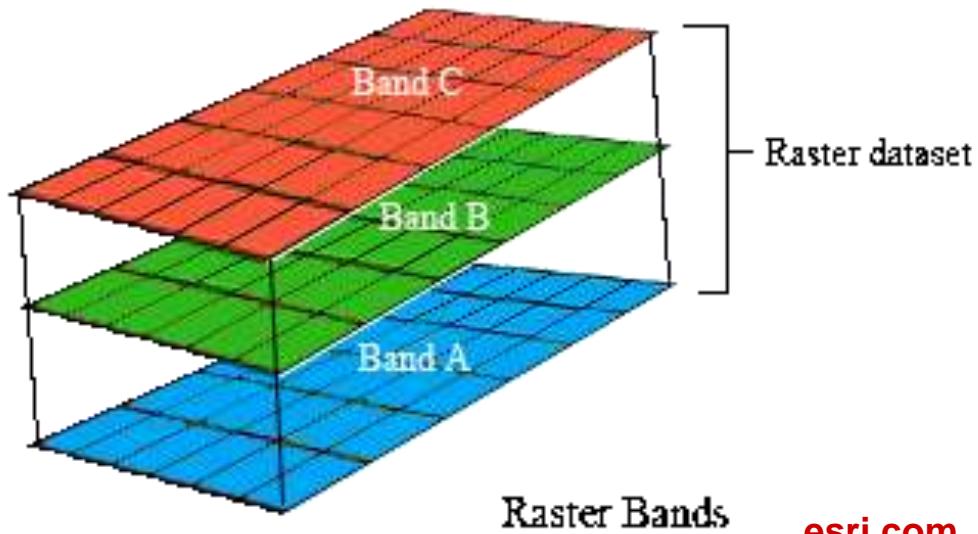
## Shapefile

 PAK_adm0.cpg	8/11/2015 4:58 PM	CPG File	1 KB
 PAK_adm0.dbf	8/11/2015 4:58 PM	DBF File	6 KB
 PAK_adm0.prj	8/11/2015 4:58 PM	PRJ File	1 KB
 PAK_adm0.shp	8/11/2015 4:58 PM	SHP File	1,596 KB
 PAK_adm0.shx	8/11/2015 4:58 PM	SHX File	1 KB

## GeoDatabase

 2015_GAUL_Dataset_Mod.gdb		2/14/2019 11:47 AM	File folder
 a0000000a.gdbindexes		8/31/2016 7:29 AM	GDBINDEXES File 1 KB
 a0000000a.gdbtable		8/31/2016 7:29 AM	GDBTABLE File 265,664 KB
 a0000000a.gdbtblx		8/31/2016 7:29 AM	GDBTABLX File 191 KB
 a0000000a.spx		8/31/2016 7:29 AM	SPX File 585 KB
 a0000000b.gdbindexes		8/31/2016 7:30 AM	GDBINDEXES File 1 KB
 a0000000b.gdbtable		8/31/2016 7:30 AM	GDBTABLE File 110,385 KB
 a0000000b.gdbtblx		8/31/2016 7:30 AM	GDBTABLX File 6 KB
 a0000000b.spx		8/31/2016 7:30 AM	SPX File 5 KB
 a0000000c.gdbindexes		8/31/2016 7:30 AM	GDBINDEXES File 1 KB
 a0000000c.gdbtable		8/31/2016 7:30 AM	GDBTABLE File 1,125 KB
 a0000000c.gdbtblx		8/31/2016 7:30 AM	GDBTABLX File 6 KB
 a0000000c.spx		8/31/2016 7:30 AM	SPX File 5 KB

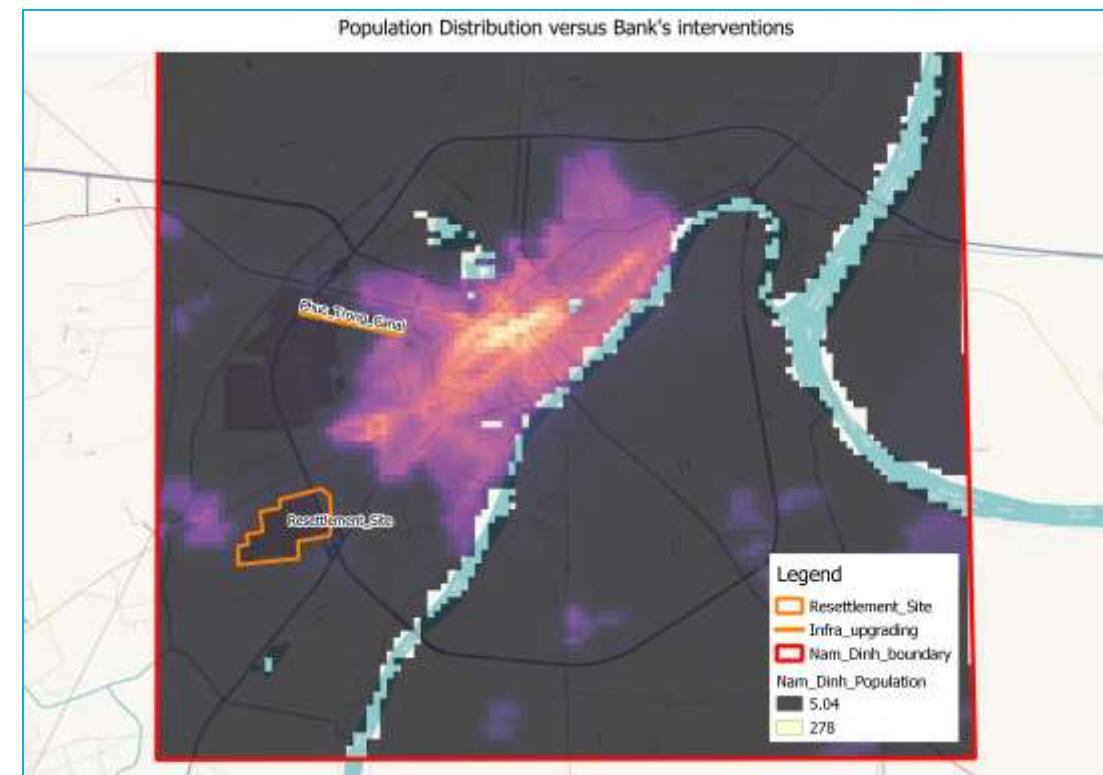
# Raster data has several bands. Typical file type is TIF file.



TIF file

Maputo\_L8\_2018.tif 5/26/2019 11:28 PM TIF File 2,137 KB

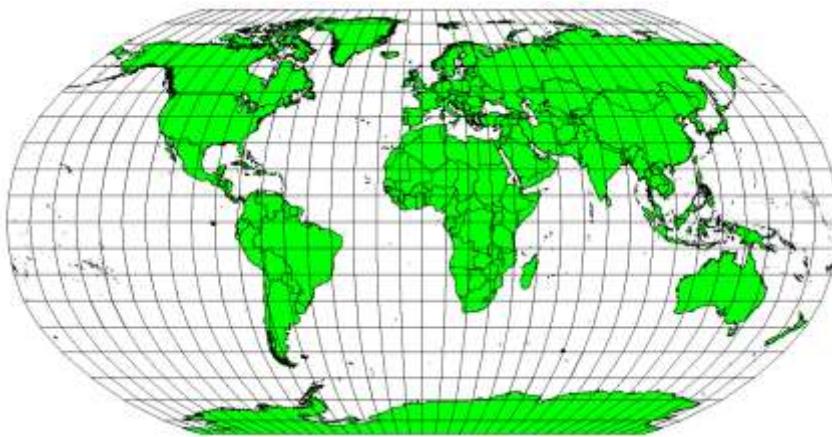
We will not use Raster data in this session.



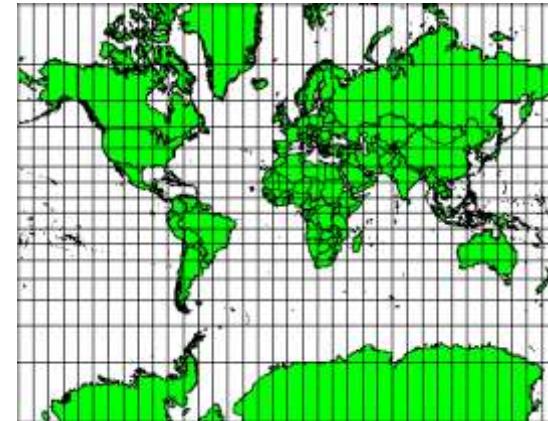
As an example, this map shows population and Bank's interventions. Population dataset is single band raster image, while Bank's interventions are vector data.

# GIS needs Coordinate Reference Systems (CRS)

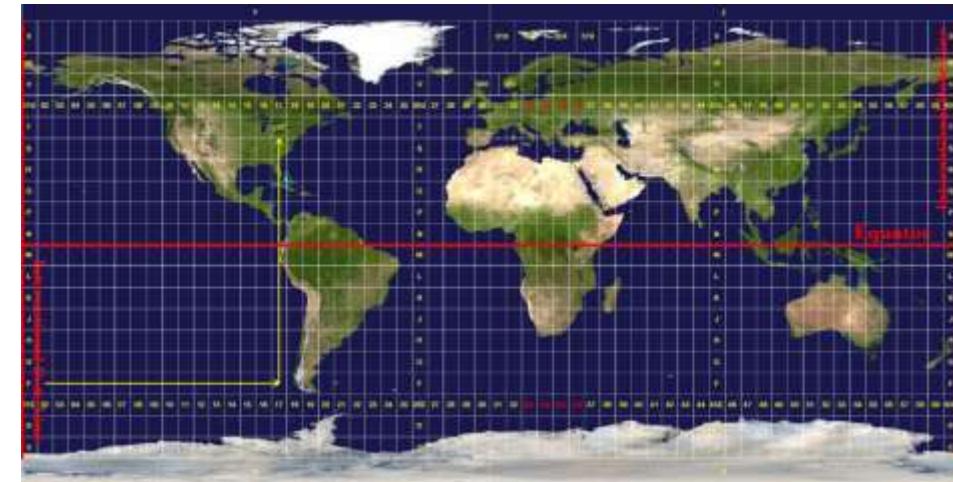
The Robinson projection



The Mercator projection



The Universal Transverse Mercator (UTM)



CRS is divided into Geographic Coordinate Systems (GCS) and Projected Coordinate Reference System (PCS).

The most famous and common projection is

**EPSG:4326 WGS 84**

Source: QGIS documentation

## Good News! QGIS has on-the-fly projection!



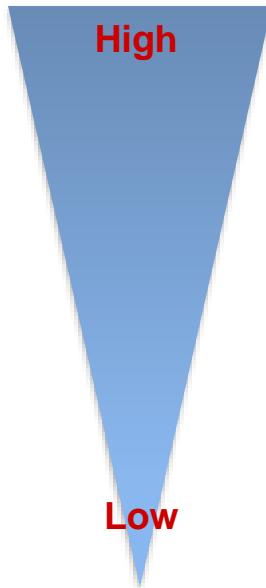
Most likely, your map is projected as EPSG 4326 WGS 84. Projected unit is degree of the globe.

If you would like to use meter or miles, you have to reproject the map, which will not be covered in this session.



# 3 ways to get project map

Accuracy

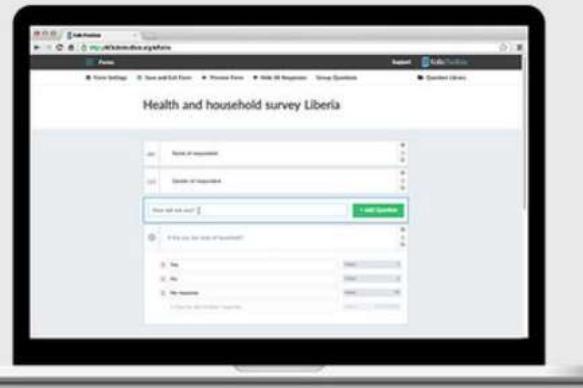


1. Ask TTLs or client if they have geospatial data (shapefile, geodatabase, geojson)
2. Collect GPS data by yourself  
(today's hands-on exercise, very short)
3. Create geospatial data from paper/PDF maps  
(today's hands-on exercise)

# 3 ways to get project map - Collect GPS data by yourself

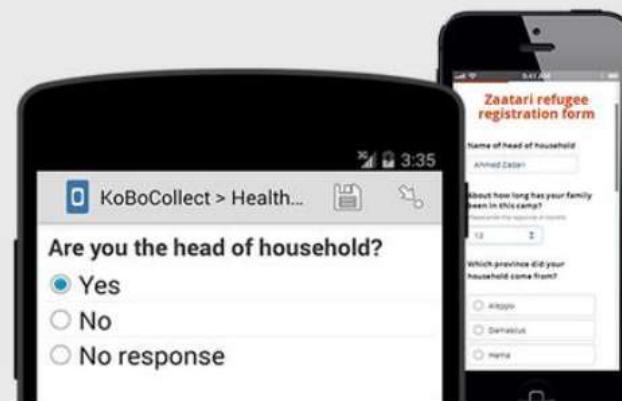
**BEFORE DOING THIS, YOU NEED TO KNOW GEMS.**

**Geo-Enabling initiative for Monitoring and Supervision (GEMS)**



## BUILD FORMS AND REUSE EXISTING QUESTIONS

Easily create survey forms through our intuitive and powerful tool. Store recurring questions in your library or share them with colleagues.



## COLLECT DATA

Quickly and reliably collect your survey data on Android, iOS, and many other devices, online or offline, in any language and with complex skip logic.

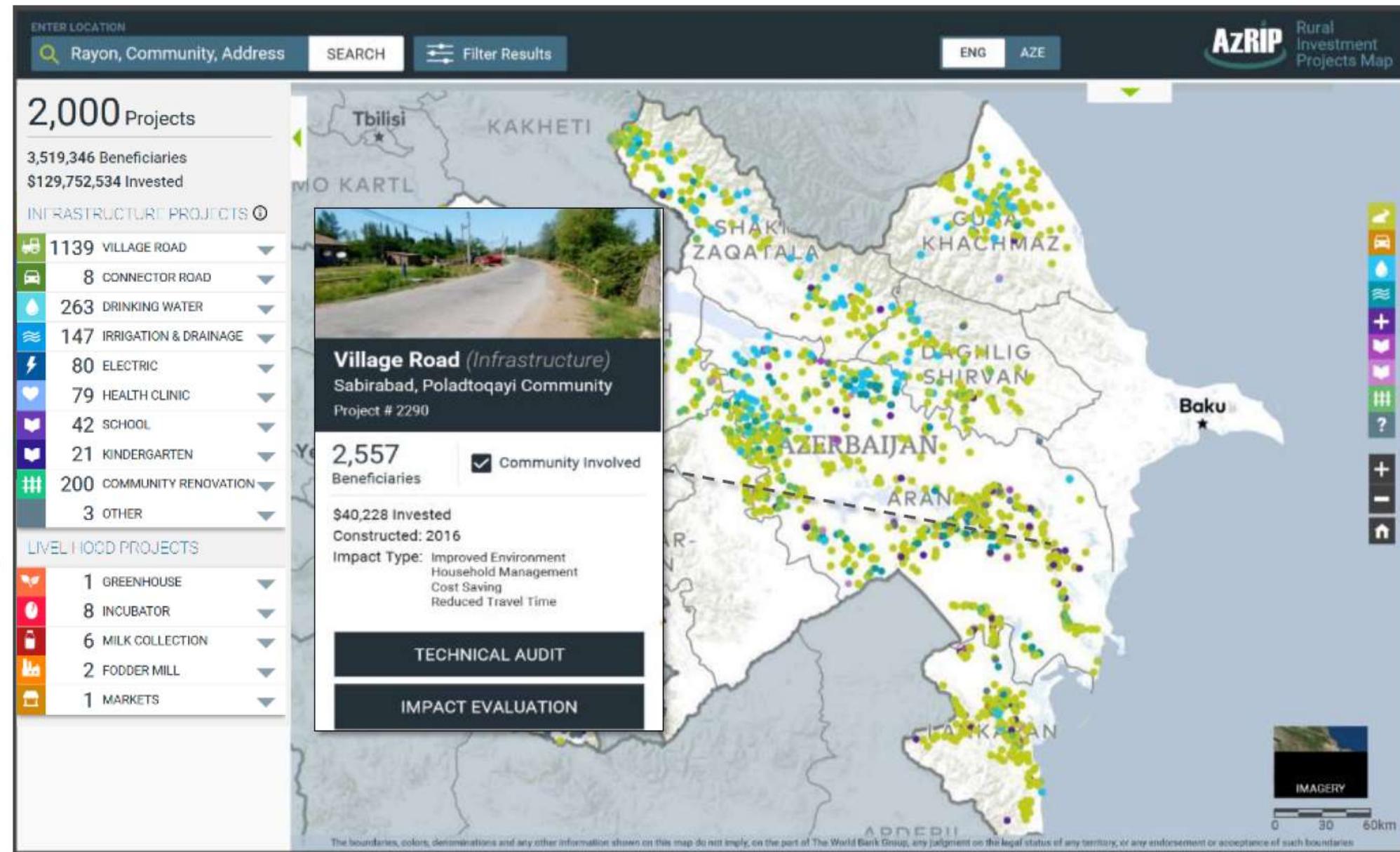


## ANALYZE AND MANAGE DATA

Inspect your data moments after it was collected - or download it for advanced analysis in other software in Excel, CSV, KML, and other formats.

# Geo-Enabling initiative for Monitoring and Supervision (GEMS)

- Remote supervision of implementation
  - Enhanced transparency and accountability
  - Structured monitoring of survey data
  - Real-time tracking of safeguards compliance
  - Coordination across projects and partners
  - Communication and citizen engagement
  - Automatic integration in centralized M&E system and geo-mapping
- Simple & low-cost ICT for improving M&E
- Capacity-building for flexible application



Example of successful application – Azerbaijan Rural Investment Project – see map tool: <http://azrip.net/maps/index.html>

## 3 ways to get project map - Collect GPS data by yourself

- Collect GPS data during your mission.
- Many GPS logger apps are available.
- Introduce [Open GPX Tracker](#)
  - Created to help OpenStreetMap contributors to generate Public GPX traces and as a tool for developers to create real GPX files to test their apps.
  - an open source application
  - Free
  - No ad



[Open GPX Tracker](#) 4+

No ads, no in-app purchases

Juan Manuel Merlos

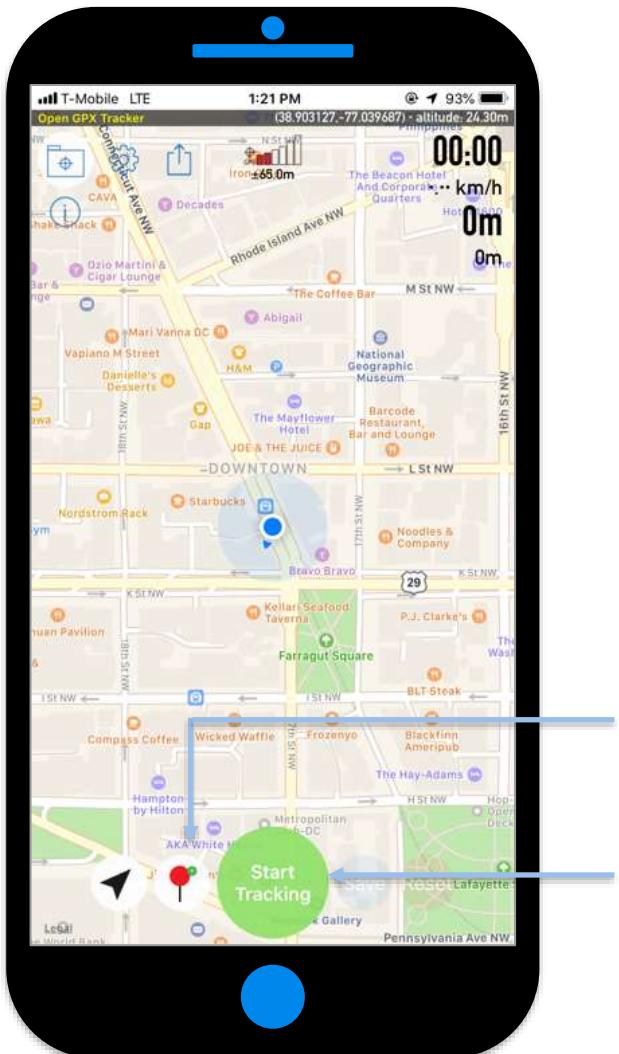
★★★★★ 4.4, 17 Ratings

Free

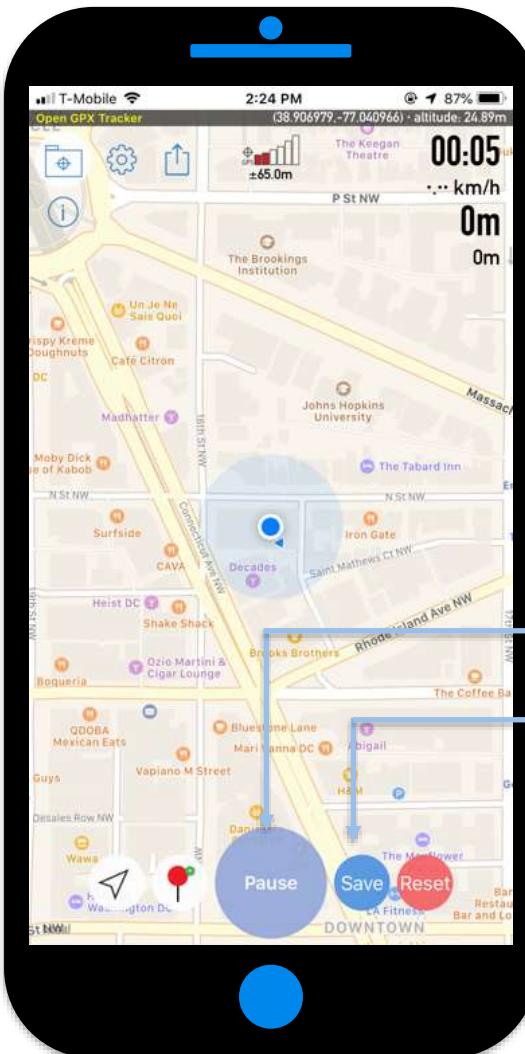
# 3 ways to get project map - Collect GPS data by yourself



[Open GPX Tracker](#)  
No ads, no in-app purchases  
Juan Manuel Merlos  
★★★★★ 4.4, 17 Ratings  
Free



**Waypoint  
(point)**  
**Route  
(Line)**



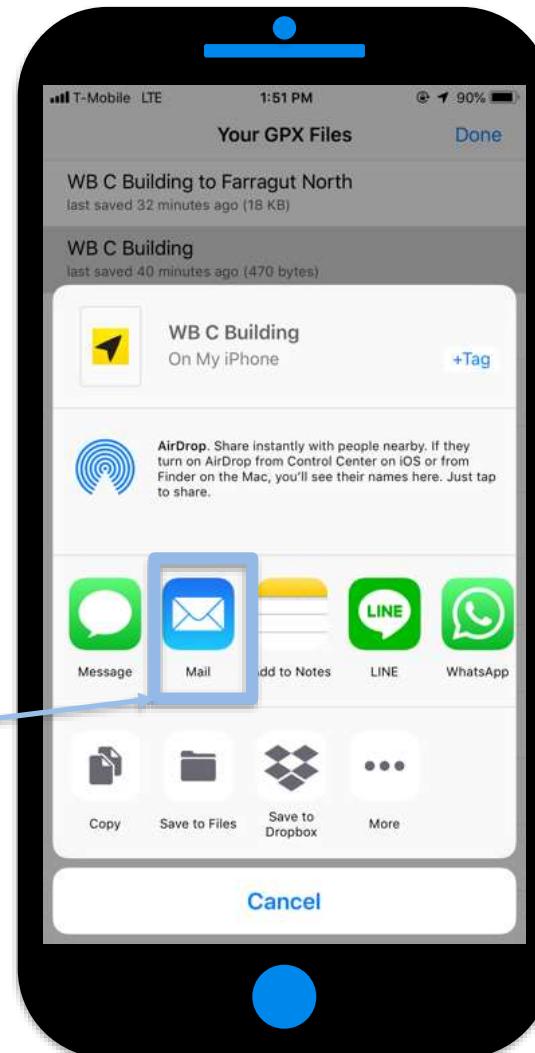
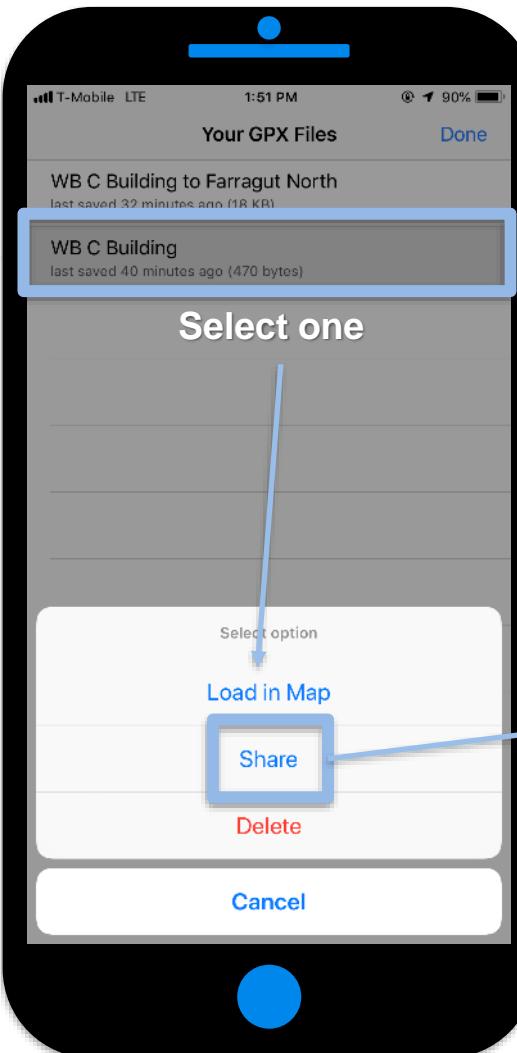
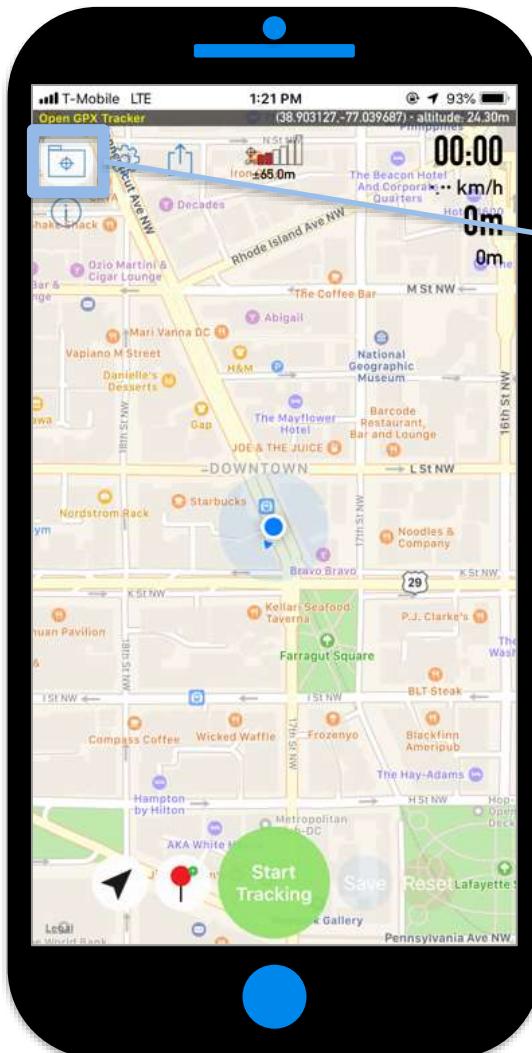
**End logger (Route)**

**Save GPS data**

# 3 ways to get project map - Collect GPS data by yourself

Exercise

## Send your GPS data into your email



Open GPX Tracker  
No ads, no in-app purchases  
Juan Manuel Merlos  
4.4, 17 Ratings  
Free

### To Improve GPS accuracy

- Make sure that you've set the date, time, and time zone correctly
- Keep a clear view in several directions.

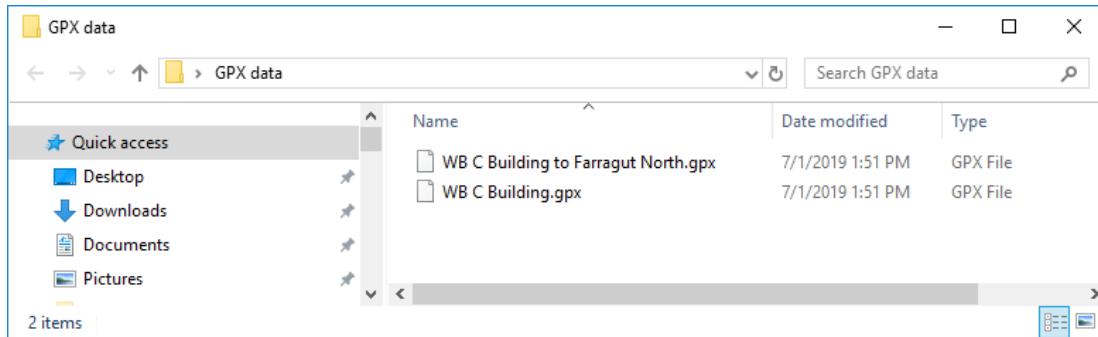
(source:  
<https://support.apple.com/en-us/HT203033>)

# 3 ways to get project map - Collect GPS data by yourself

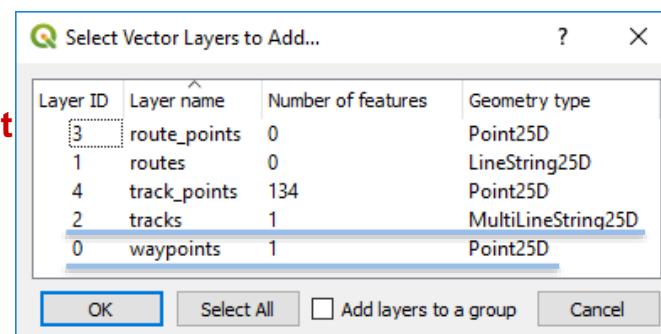


## Projecting your GPS data on QGIS

Your can download your GPS data



QGIS promptly asks you which data type you want to show in the QGIS. Select waypoints or tracks.



# Get base map (geospatial data)

## Administration Boundary

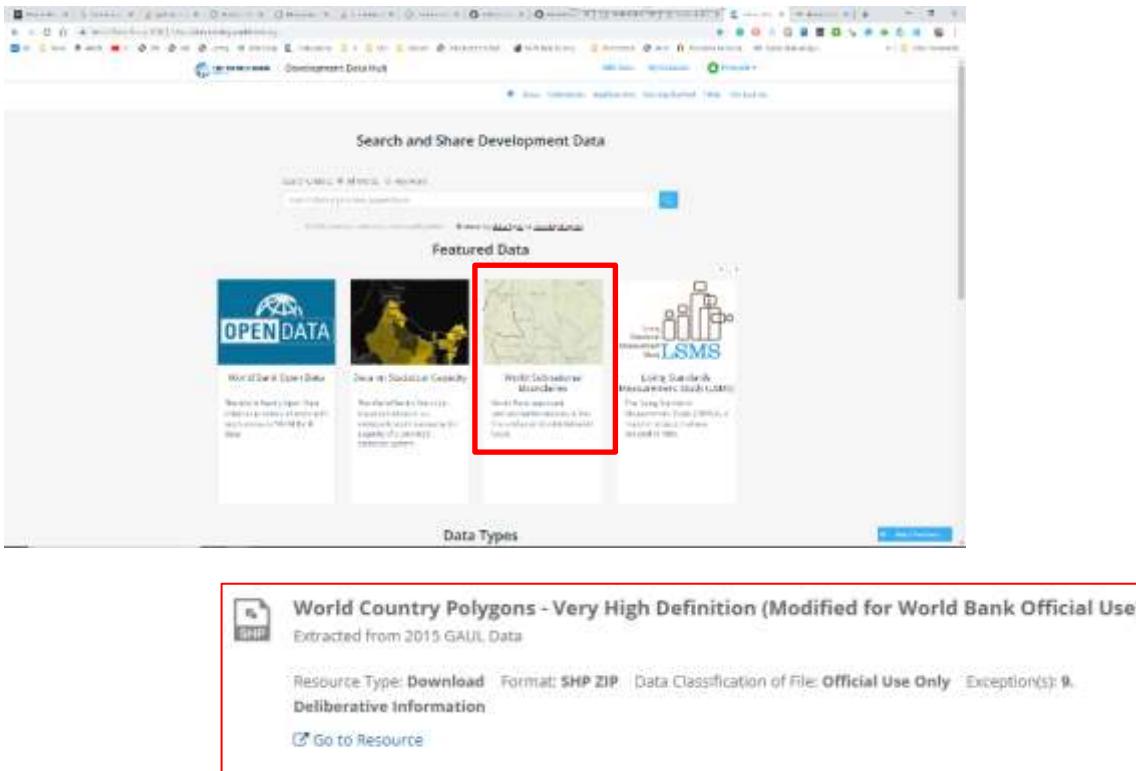
1. World Bank Subnational Boundary (<https://datacatalog.worldbank.org/>)
2. DIVA-GIS (<https://www.diva-gis.org/gdata>)

## Feature Data

1. Development Data Hub (<https://datacatalog.worldbank.org/>)
2. Open Street Map (custom download at <https://extract.bbbike.org/>)
3. The Humanitarian Data Exchange (<https://data.humdata.org/dataset>)

# Get base map (geospatial data) – Administration Boundary

## WB Subnational Boundary

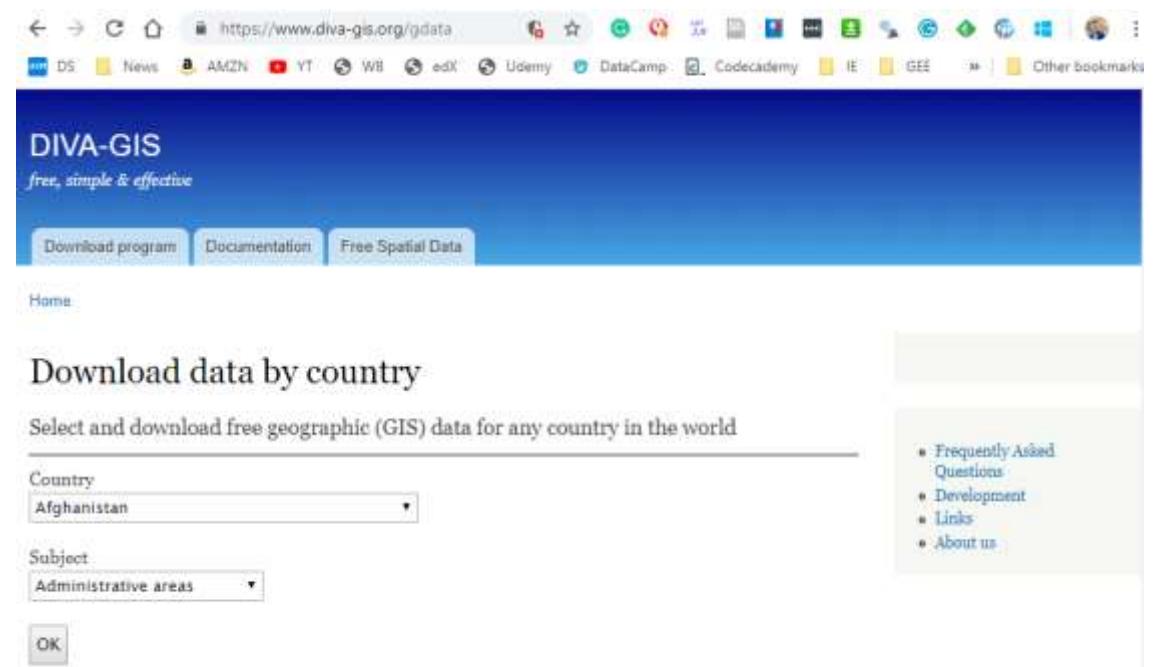


The screenshot shows the World Bank Data Catalog interface. In the 'Featured Data' section, there is a thumbnail for 'World Subnational Boundaries' which is highlighted with a red box. Below this, a detailed view of the dataset is shown with the following information:

- World Country Polygons - Very High Definition (Modified for World Bank Official Use)**
- Extracted from 2015 GADM Data
- Resource Type: Download
- Format: SHP ZIP
- Data Classification of File: Official Use Only
- Exception(s): 9.
- Deliberative Information
- Go to Resource

<https://datacatalog.worldbank.org/>

## DIVA-GIS



The screenshot shows the DIVA-GIS website. At the top, there is a navigation bar with links for 'Download program', 'Documentation', and 'Free Spatial Data'. Below this is a search bar labeled 'Home'. A main heading says 'Download data by country'. To the right, there is a sidebar with a list of links:

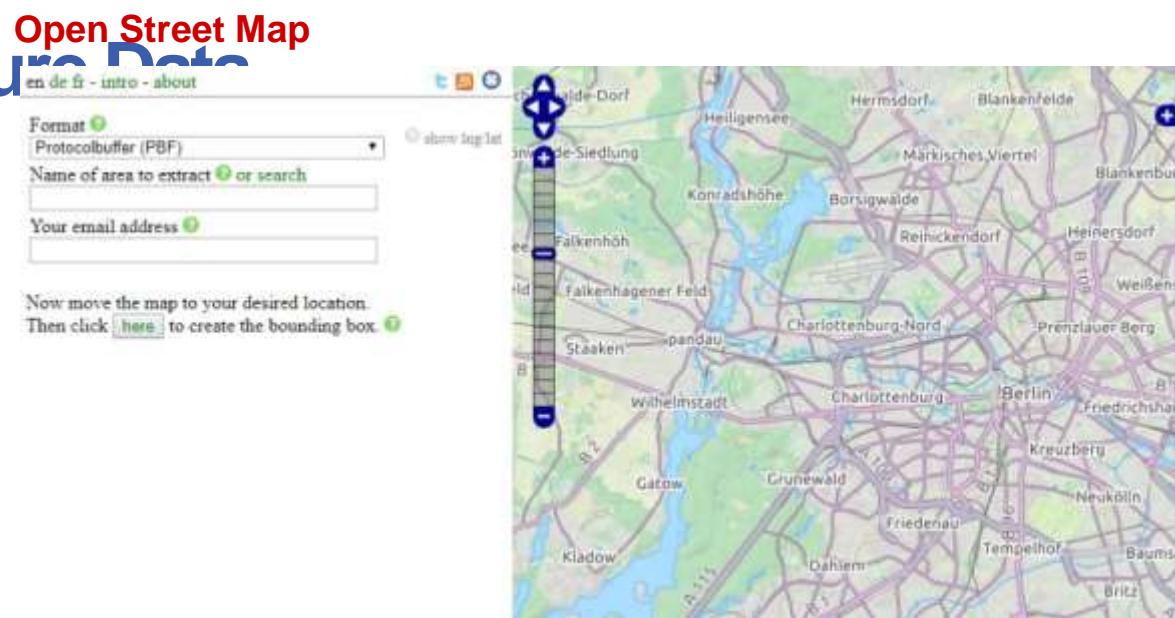
- Frequently Asked Questions
- Development
- Links
- About us

<https://www.diva-gis.org/gdata>

# Get base map (geospatial data) – Feature Data

# Development Data Hub

The screenshot shows the Development Data Hub interface. On the left, there's a sidebar titled "REFINED BY" with various filters like License, Data Classification, Data Type (selected as Geospatial), Country, VPU, Resource Type, Languages Supported, Periodicity, Rating, and Collections. The "Data Type" section is highlighted with a red box. In the center, there's a search bar with "Search Criteria: All Words" selected. Below it is a search input field with placeholder text "Search data e.g Income, Expenditure" and a magnifying glass icon. Underneath the search bar, there are tabs for "All", "Datasets", "Indicators", and "Visualizations", with "All" being the active tab. To the right, there are sorting options: "Sort By: Most Relevant", "Alphabetical", and "Last Updated" (which is underlined). A message says "Showing 1 - 10 of 1280 results". The main content area features a dataset card for "Nigeria - Jigawa State Settlement Dataset" with a CC logo, a thumbnail image, and a detailed description: "Data on Nigeria Settlement Location and Distribution downloaded from the The Bill & Melinda Gates Foundation Vaccination Tracking System (VTS). To learn more about the VTS project, please visit <http://vts.eocng.org/Home/About...>". It also includes "See More", "Data Type: Geospatial", "Unit: GEE", "Periodicity: Periodicity not specified", "Last Updated: Jun 04, 2019", "Publisher: Shaky", "Sherpa", and "Access Options: Download".



# Humanitarian Data Exchange

The screenshot shows the OpenStreetMap Data (HDX) homepage. At the top, there's a navigation bar with links for 'DATA', 'LOCATIONS', 'ORGANISATIONS', 'QUICKLINKS', 'FAQ', 'Log In', and 'Sign up'. Below the navigation is a search bar with the placeholder 'Search Datasets...'. To the right of the search bar is a red button labeled 'ADD DATA'. The main content area has a header 'Data [17]' and a search input field. Below this, there are two dataset cards:

- OpenStreetMap GIS data on Guinea, Liberia, and Sierra Leone**  
800B  
1000+ Downloads  
Updated June 3, 2020 | Dataset date: Jan 1, 2019 - Jun 1, 2019  
This dataset is updated: Never
- Cox's Bazar District - Refugee Camp Shelter/Infrastructure Programmatic January...**  
REACH Initiative  
400+ Downloads  
Updated May 8, 2020 | Dataset date: May 7, 2020  
This dataset is updated: As needed

On the left side, there are two sidebar sections: 'FEATURED' and 'LICENSING'. The 'FEATURED' sidebar contains links for 'CODE', 'sub-national', 'Geodata', 'Datasets on request (HDX)', 'Connected', 'Datasets with Quick Charts', 'Datasets with Stimulus', and 'Datasets with HQ tags'. The 'LICENSING' sidebar contains links for 'Bangladesh' and 'Democratic People's Republic of Korea'.

# Download Vietnam Administration Boundary (1/3)

- Google “diva gis shapefile”

The screenshot shows a Google search results page. The search bar contains the query "diva gis shapefile". Below the search bar, the "All" button is highlighted, followed by "Images", "Videos", "News", "Maps", and "More". To the right are "Settings" and "Tools" buttons. A microphone icon and a magnifying glass icon are also present. Below the navigation bar, it says "About 15,500 results (0.39 seconds)". The first result is a purple link titled "Download data by country | DIVA-GIS" with the URL "https://www.diva-gis.org/gdata". Below the link, there is a snippet of text: "Vector data are stored as ESRI shapefiles Grid (raster) data are stored as DIVA gridfiles. Each "shapefile" consist of at least three actual files. This is a commonly ...". There are also two other snippets below: "Population: Population density (old)" and "Elevation: SRTM30 dataset: CGIAR-SRTM data ...".

## Download Vietnam Administration Boundary (2/3)

**DIVA-GIS**  
*free, simple & effective*

Download program Documentation Free Spatial Data

Home

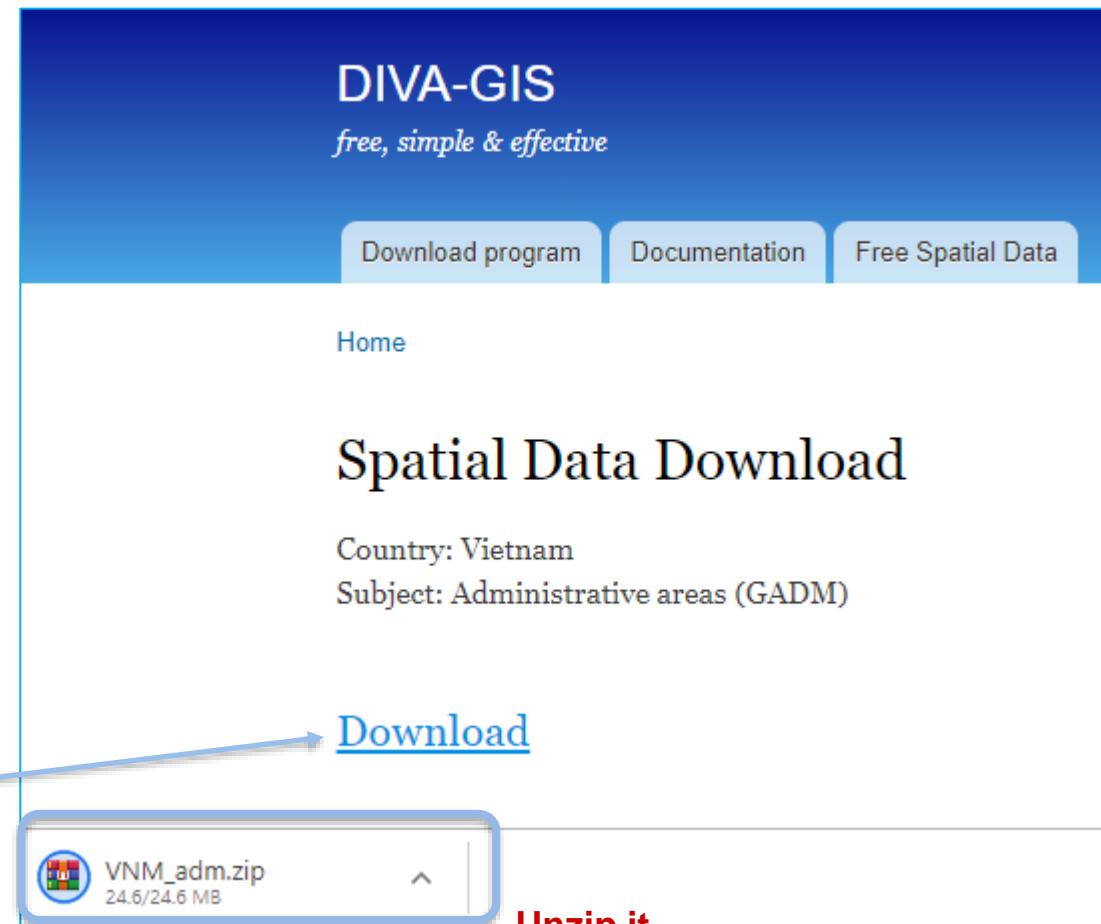
### Download data by country

Select and download free geographic (GIS) data for any country in the world

Country: **Vietnam**

Subject: **Administrative areas**

**OK**



# Download Vietnam Administration Boundary (3/3)

Make sure unzipping zip file

Name	Date modified	Type	Size
license.txt	8/13/2015 1:01 AM	Text Document	1 KB
VNM_adm0.cpg	8/11/2015 5:06 PM	CPG File	1 KB
VNM_adm0.csv	8/11/2015 6:56 PM	Microsoft Excel C...	2 KB
VNM_adm0.dbf	8/11/2015 5:06 PM	DBF File	6 KB
VNM_adm0.prj	8/11/2015 5:06 PM	PRJ File	1 KB
VNM_adm0.shp	8/11/2015 5:06 PM	SHP File	3,557 KB
VNM_adm0.shx	8/11/2015 5:06 PM	SHX File	1 KB
VNM_adm1.cpg	8/11/2015 5:27 PM	CPG File	1 KB
VNM_adm1.csv	8/11/2015 8:45 PM	Microsoft Excel C...	6 KB
VNM_adm1.dbf	8/11/2015 5:27 PM	DBF File	30 KB
VNM_adm1.prj	8/11/2015 5:27 PM	PRJ File	1 KB
VNM_adm1.shp	8/11/2015 5:27 PM	SHP File	7,044 KB
VNM_adm1.shx	8/11/2015 5:27 PM	SHX File	1 KB
VNM_adm2.cpg	8/11/2015 5:46 PM	CPG File	1 KB
VNM_adm2.csv	8/11/2015 11:36 PM	Microsoft Excel C...	69 KB
VNM_adm2.dbf	8/11/2015 5:46 PM	DBF File	388 KB
VNM_adm2.prj	8/11/2015 5:46 PM	PRJ File	1 KB
VNM_adm2.shp	8/11/2015 5:46 PM	SHP File	15,274 KB
VNM_adm2.shx	8/11/2015 5:46 PM	SHX File	6 KB
VNM_adm3.cpg	8/11/2015 5:57 PM	CPG File	1 KB
VNM_adm3.csv	8/12/2015 10:21 AM	Microsoft Excel C...	1,190 KB
VNM_adm3.dbf	8/11/2015 5:57 PM	DBF File	6,532 KB
VNM_adm3.prj	8/11/2015 5:57 PM	PRJ File	1 KB
VNM_adm3.shp	8/11/2015 5:57 PM	SHP File	46,278 KB
VNM_adm3.shx	8/11/2015 5:57 PM	SHX File	85 KB

25 items | 1 item selected 246 bytes



**Don't delete any file!**

**Shapefile is composed by multiple files (.cpg, .dbf, .prj, .shp, .shx)**

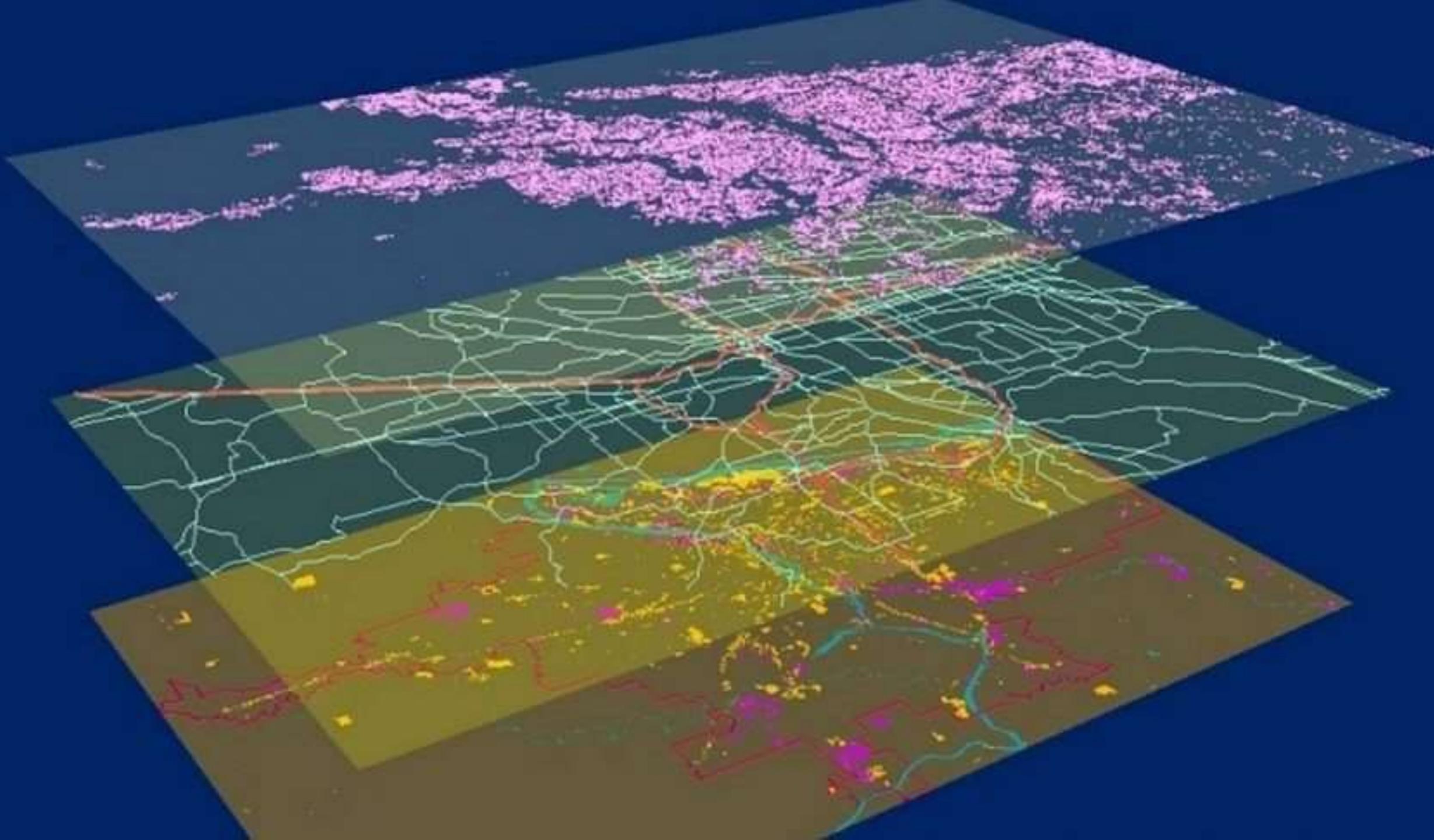
**Definition of admin boundaries differs by countries.**

**In Vietnam,**

- **ADM0: Country**
- **ADM1: Province**
- **ADM2: District**
- **ADM3: Township/Commune**

**For admin boundaries in other countries, check:**

[https://en.wikipedia.org/wiki/List\\_of\\_administrative\\_divisions\\_by\\_country](https://en.wikipedia.org/wiki/List_of_administrative_divisions_by_country)



# Installing QGIS

<https://qgis.org/en/site/forusers/download.html>

Download for Windows

QGIS in OSGeo4W:

-  [OSGeo4W Network Installer \(64 bit\)](#)
-  [OSGeo4W Network Installer \(32 bit\)](#)

In the installer choose **Desktop Express Install** and select **QGIS** to install the latest release.  
To get the long term release (that is not also the latest release) choose **Advanced Install** and select **qgis-ltr-full**.  
To get the bleeding-edge development build choose **Advanced Install** and select **qgis-dev-full**.

Standalone Installers from OSGeo4W packages

Latest release (richest on features):

-  [QGIS Standalone Installer Version 3.8 \(64 bit\)](#)
-  md5
-  [QGIS Standalone Installer Version 3.8 \(32 bit\)](#)
-  md5

Download for Mac OS X

Mac Installer Packages for macOS El Capitan (10.11) and newer.

Installation instructions are in the Read Me on the disk image. These packages use the [python.org Python 3](#), version 3.6, the "macosx10.9" build - other distributions are not supported. Install Python before installing QGIS.

Additional GDAL format plugins and PROJ grids are available at [kyngchaos.com](#)

Latest release (richest on features):

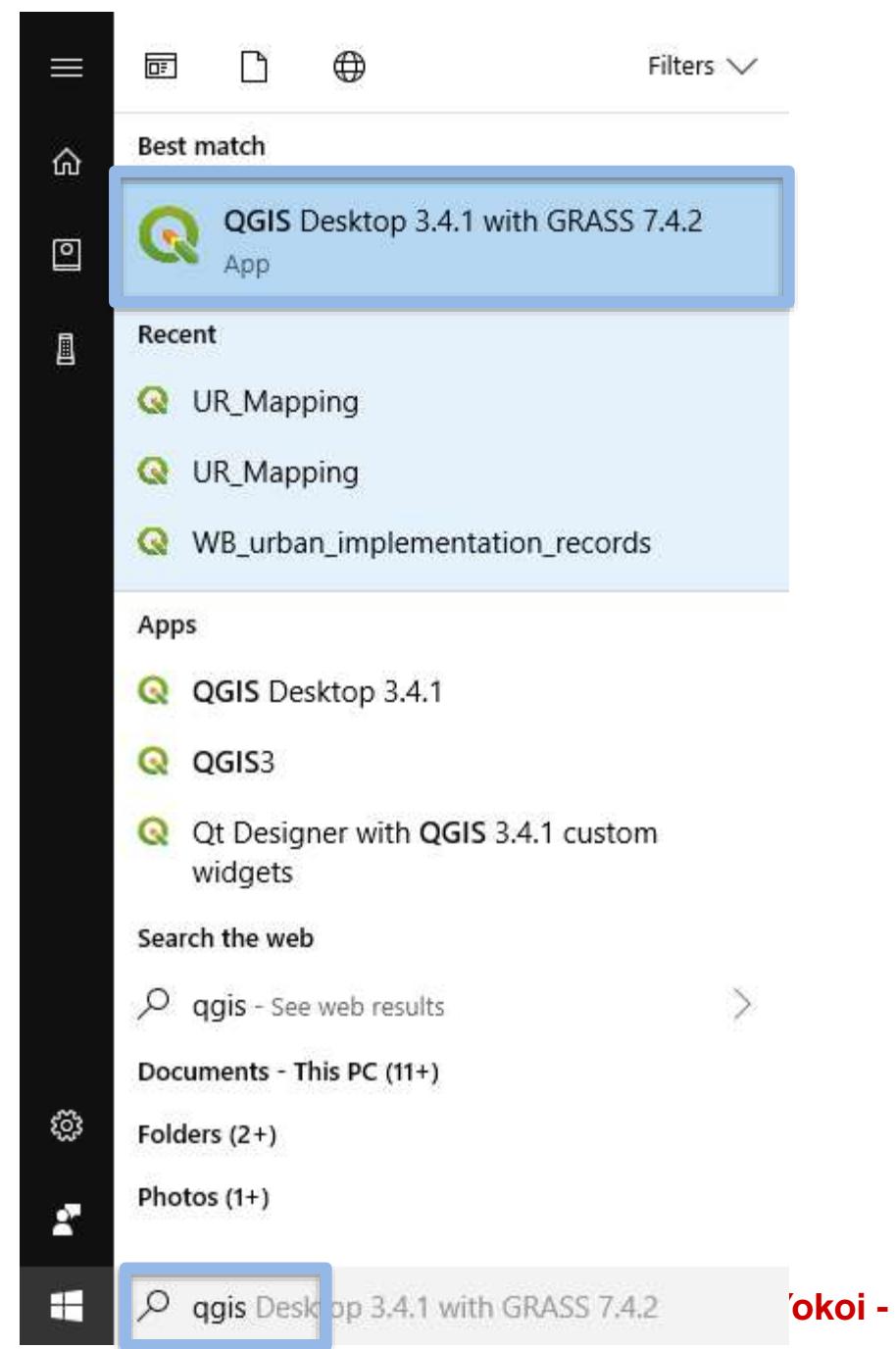
-  [QGIS macOS Installer Version 3.6.3](#)

Long term release (most stable):

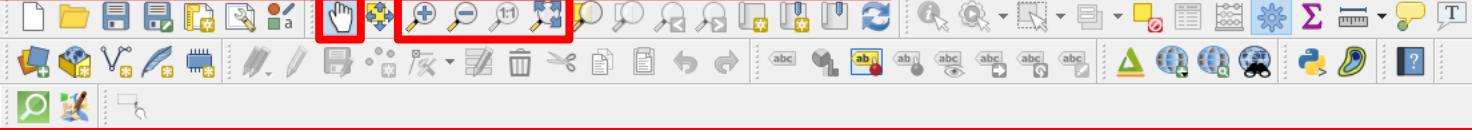
-  [QGIS macOS Installer Version 3.4.8](#)

# Launch QGIS

- Type “qgis” in your windows
- It takes a while to open QGIS



## Toolbar



## Browser

**Browser**

- ▼ Favorites
  - > Desktop
  - > Geospatial
  - > Home
- ▼ C:\
  - > ado
  - > Intel
  - > OSGeo4W64
  - > PerfLogs
  - > Program Files
  - > Program Files (x86)
  - > PwrMgmt
  - > Temp
  - > Users
  - > WBG
  - > Windows
- > G:\
- > M:\
- > O:\
- > Q:\
- GeoPackage
- SpatialLite

**Layers**

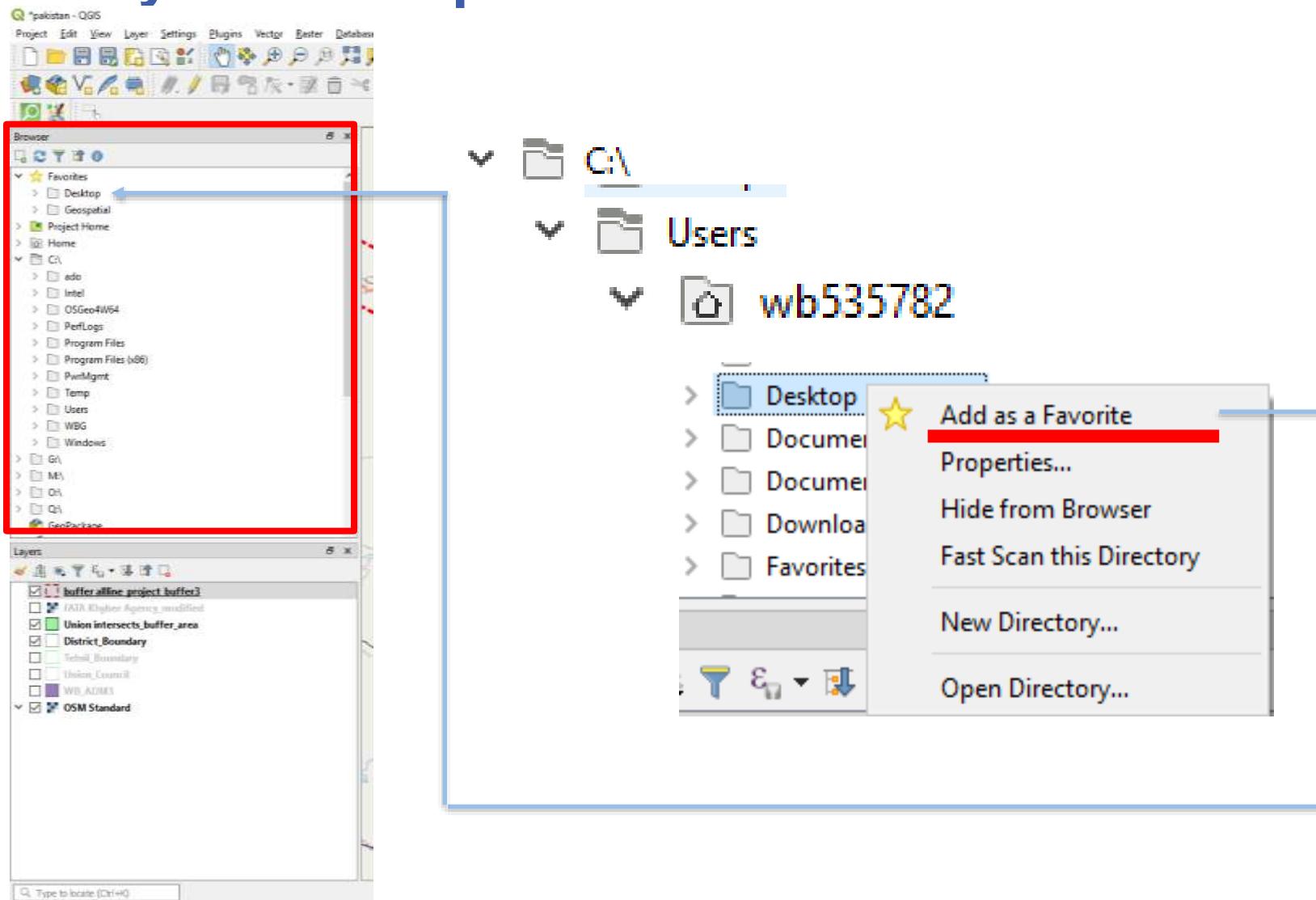
## Main Window

**Processing Toolbox**

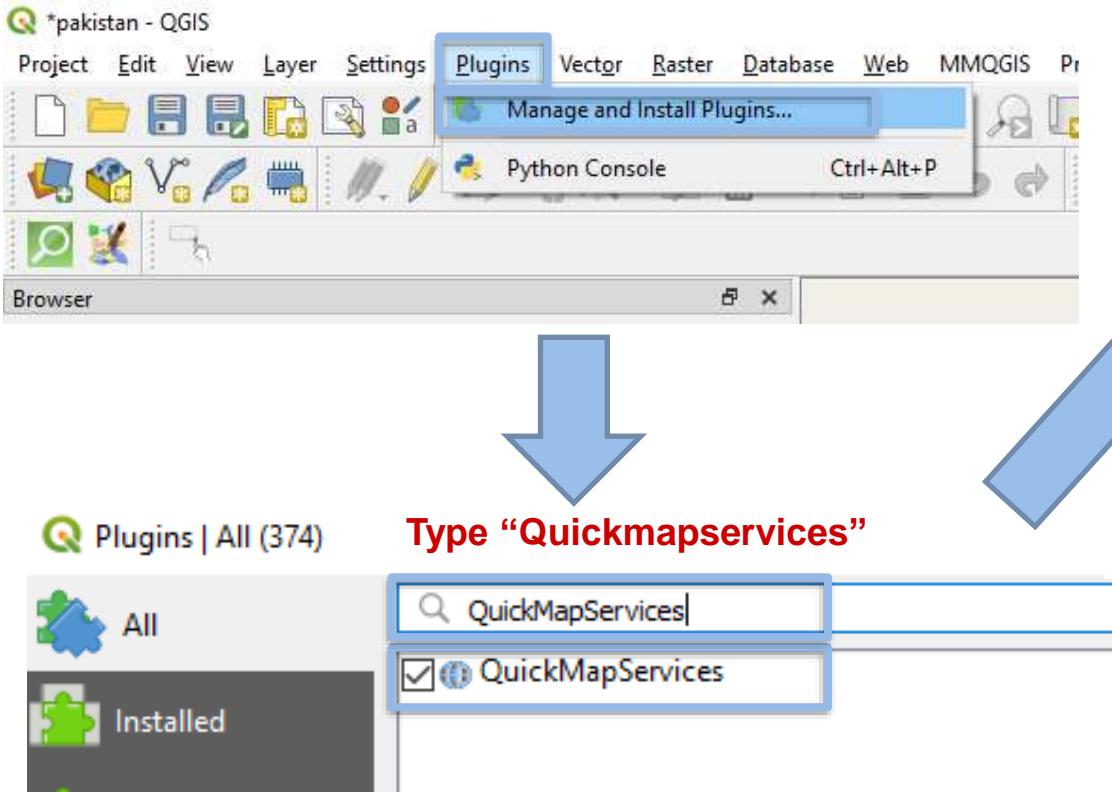
- Recently used
- Cartography
- Database
- File tools
- Graphics
- Interpolation
- Layer tools
- Network analysis
- Raster analysis
- Raster terrain analysis
- Raster tools
- Vector analysis
- Vector creation
- Vector general
- Vector geometry
- Vector overlay
- Vector selection
- Vector table
- Contour plugin
- GDAL
- GRASS
- Qgis2threejs
- SAGA

CRS

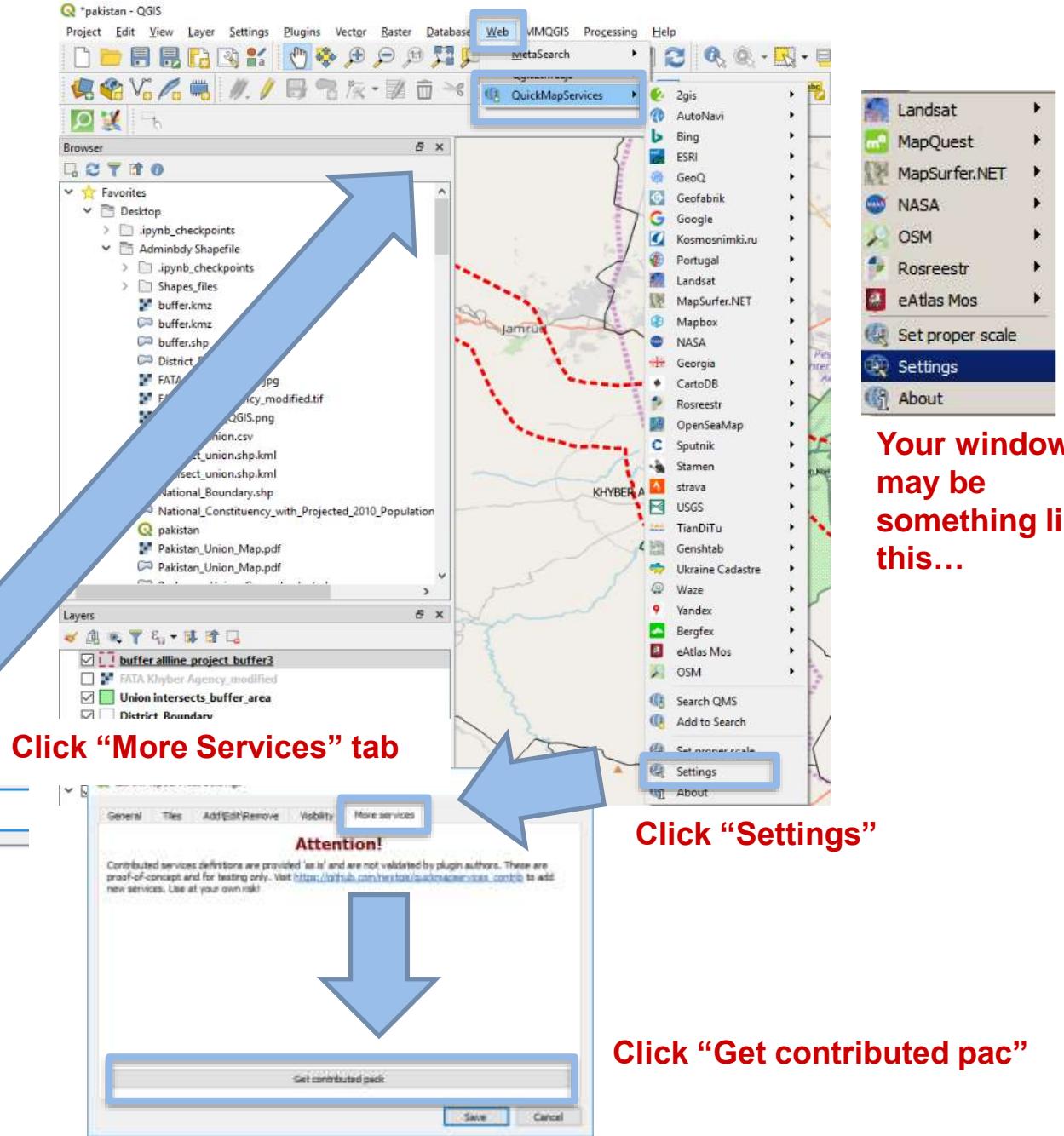
# Connect your Desktop to Favorite



# Add webmap services



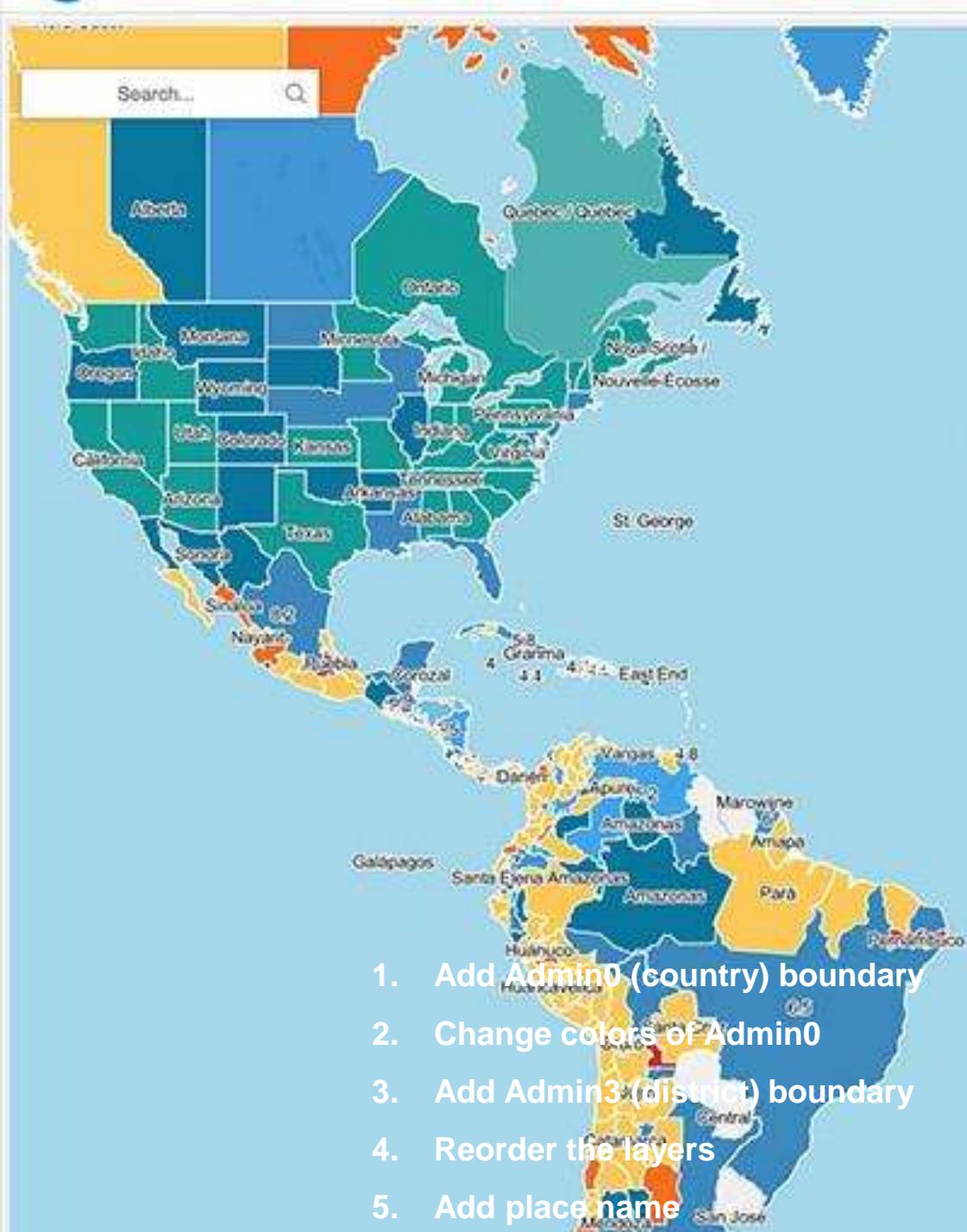
Type “Quickmapservices”



Click “More Services” tab

Click “Settings”

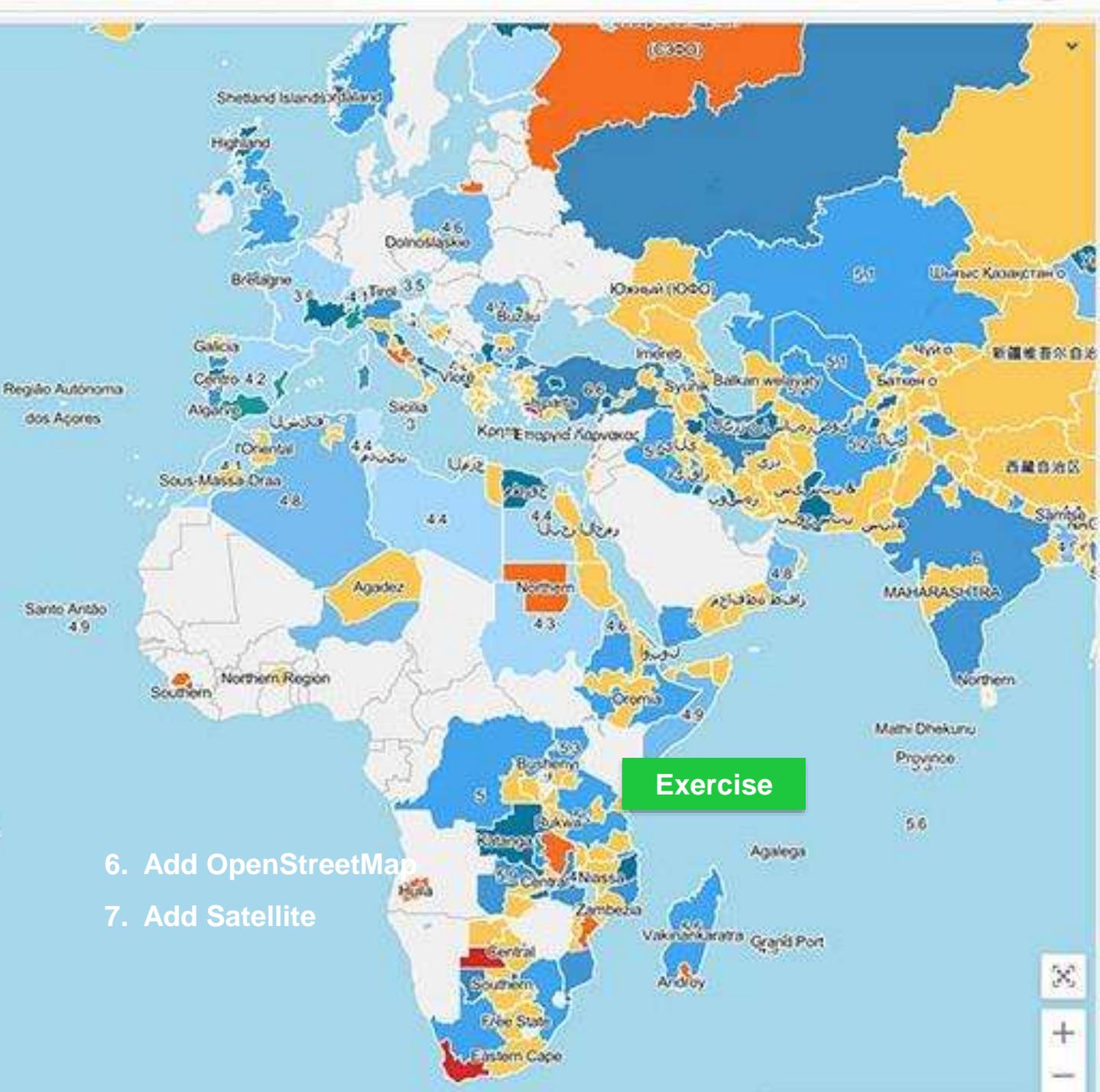
Click “Get contributed pac”



- 

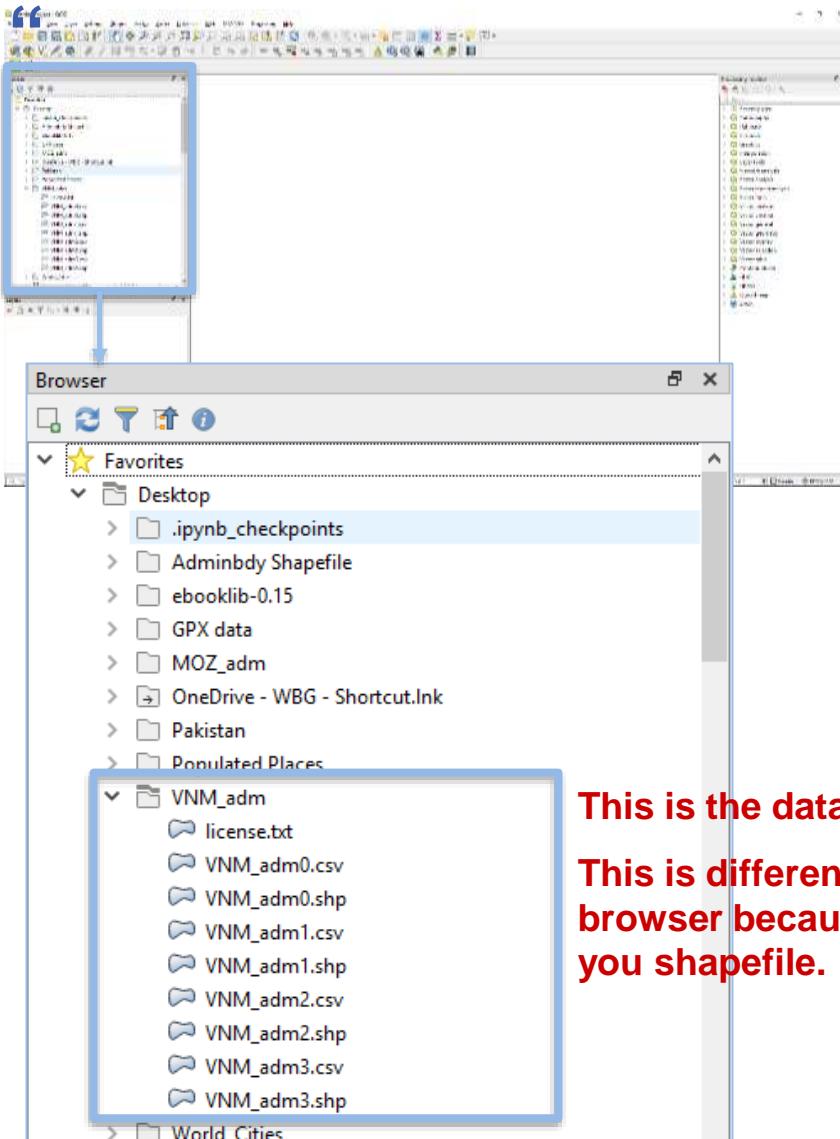
A map of Costa Rica showing administrative divisions. The country is divided into provinces, which are further subdivided into districts. Major cities like San José, Heredia, Alajuela, Cartago, and Liberia are labeled. The map uses a color-coded system where each province has a distinct color.

  1. Add Admin0 (country) boundary
  2. Change colors of Admin0
  3. Add Admin3 (district) boundary
  4. Reorder the layers
  5. Add place name



## Exercise

# Look at your “Browser” Go to “Favorite” > “Desktop” > “VNM\_adm”



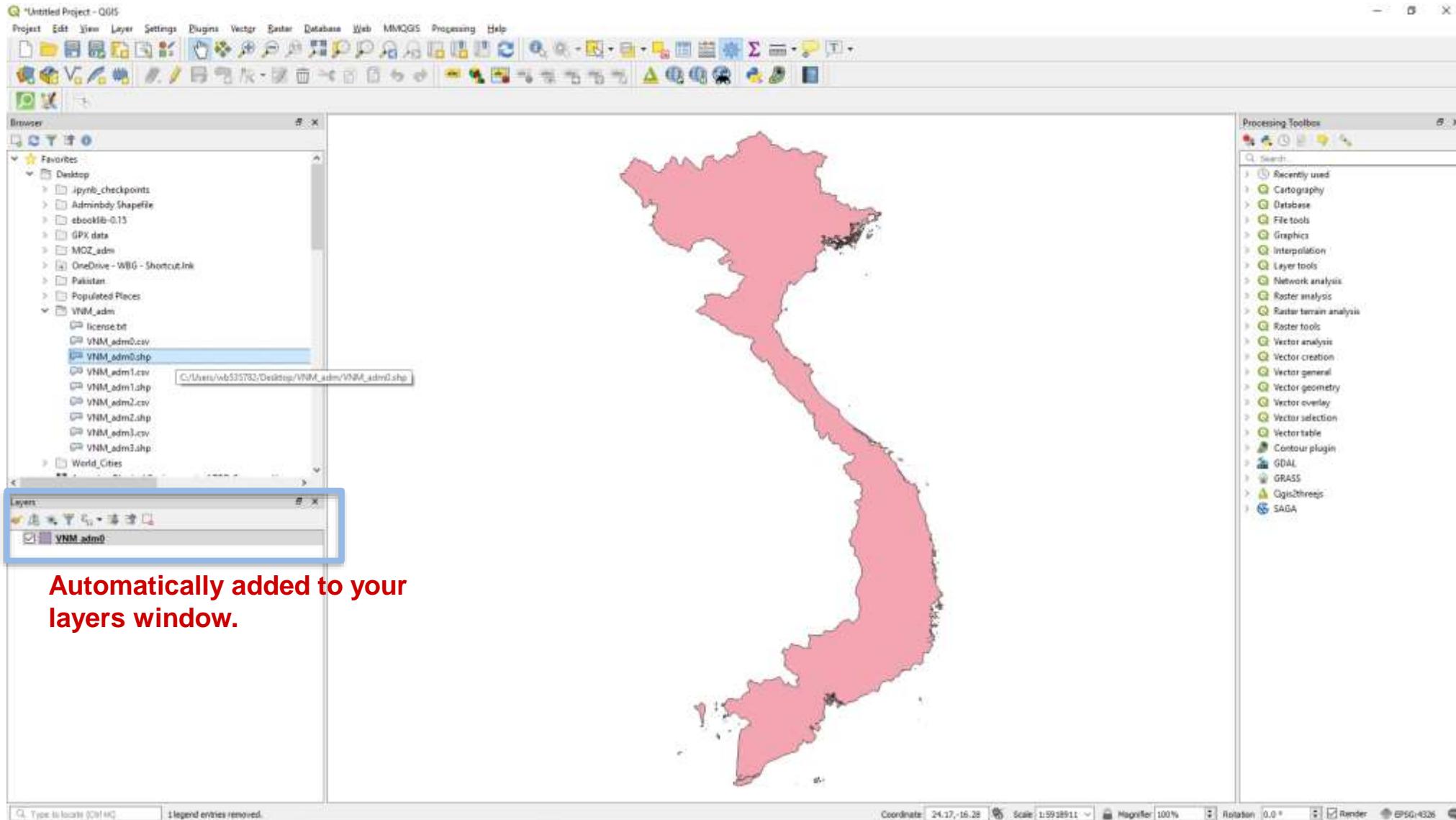
This is the data folder of VNM\_adm.

This is different from your windows browser because QGIS can only show you shapefile.

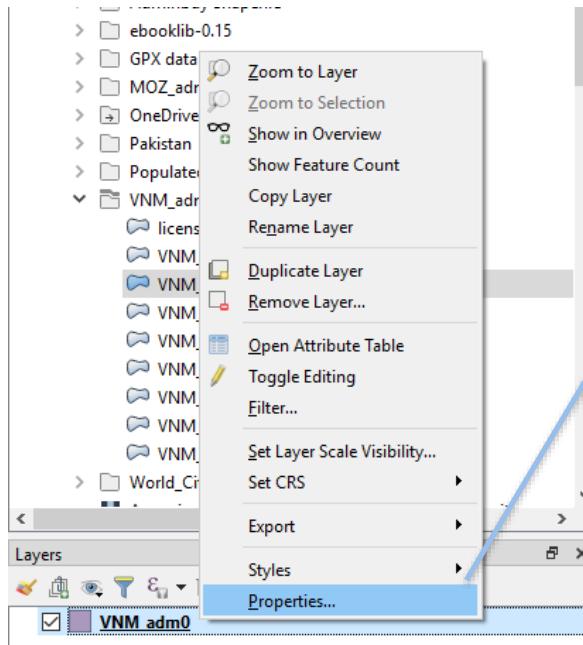
Name	Date modified	Type	Size
license.txt	8/13/2015 1:01 AM	Text Document	1 KB
VNM_adm0.cpg	8/11/2015 5:06 PM	CPG File	1 KB
VNM_adm0.csv	8/11/2015 6:56 PM	Microsoft Excel C...	2 KB
VNM_adm0.dbf	8/11/2015 5:06 PM	DBF File	6 KB
VNM_adm0.prj	8/11/2015 5:06 PM	PRJ File	1 KB
VNM_adm0.shp	8/11/2015 5:06 PM	SHP File	3,557 KB
VNM_adm0.shx	8/11/2015 5:06 PM	SHX File	1 KB
VNM_adm1.cpg	8/11/2015 5:27 PM	CPG File	1 KB
VNM_adm1.csv	8/11/2015 8:45 PM	Microsoft Excel C...	6 KB
VNM_adm1.dbf	8/11/2015 5:27 PM	DBF File	30 KB
VNM_adm1.prj	8/11/2015 5:27 PM	PRJ File	1 KB
VNM_adm1.shp	8/11/2015 5:27 PM	SHP File	7,044 KB
VNM_adm1.shx	8/11/2015 5:27 PM	SHX File	1 KB
VNM_adm2.cpg	8/11/2015 5:46 PM	CPG File	1 KB
VNM_adm2.csv	8/11/2015 11:36 PM	Microsoft Excel C...	69 KB
VNM_adm2.dbf	8/11/2015 5:46 PM	DBF File	388 KB
VNM_adm2.prj	8/11/2015 5:46 PM	PRJ File	1 KB
VNM_adm2.shp	8/11/2015 5:46 PM	SHP File	15,274 KB
VNM_adm2.shx	8/11/2015 5:46 PM	SHX File	6 KB
VNM_adm3.cpg	8/11/2015 5:57 PM	CPG File	1 KB
VNM_adm3.csv	8/12/2015 10:21 AM	Microsoft Excel C...	1,190 KB
VNM_adm3.dbf	8/11/2015 5:57 PM	DBF File	6,532 KB
VNM_adm3.prj	8/11/2015 5:57 PM	PRJ File	1 KB
VNM_adm3.shp	8/11/2015 5:57 PM	SHP File	46,278 KB
VNM_adm3.shx	8/11/2015 5:57 PM	SHX File	85 KB

1. Add Admin0 (country) boundary
2. Change colors of Admin0
3. Add Admin3 (district) boundary
4. Reorder the layers
5. Add place name
6. Add OpenStreetMap
7. Add Satellite

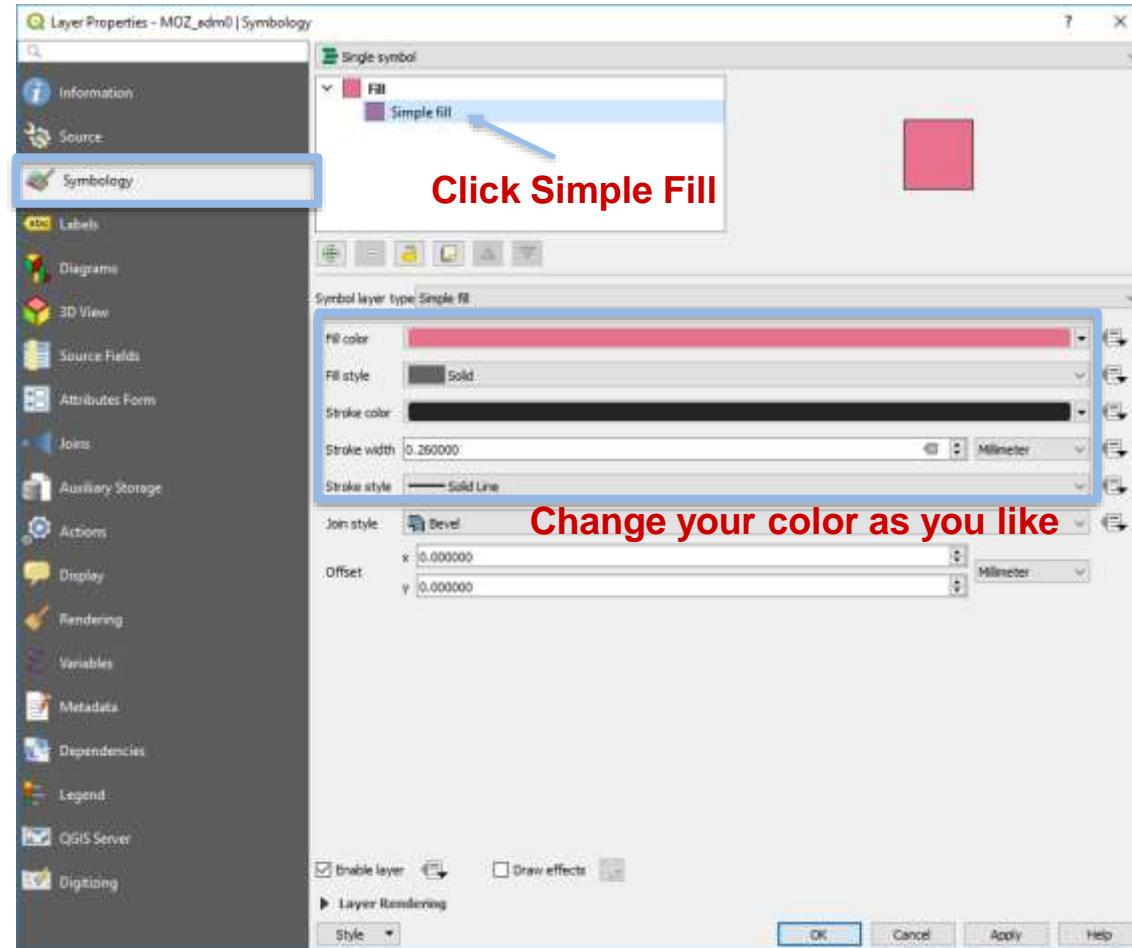
# Double click your “VNM\_adm0.shp” file



# Show “Layer Properties”, go to “Symbology”, and select “Simple Fill”



- Double Click your “VNM\_adm0” OR
- Right click your “VNM\_adm0” and select “Properties”



1. Add Admin0 (country) boundary
2. Change colors of Admin0
3. Add Admin3 (district) boundary
4. Reorder the layers
5. Add place name
6. Add OpenStreetMap
7. Add Satellite



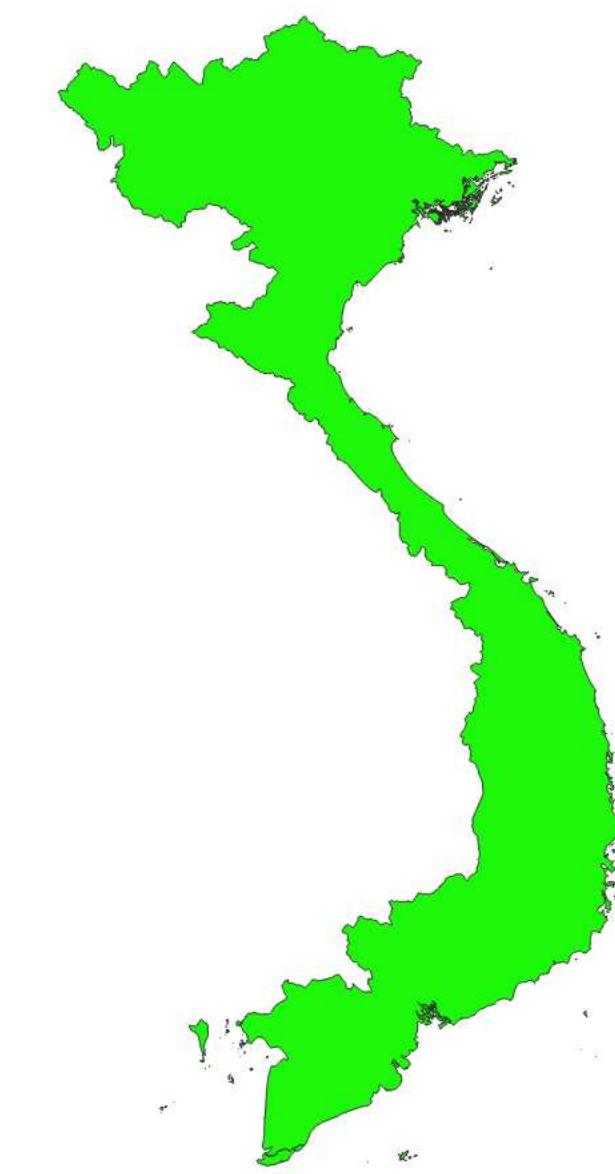
## Browser

Favorites

- Desktop
  - .ipynb\_checkpoints
  - Adminbdy Shapefile
  - ebooklib-0.15
  - GPX data
  - MOZ\_adm
  - OneDrive - WBG - Shortcut.lnk
  - Pakistan
  - Populated Places
- VNM\_adm
  - license.txt
  - VNM\_adm0.csv
  - VNM\_adm0.shp
  - VNM\_adm1.csv
  - VNM\_adm1.shp
  - VNM\_adm2.csv
  - VNM\_adm2.shp
  - VNM\_adm3.csv
  - VNM\_adm3.shp
- World\_Cities

Layers

- VNM adm0

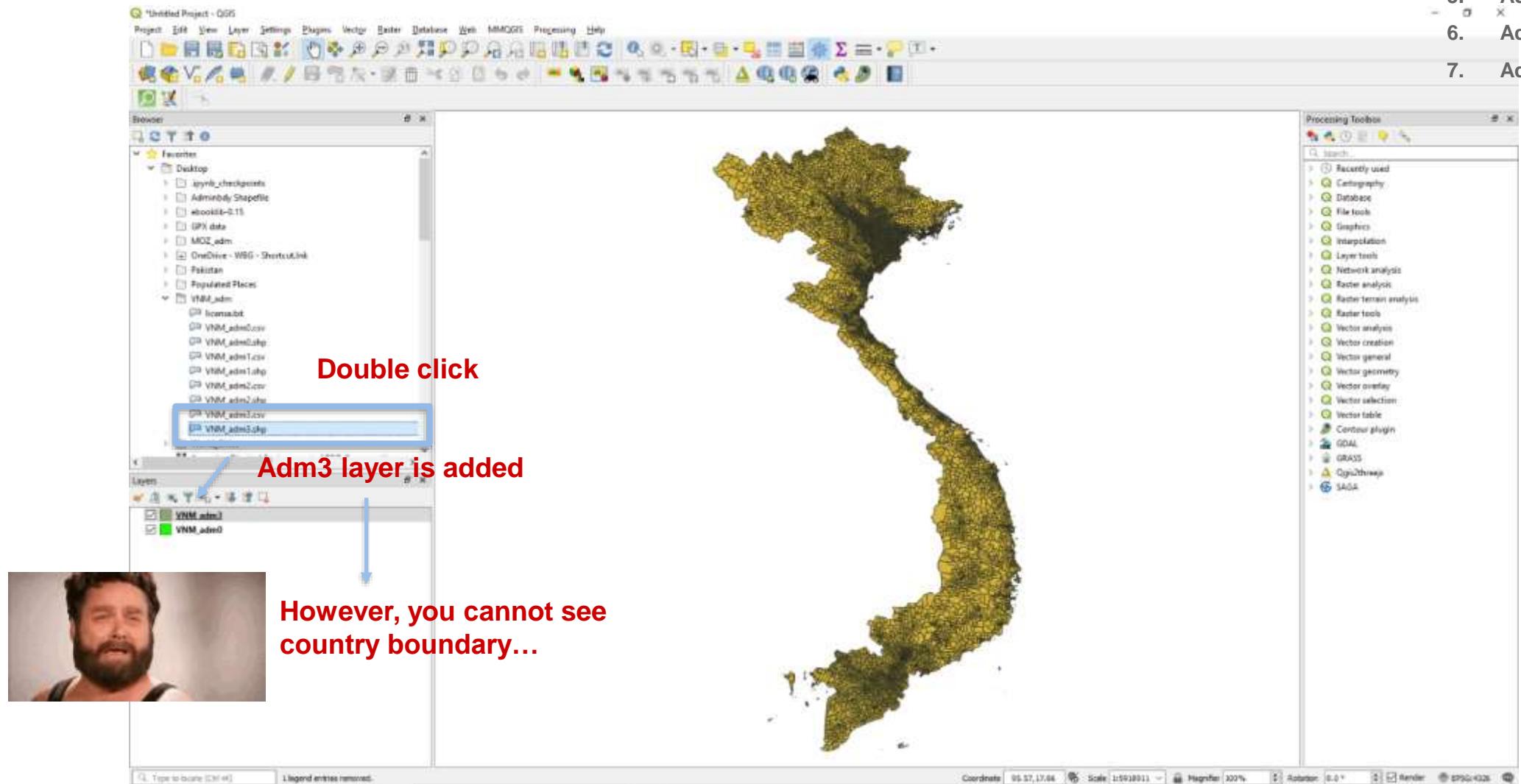


## Processing Toolbox

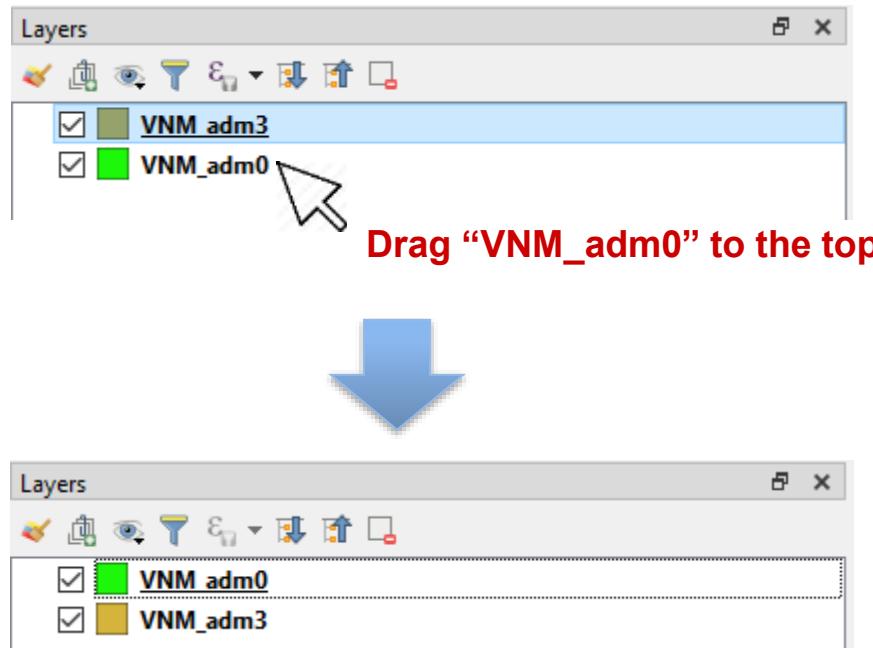
- Search...
- Recently used
  - Cartography
  - Database
  - File tools
  - Graphics
  - Interpolation
  - Layer tools
  - Network analysis
  - Raster analysis
  - Raster terrain analysis
  - Raster tools
  - Vector analysis
  - Vector creation
  - Vector general
  - Vector geometry
  - Vector overlay
  - Vector selection
  - Vector table
  - Contour plugin
  - GDAL
  - GRASS
  - Qgis2threejs
  - SAGA

1. Add Admin0 (country) boundary
2. Change colors of Admin0
3. **Add Admin3 (district) boundary**
4. Reorder the layers
5. Add place name
6. Add OpenStreetMap
7. Add Satellite

# Add another layer to the country layer



# Change the layer order



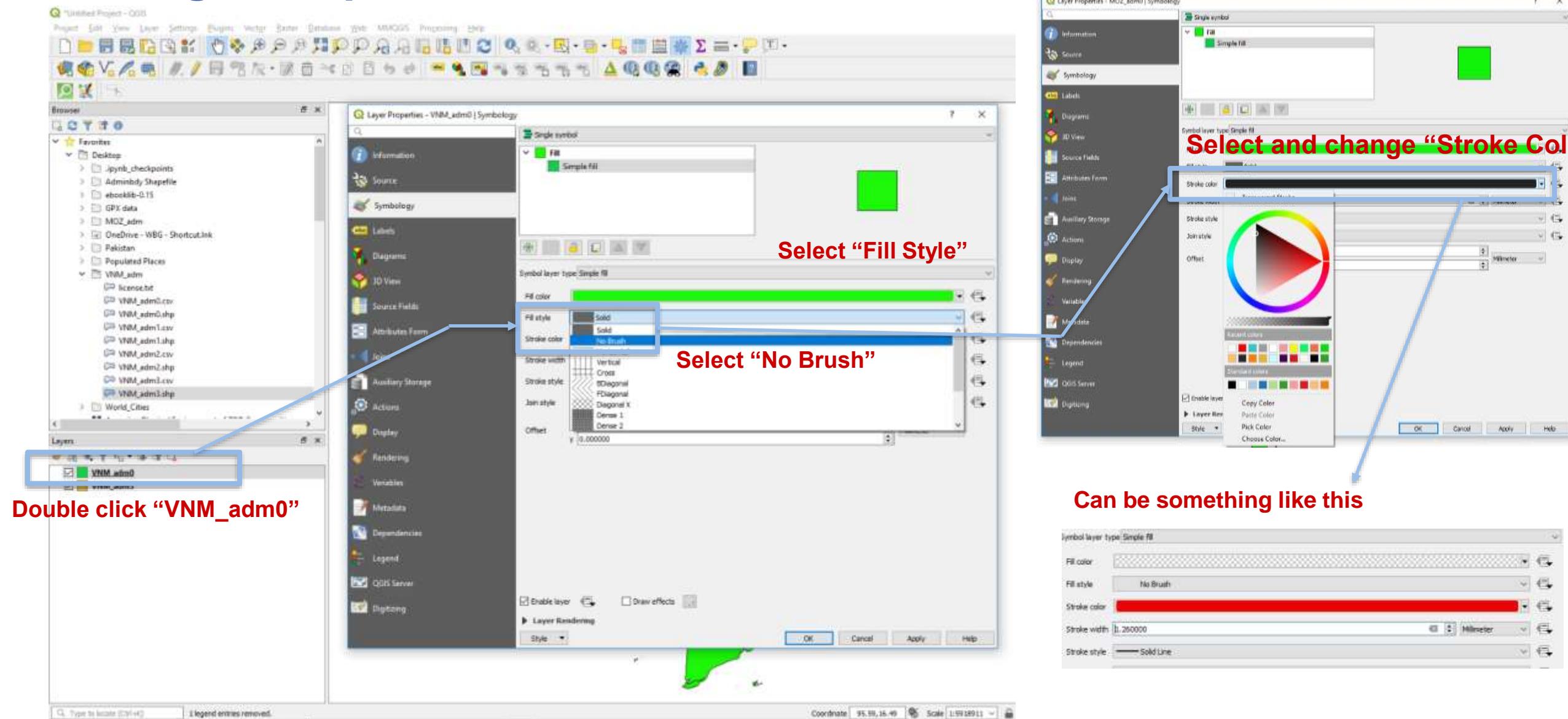
QGIS shows ADM3 file



QGIS shows ADM0 file

1. Add Admin0 (country) boundary
2. Change colors of Admin0
3. Add Admin3 (district) boundary
4. **Reorder the layers**
5. Add place name
6. Add OpenStreetMap
7. Add Satellite

# Change transparent fill color and colored border.





## Browser

Favorites

- Desktop
  - .ipynb\_checkpoints
  - Adminbdy Shapefile
  - ebooklib-0.15
  - GPX data
  - MOZ\_adm
  - OneDrive - WBG - Shortcut.lnk
  - Pakistan
  - Populated Places
- VNM\_adm
  - license.txt
  - VNM\_adm0.csv
  - VNM\_adm0.shp
  - VNM\_adm1.csv
  - VNM\_adm1.shp
  - VNM\_adm2.csv
  - VNM\_adm2.shp
  - VNM\_adm3.csv
  - VNM\_adm3.shp
- World\_Cities

Layers

- VNM\_adm0
- VNM\_adm3

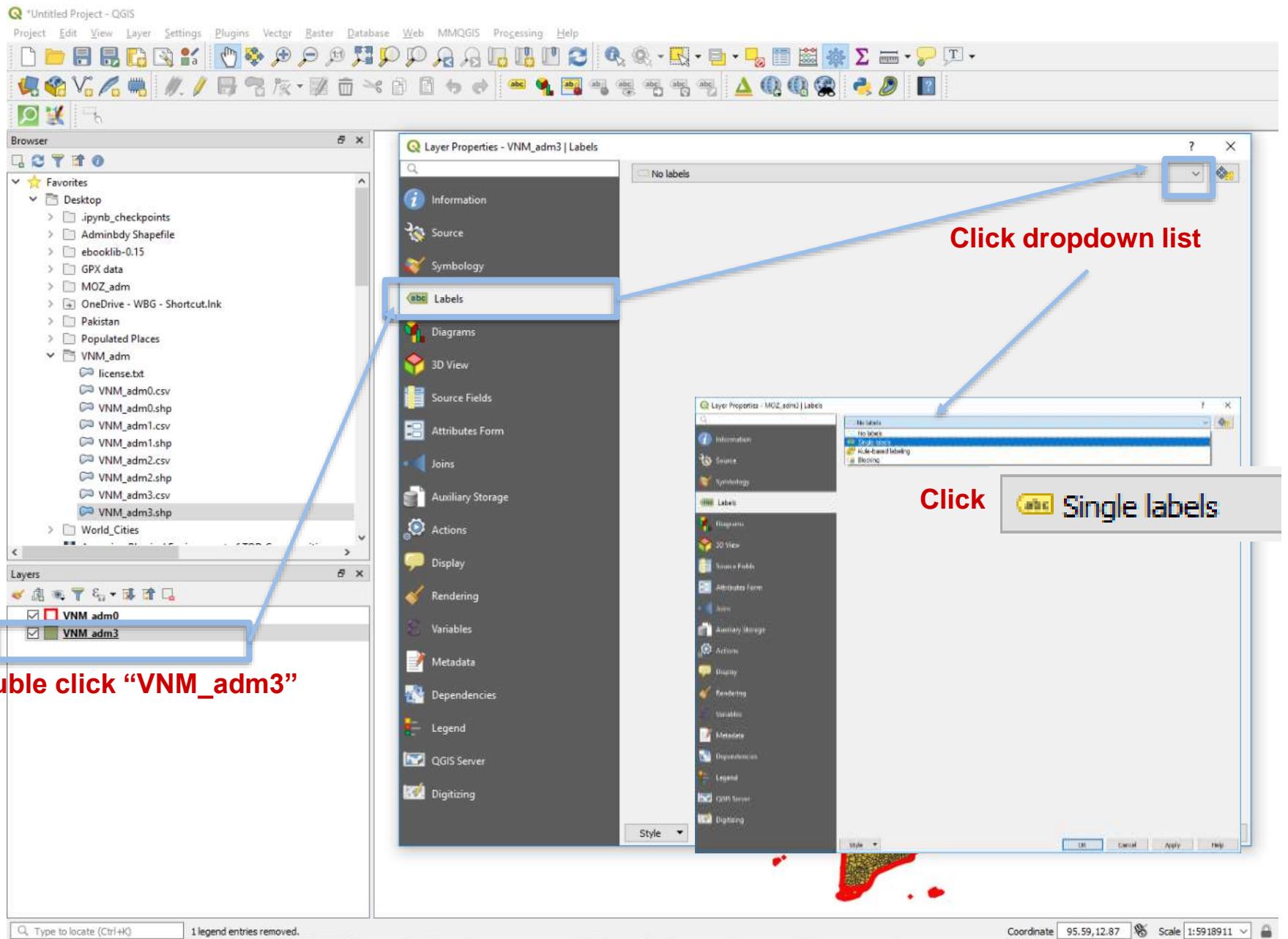


## Processing Toolbox

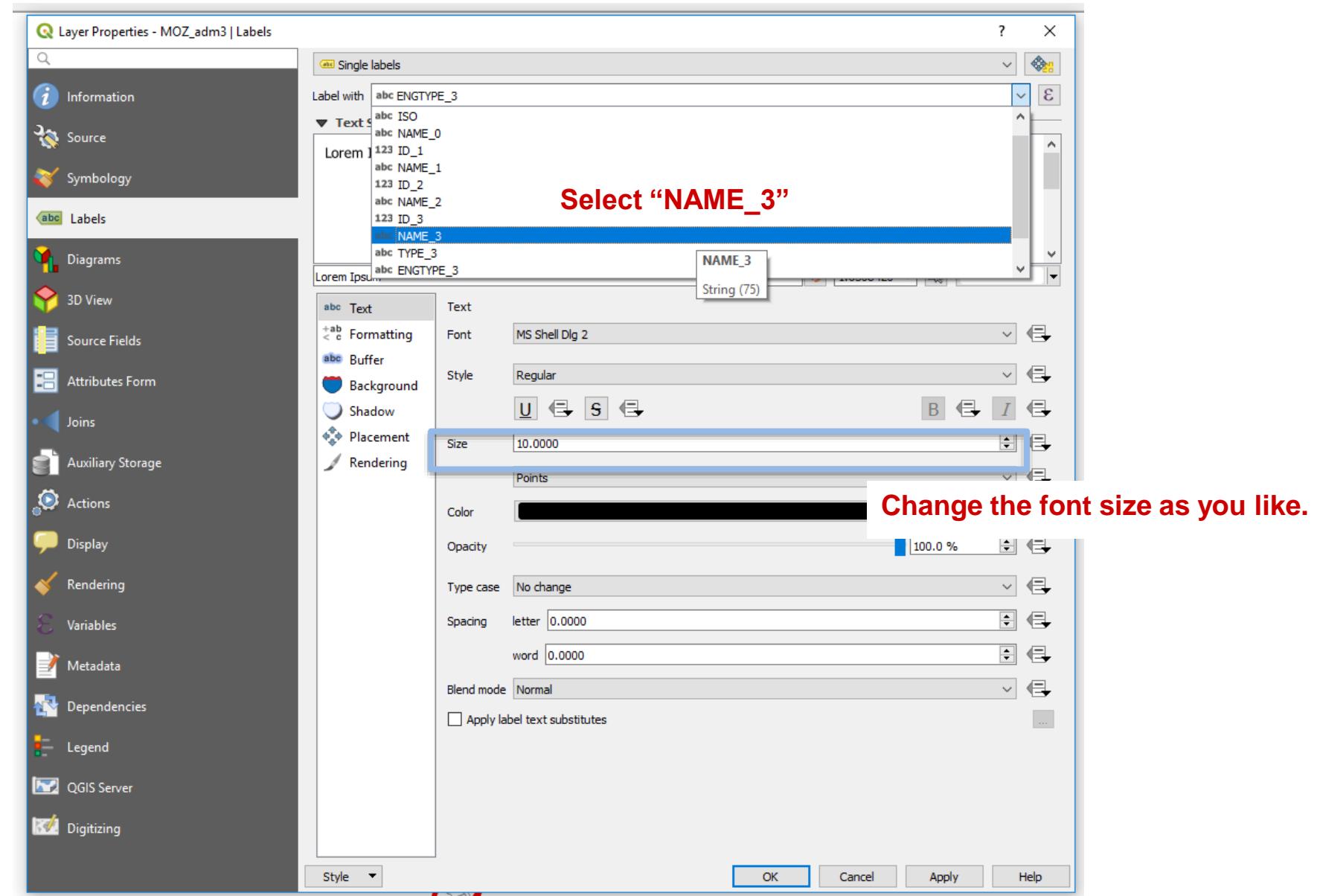
- Search...
- Recently used
  - Cartography
  - Database
  - File tools
  - Graphics
  - Interpolation
  - Layer tools
  - Network analysis
  - Raster analysis
  - Raster terrain analysis
  - Raster tools
  - Vector analysis
  - Vector creation
  - Vector general
  - Vector geometry
  - Vector overlay
  - Vector selection
  - Vector table
  - Contour plugin
  - GDAL
  - GRASS
  - Qgis2threejs
  - SAGA

# Add place name.

1. Add Admin0 (country) boundary
2. Change colors of Admin0
3. Add Admin3 (district) boundary
4. Reorder the layers
5. **Add place name**
6. Add OpenStreetMap
7. Add Satellite



# Add place name.



\*Untitled Project - QGIS

Project Edit View Layer Settings Plugins Raster Database Web MMQGIS Processing Help

Browser

Favorites

- Desktop
  - .ipynb\_checkpoints
  - Adminbdy Shapefile
  - ebooklib-0.15
  - GPX data
  - MOZ\_adm
  - OneDrive - WBG - Shortcut.lnk
  - Pakistan
  - Populated Places
- VNM\_adm
  - license.txt
  - VNM\_adm0.csv
  - VNM\_adm0.shp
  - VNM\_adm1.csv
  - VNM\_adm1.shp
  - VNM\_adm2.csv
  - VNM\_adm2.shp
  - VNM\_adm3.csv
  - VNM\_adm3.shp
- World\_Cities

Layers

- VNM\_adm0
- VNM\_adm3

Processing Toolbox

Search...

- Recently used
- Cartography
- Database
- File tools
- Graphics
- Interpolation
- Layer tools
- Network analysis
- Raster analysis
- Raster terrain analysis
- Raster tools
- Vector analysis
- Vector creation
- Vector general
- Vector geometry
- Vector overlay
- Vector selection
- Vector table
- Contour plugin
- GDAL
- GRASS
- Qgis2threejs
- SAGA

Coordinate 106.613, 10.954 Scale 1:398631 Magnifier 100% Rotation 0.0° Render EPSG:4326

44

Type to locate (Ctrl+K) 1 legend entries removed.

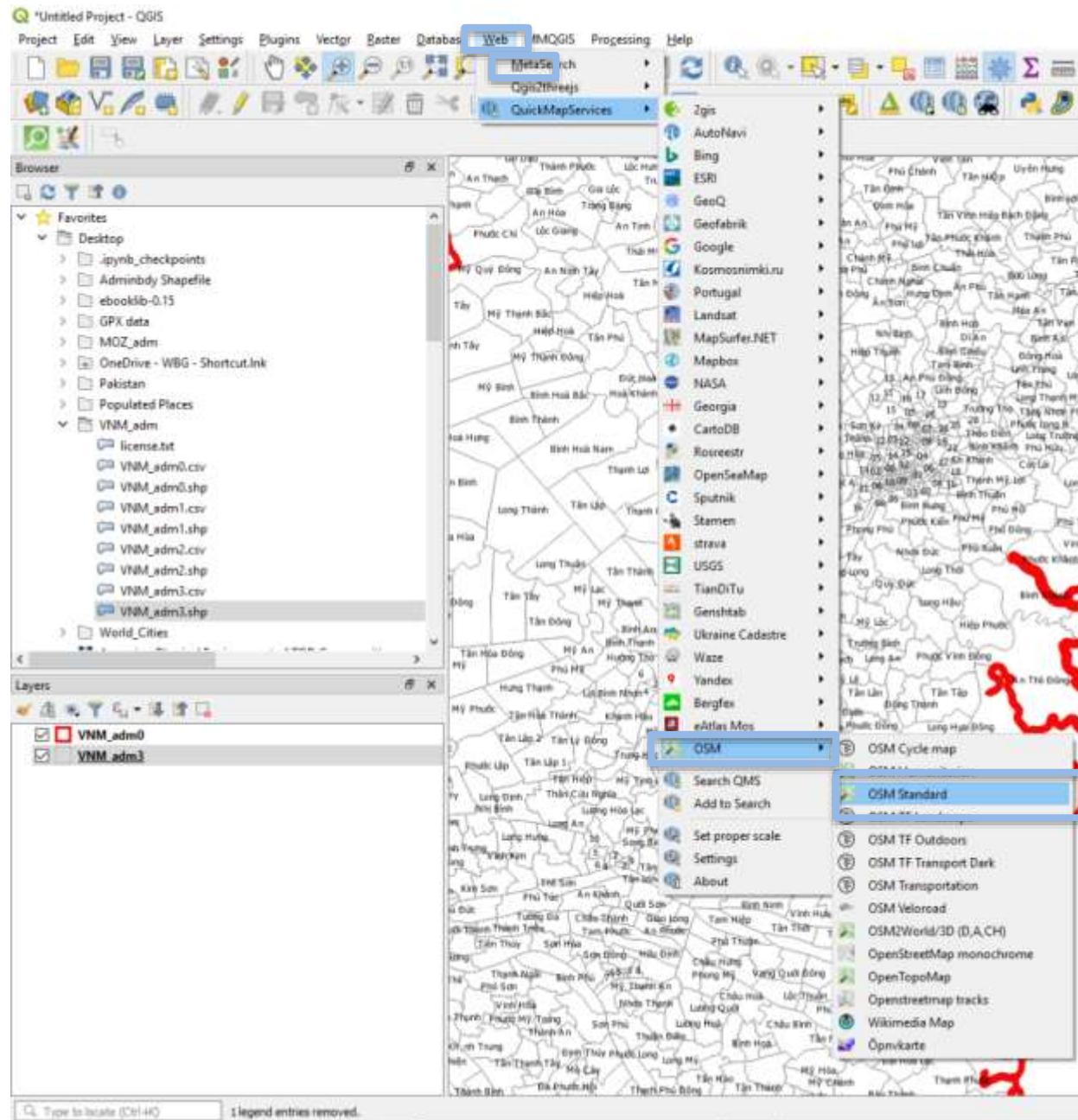
# Add Open Street map

- Tool bar “Web” ->
- QuickMapServices ->
- OSM ->
- OSM Standard



**Due to the heavy file size of OSM,  
QGIS is prone to crush. Recommend to save  
your map frequently.**

1. Add Admin0 (country) boundary
2. Change colors of Admin0
3. Add Admin3 (district) boundary
4. Reorder the layers
5. Add place name
6. **Add OpenStreetMap**
7. Add Satellite





## Browser

Favorites

- Desktop
  - .ipynb\_checkpoints
  - Adminbdy Shapefile
  - ebooklib-0.15
  - GPX data
  - MOZ\_adm
  - OneDrive - WBG - Shortcut.lnk
  - Pakistan
  - Populated Places
- VNM\_adm
  - license.txt
  - VNM\_adm0.csv
  - VNM\_adm0.shp
  - VNM\_adm1.csv
  - VNM\_adm1.shp
  - VNM\_adm2.csv
  - VNM\_adm2.shp
  - VNM\_adm3.csv
  - VNM\_adm3.shp
- World\_Cities

## Layers

VNM\_adm0

VNM\_adm3

OSM Standard



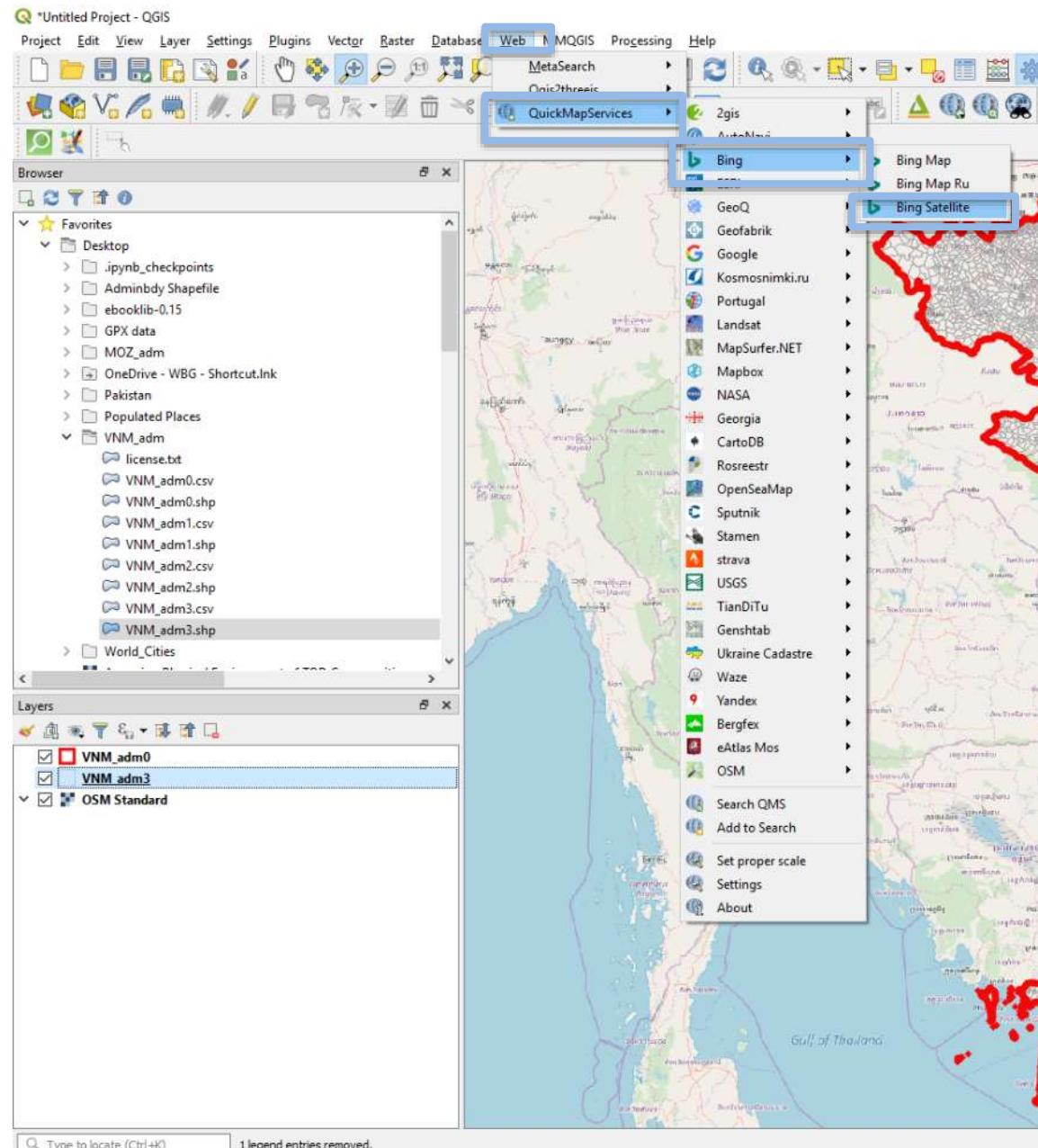
## Processing Toolbox

- Search...
- Recently used
  - Cartography
  - Database
  - File tools
  - Graphics
  - Interpolation
  - Layer tools
  - Network analysis
  - Raster analysis
  - Raster terrain analysis
  - Raster tools
  - Vector analysis
  - Vector creation
  - Vector general
  - Vector geometry
  - Vector overlay
  - Vector selection
  - Vector table
  - Contour plugin
  - GDAL
  - GRASS
  - Qgis2threejs
  - SAGA

# Add Satellite Map

- Tool bar “Web” ->
- QuickMapServices ->
- Bing ->
- Bing Satellite

1. Add Admin0 (country) boundary
2. Change colors of Admin0
3. Add Admin3 (district) boundary
4. Reorder the layers
5. Add place name
6. Add OpenStreetMap
7. Add Satellite



\*Untitled Project - QGIS

Project Edit View Layer Settings Plugins Vector Raster Database Web MMQGIS Processing Help

Browser

Favorites

- Desktop
  - .ipynb\_checkpoints
  - Adminbdy Shapefile
  - ebooklib-0.15
  - GPX data
  - MOZ\_adm
  - OneDrive - WBG - Shortcut.lnk
  - Pakistan
  - Populated Places
- VNM\_adm
  - license.txt
  - VNM\_adm0.csv
  - VNM\_adm0.shp
  - VNM\_adm1.csv
  - VNM\_adm1.shp
  - VNM\_adm2.csv
  - VNM\_adm2.shp
  - VNM\_adm3.csv
  - VNM\_adm3.shp
- World\_Cities

Layers

- VNM\_adm
- VNM\_adm3
- Bing Satellite
- OSM Standard

Processing Toolbox

Search...

- Recently used
- Cartography
- Database
- File tools
- Graphics
- Interpolation
- Layer tools
- Network analysis
- Raster analysis
- Raster terrain analysis
- Raster tools
- Vector analysis
- Vector creation
- Vector general
- Vector geometry
- Vector overlay
- Vector selection
- Vector table
- Contour plugin
- GDAL
- GRASS
- Qgis2threejs
- SAGA

Make sure Bing Satellite is in the upper position from OSM

Coordinate 102.18,23.63 Scale 1:5918911 Magnifier 100% Rotation 0.0° Render EPSG:4326



### Exercise

1. Copy PDF map from the project document
2. Find the project location in QGIS
3. Georeferencing

## Source data

- Project Appraisal Document (PAD)
- Environmental Assessment Report (EA)
- Implementation Completion Report (ICR)

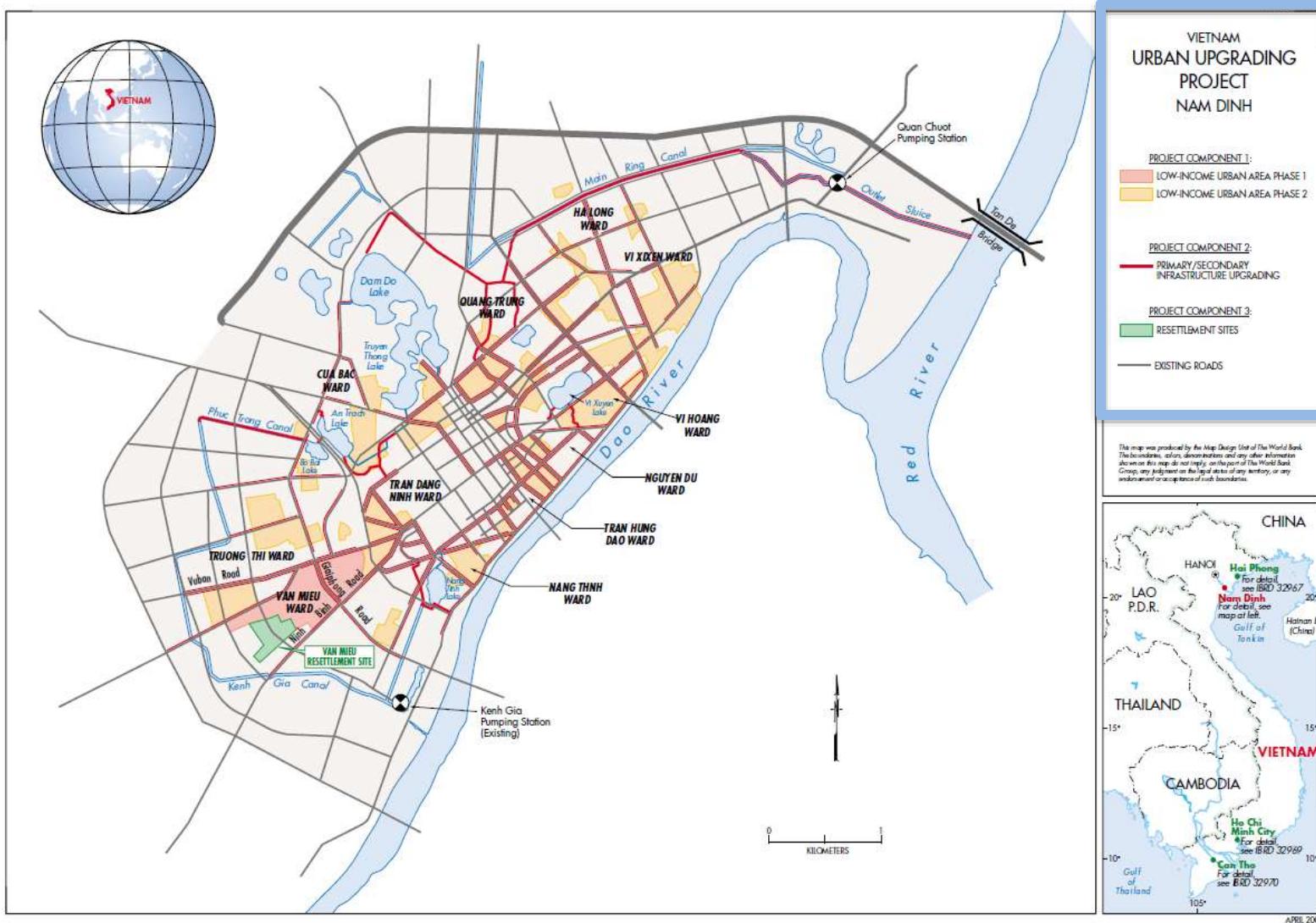
1. [Copy PDF map from the project document](#)
2. Find the project location in QGIS
3. Georeferencing

# Vietnam: URBAN UPGRADING PROJECT

- PAD has project location information (last page).
  - <http://documents.worldbank.org/curated/en/105001468762926749/pdf/275260VN.pdf>

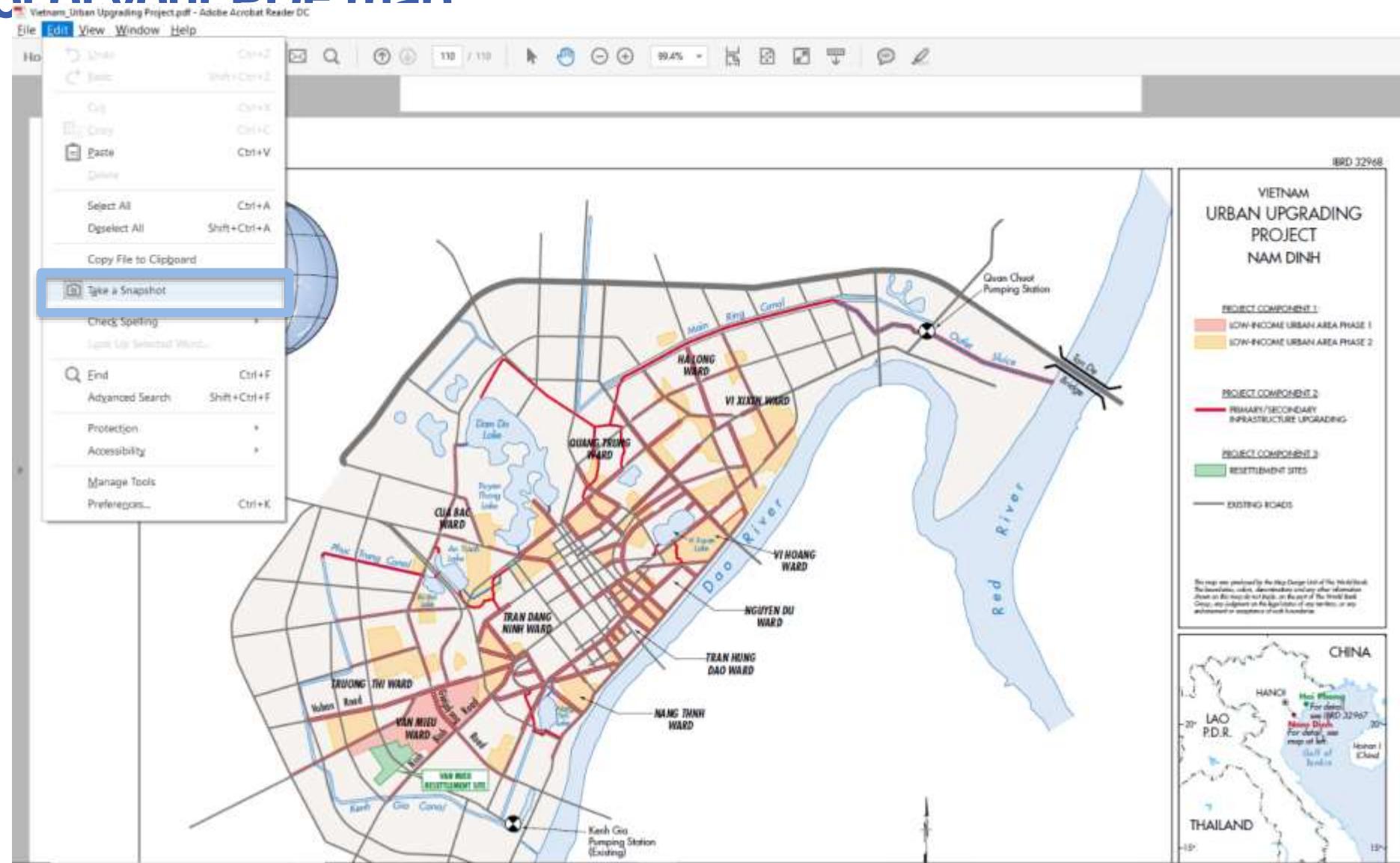


# Pay attention to the legend



APRIL 2004

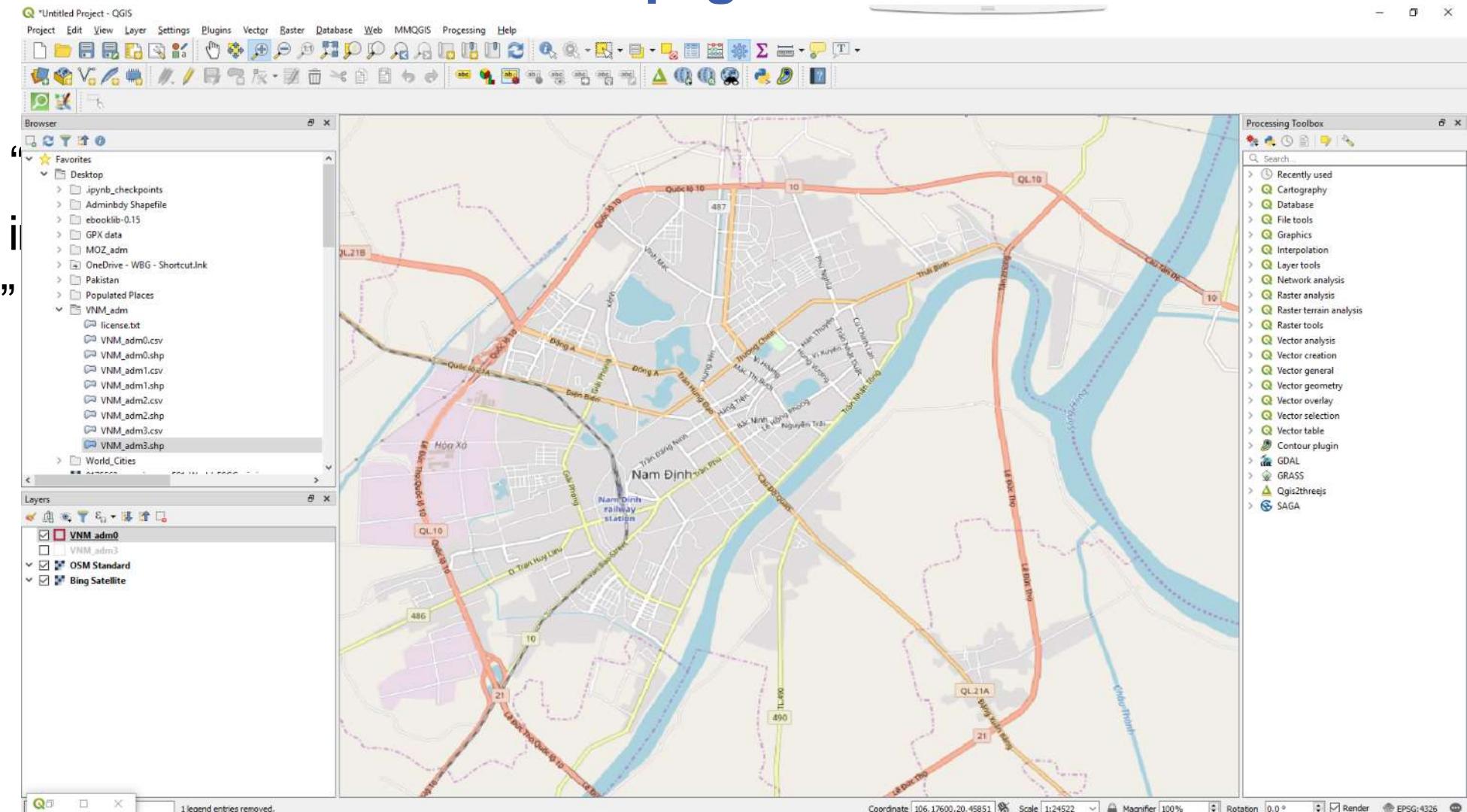
# Take a “snapshot of your DDF map”



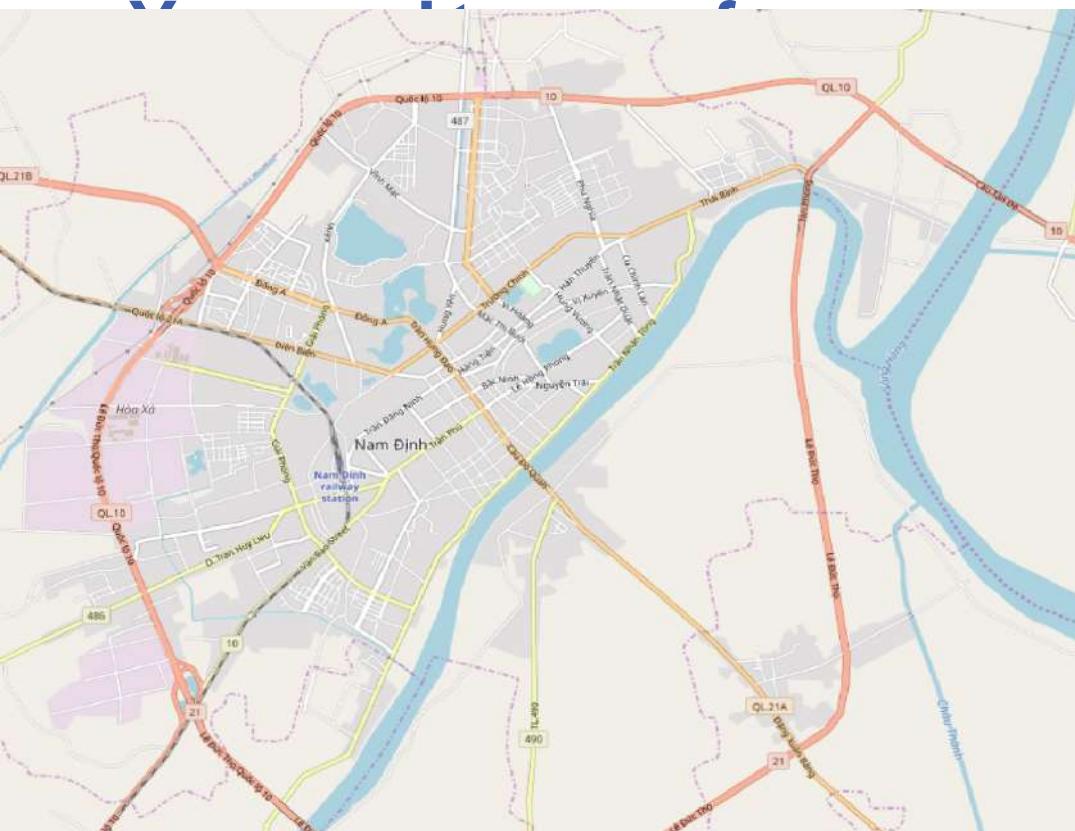
1. Copy PDF map from the project document
2. Find the project location in QGIS
3. Georeferencing

# Find the project location in the QGIS main page

- The project is in “Nam Dinh”
- Use  to zoom in
- Find “Nam Dinh”



Now you have similar maps. The left side map is georeferenced base map, while the right side map is non-georeferenced project map.



# Install “Georeferencer” plugin

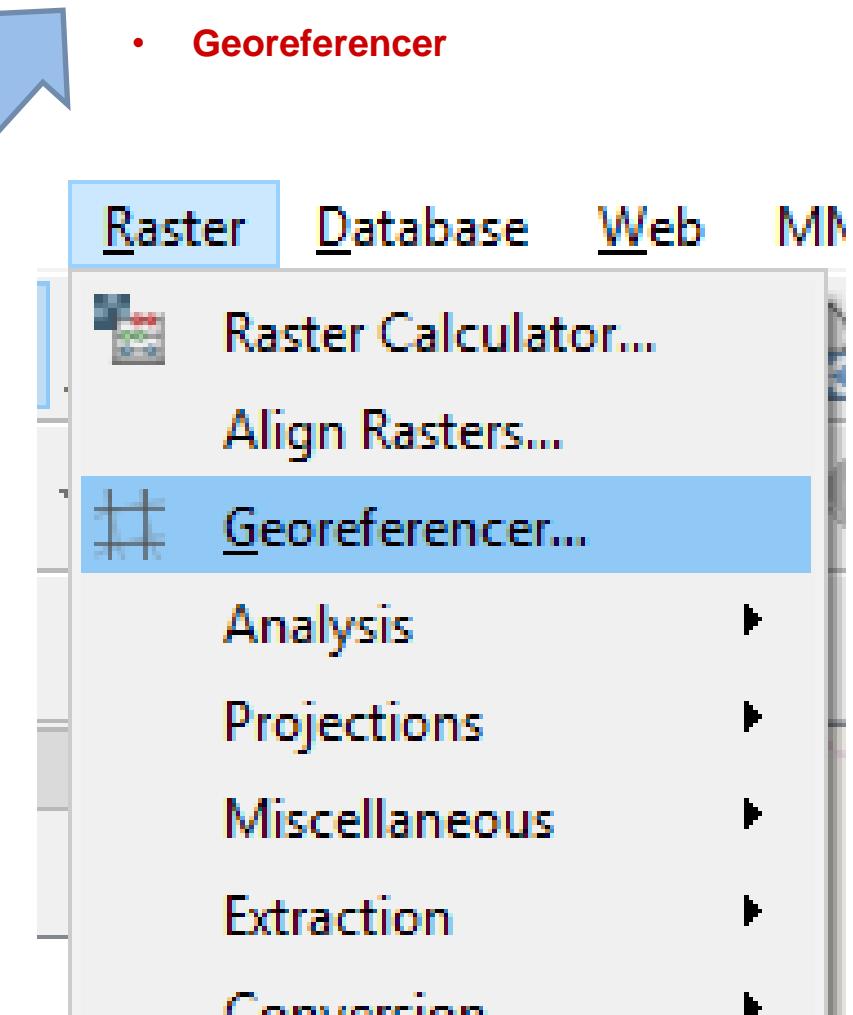
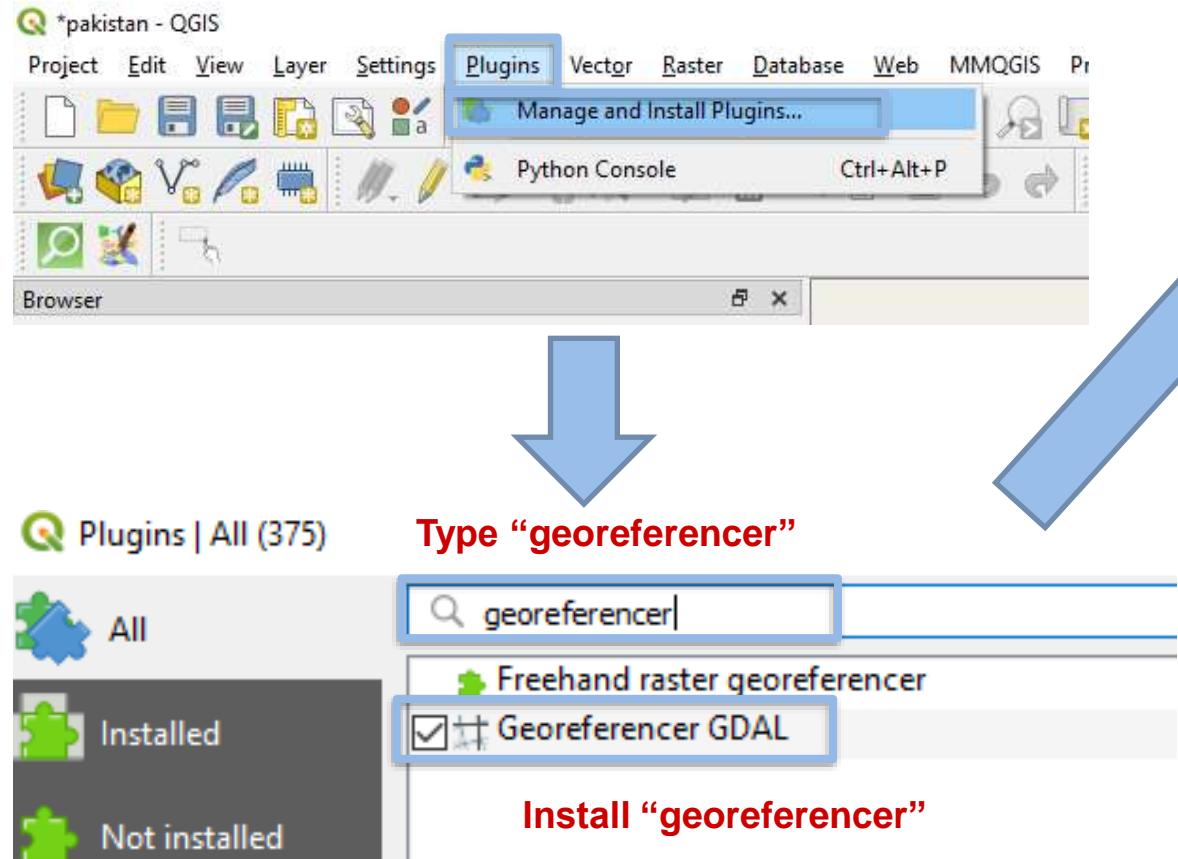
1. Copy PDF map from the project document

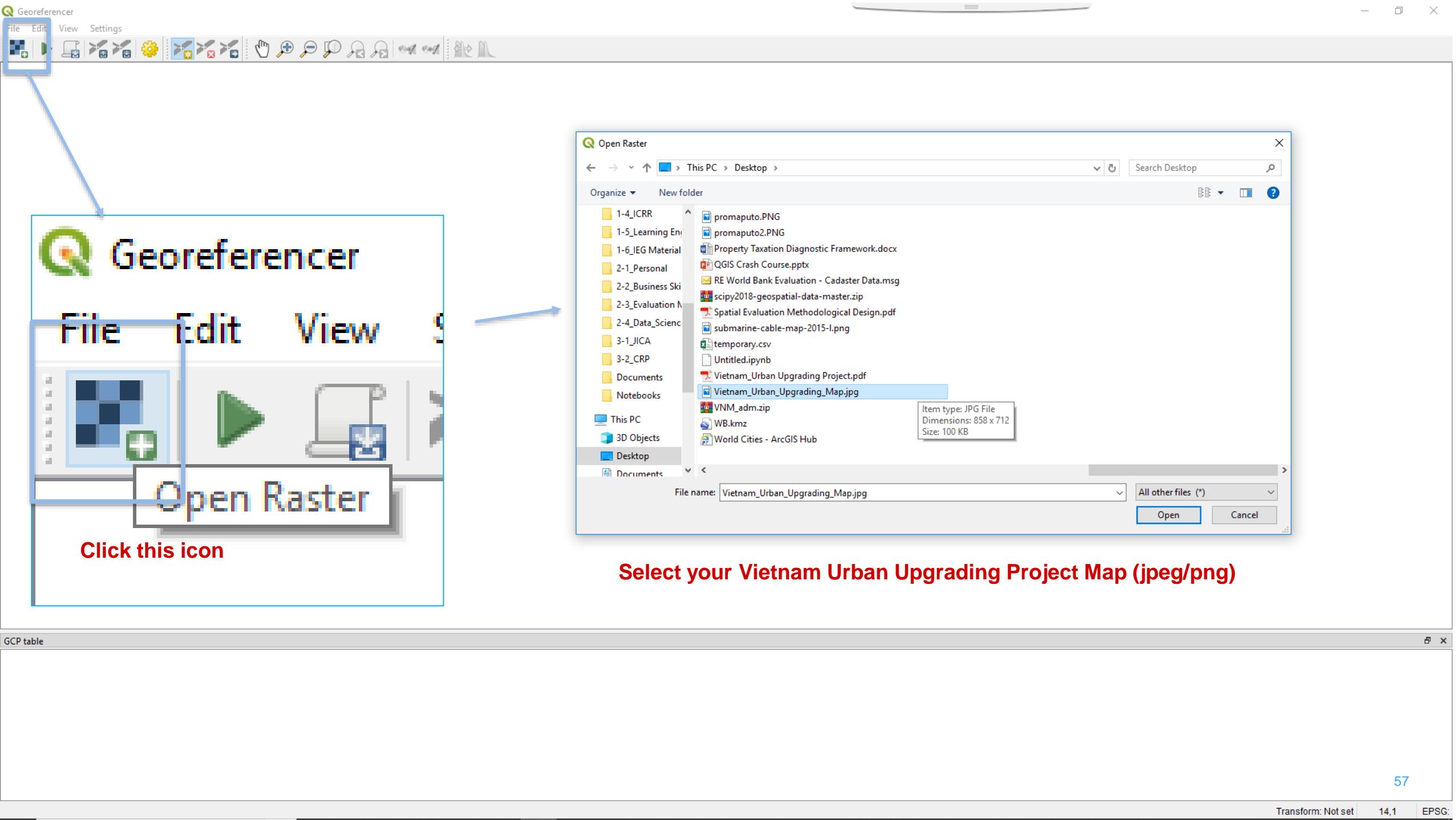
2. Find the project location in QGIS

3. Georeferencing

- Toolbar “Raster” ->

- Georeferencer



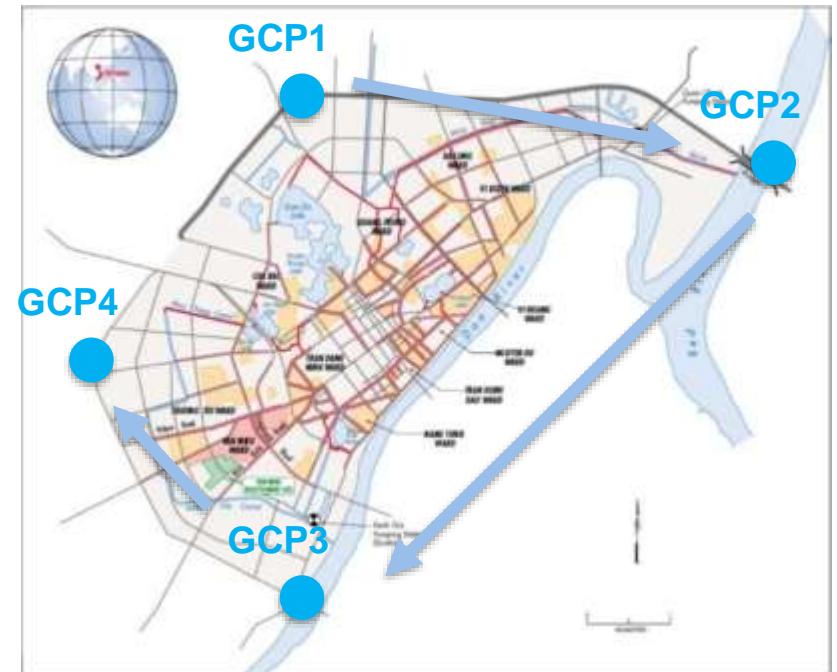


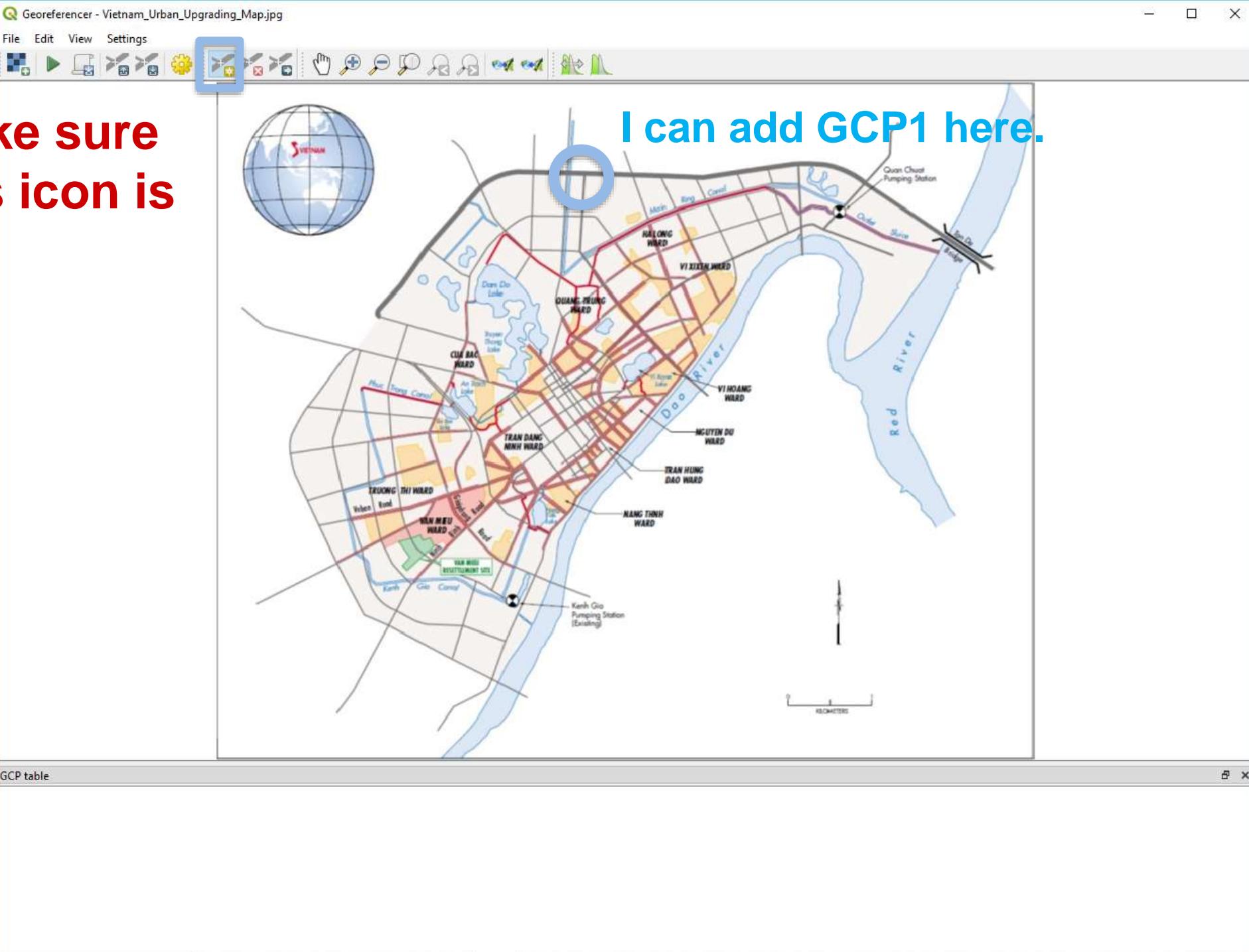


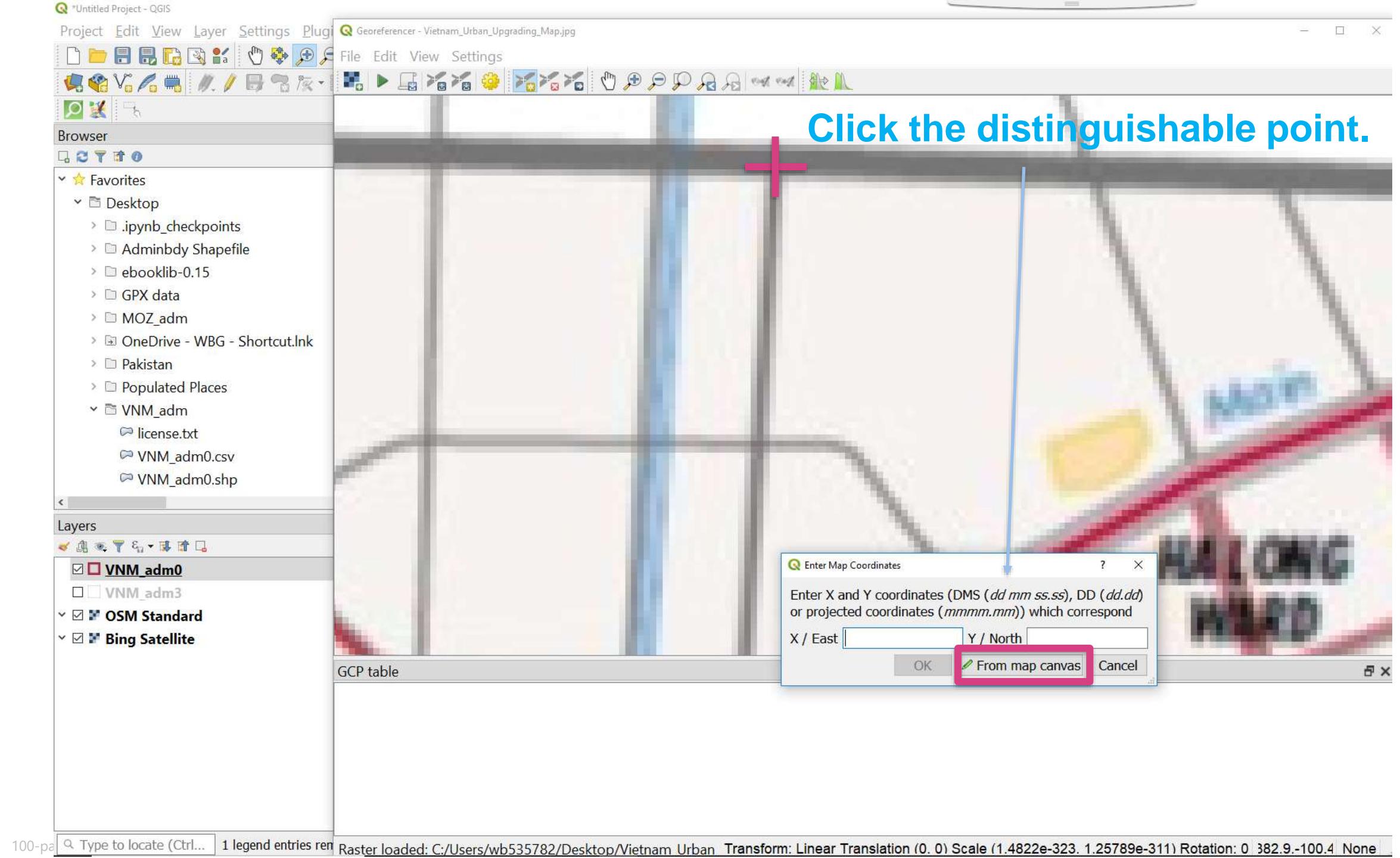
GCP table

## Georeferencing paper/JPEG map

- Now you need to georeference this JPEG map.
- You need to provide at least four Ground Controlling Points (GCP).
- GCP should be recommended to be placed at the edge of the JPEG file.
- You need to find distinguishable shape of the map (e.g., sharp edge, cross section of river and road, unique shape.).







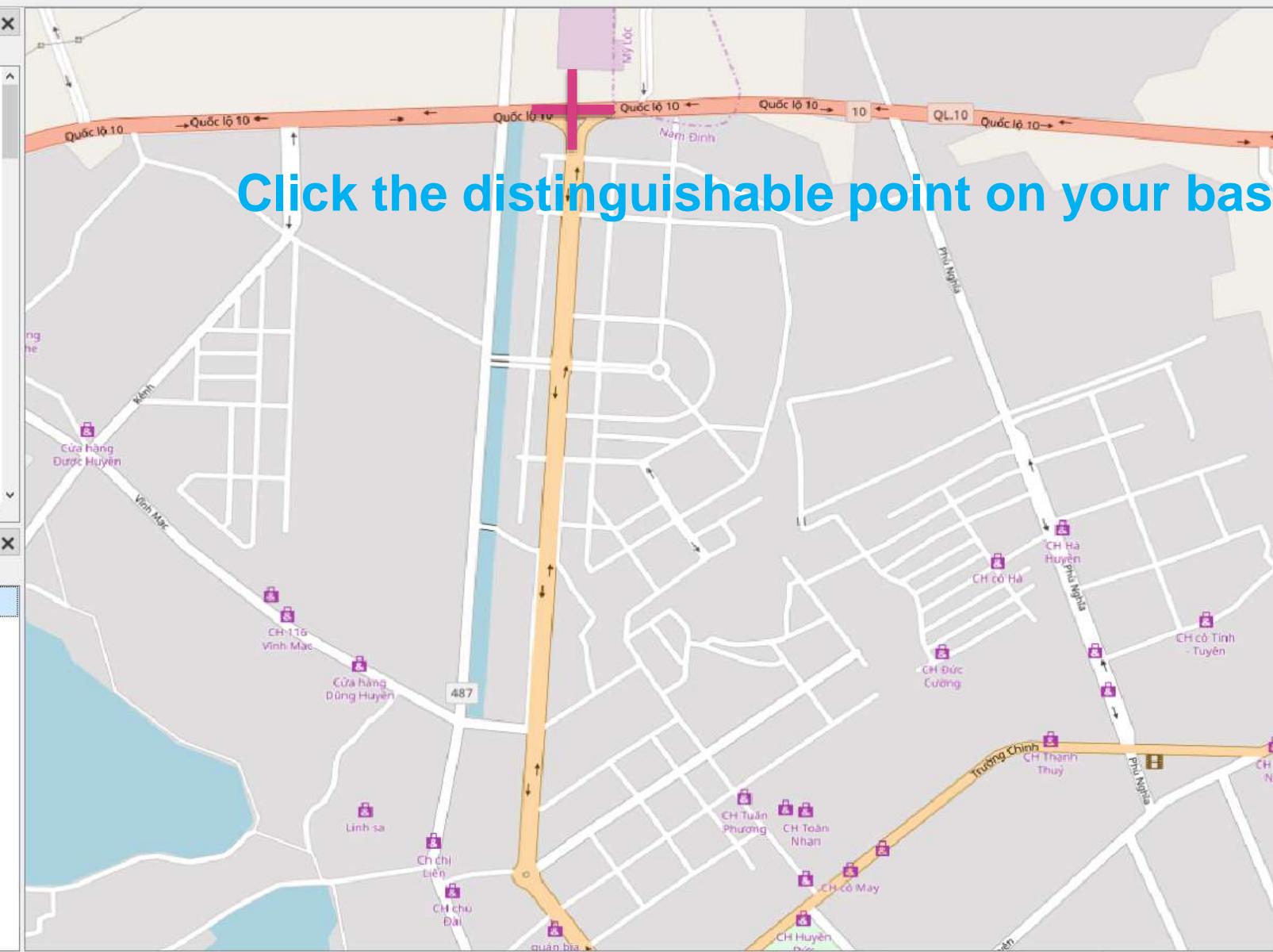


## Browser

- ▼ Favorites
- ▼ Desktop
  - > .ipynb\_checkpoints
  - > Adminbdy Shapefile
  - > ebooklib-0.15
  - > GPX data
  - > MOZ\_adm
  - > OneDrive - WBG - Shortcut.lnk
  - > Pakistan
  - > Populated Places
- ▼ VNM\_adm
  - license.txt
  - VNM\_adm0.csv
  - VNM\_adm0.shp

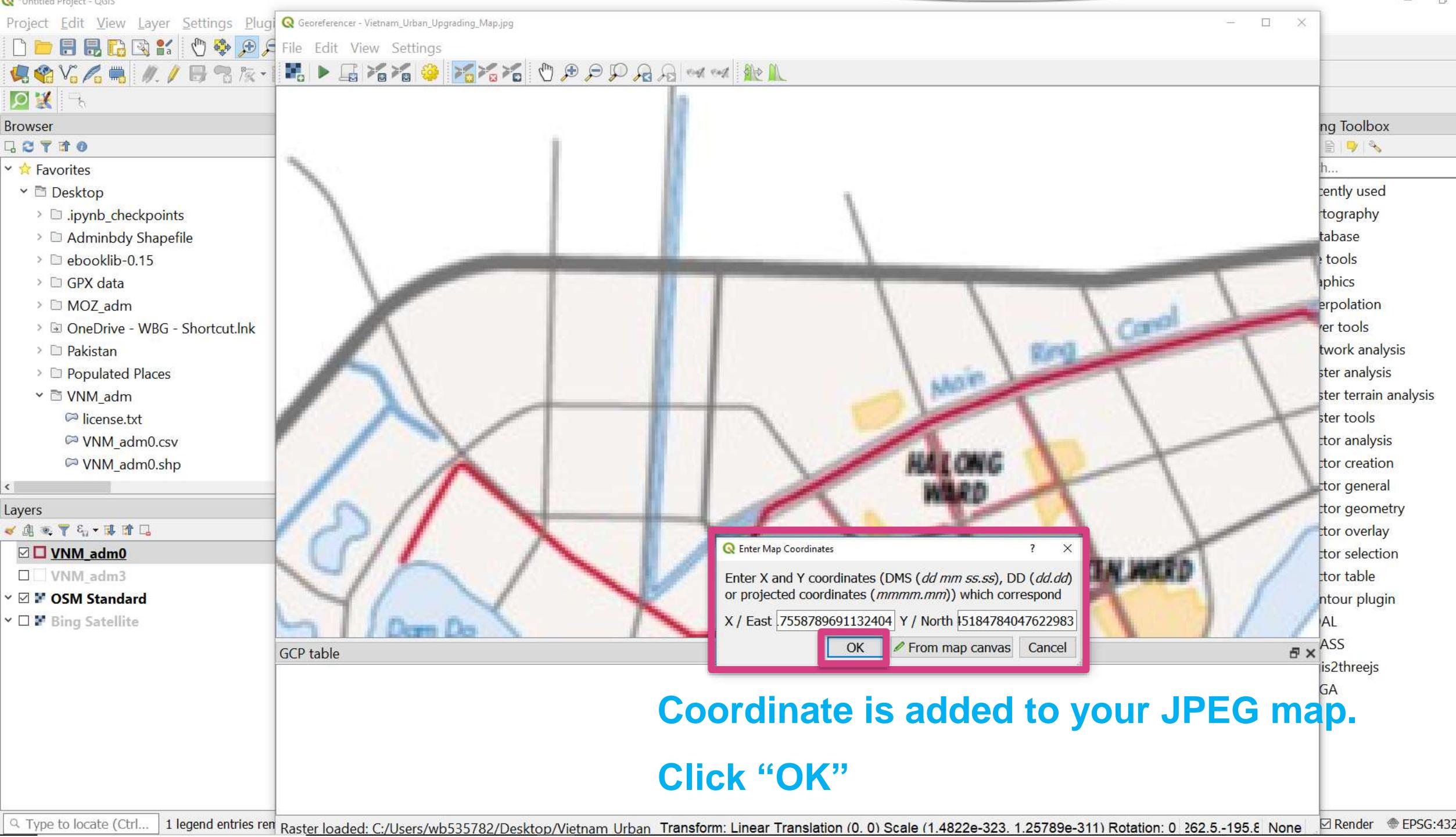
## Layers

- VNM\_adm0**
- VNM\_adm3
- OSM Standard**
- Bing Satellite

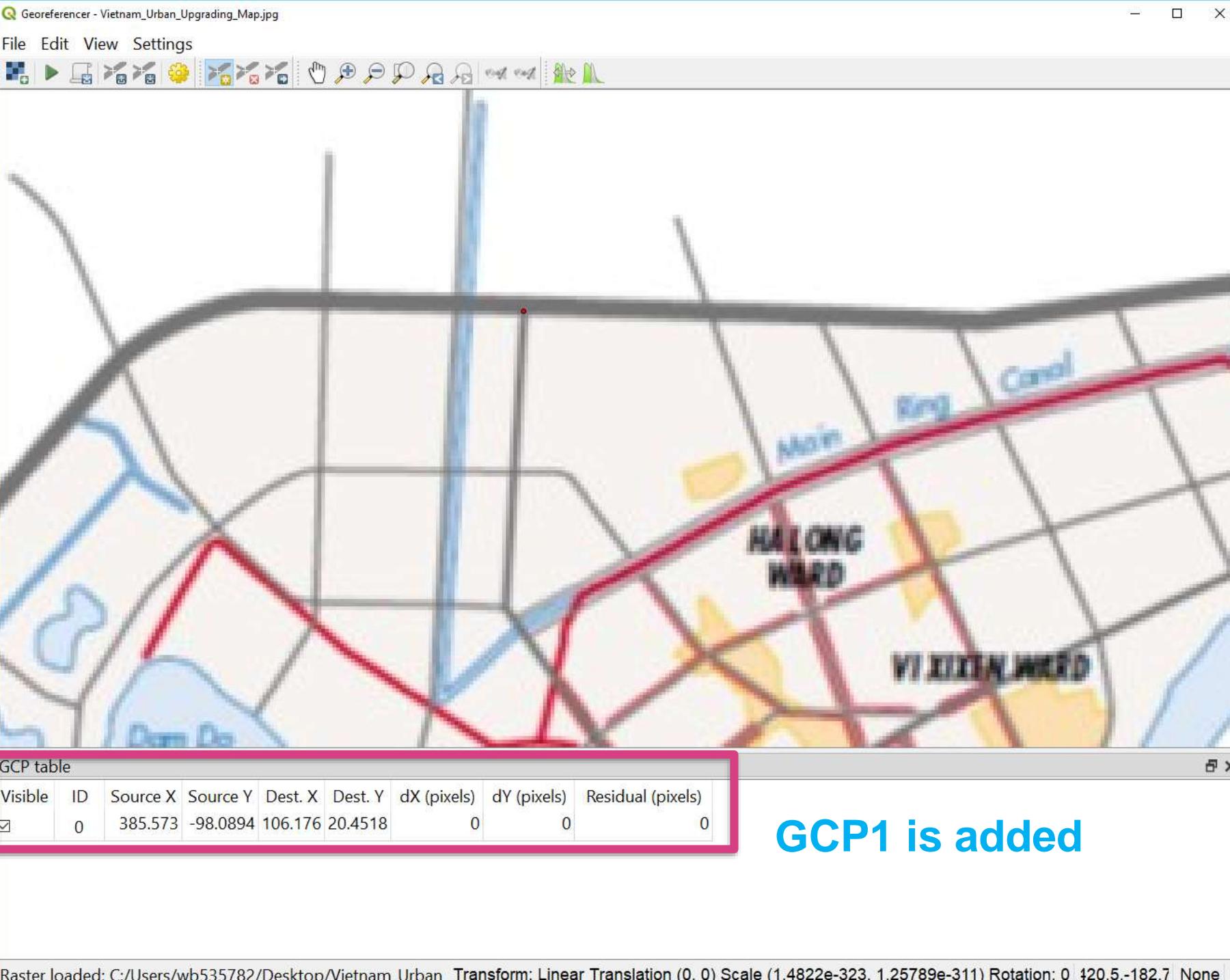


## Processing Toolbox

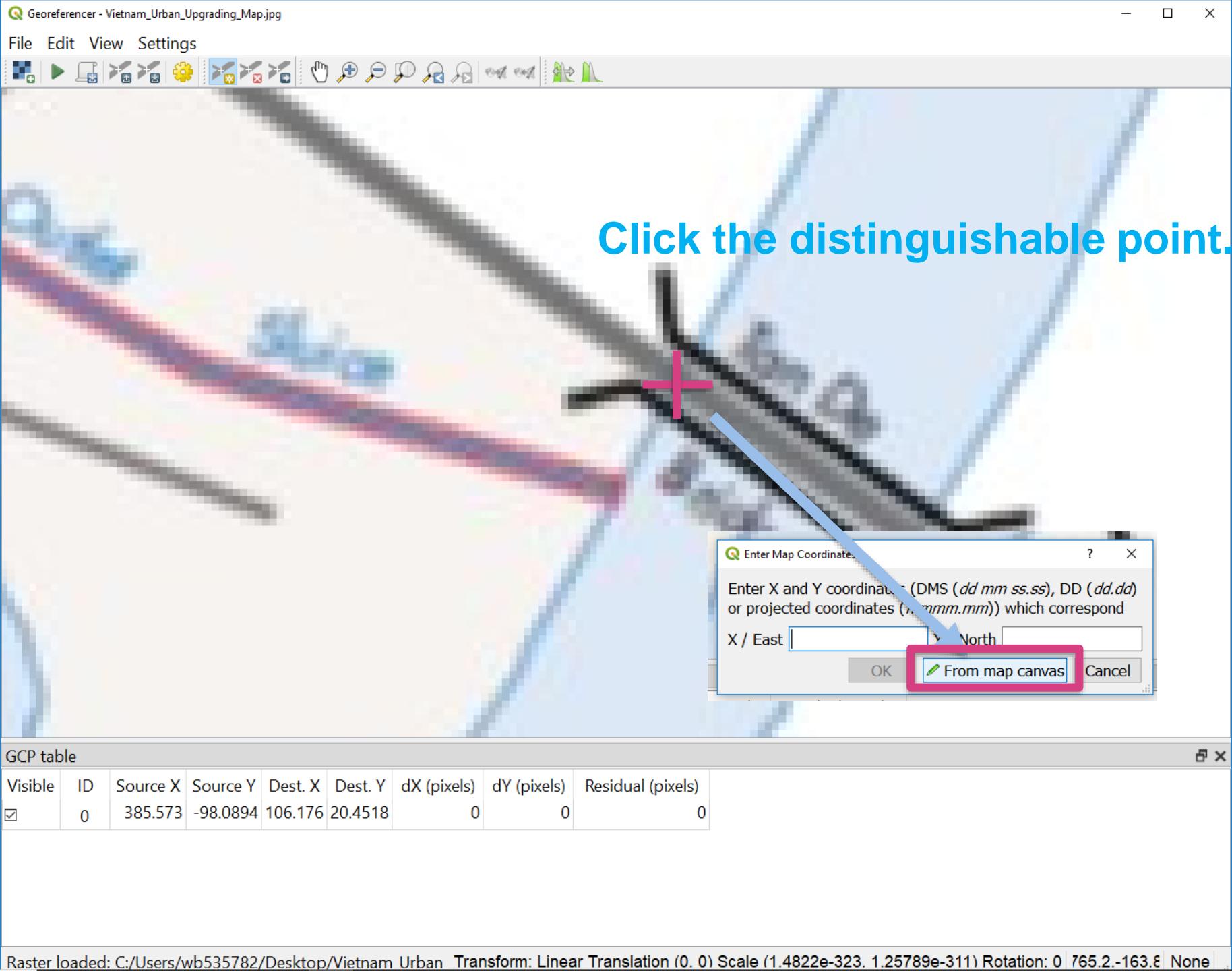
- Search...
- > Recently used
- > Cartography
- > Database
- > File tools
- > Graphics
- > Interpolation
- > Layer tools
- > Network analysis
- > Raster analysis
- > Raster terrain analysis
- > Raster tools
- > Vector analysis
- > Vector creation
- > Vector general
- > Vector geometry
- > Vector overlay
- > Vector selection
- > Vector table
- > Contour plugin
- > GDAL
- > GRASS
- > Qgis2threejs
- > SAGA



Coordinate is added to your JPEG map.  
Click “OK”



## Add GCP2



\*Untitled Project - QGIS

Project Edit View Layer Settings Plugins Vector Raster Database Web MMQGIS Processing Help

Browser

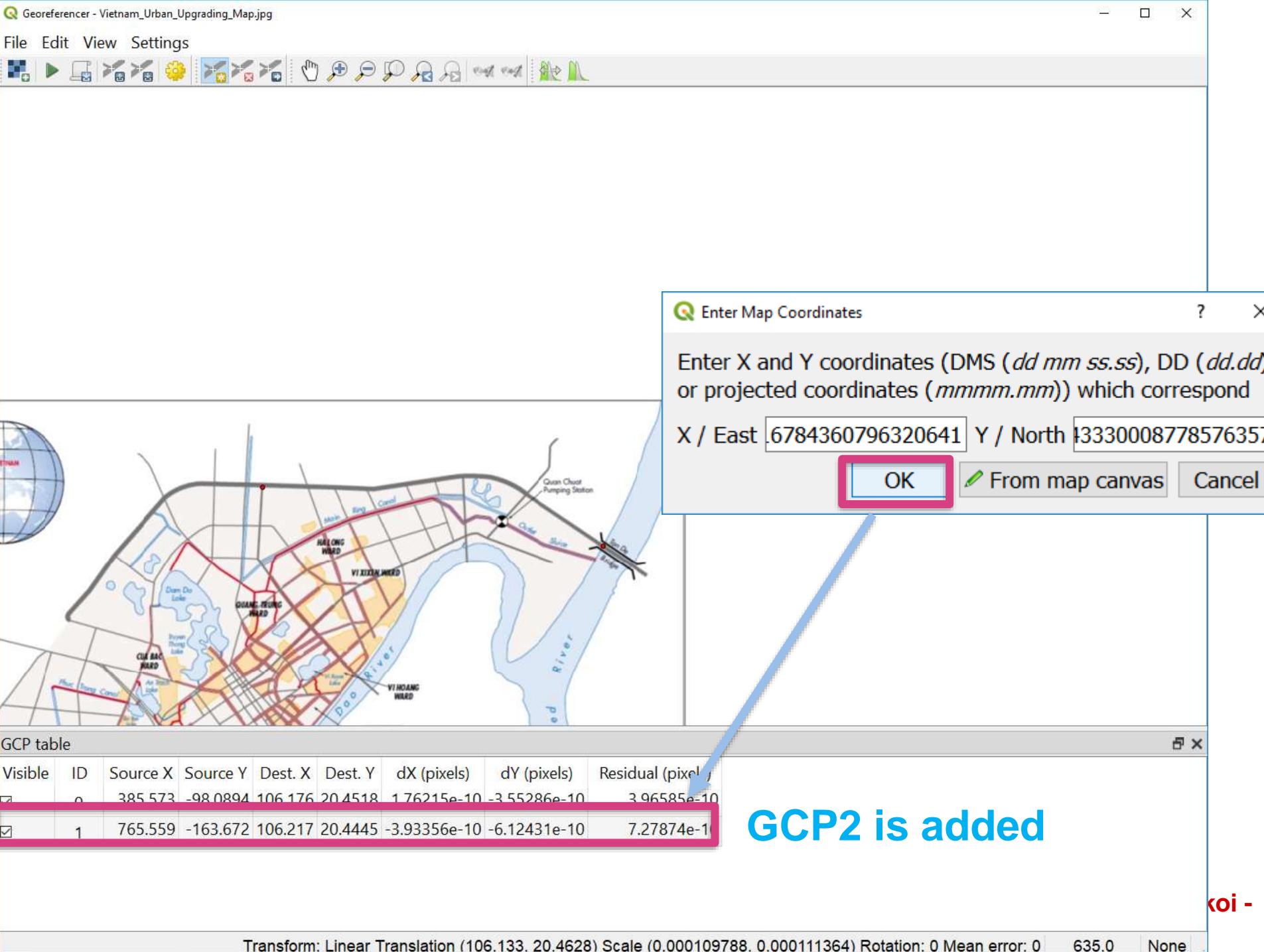
Processing Toolbox

Layers

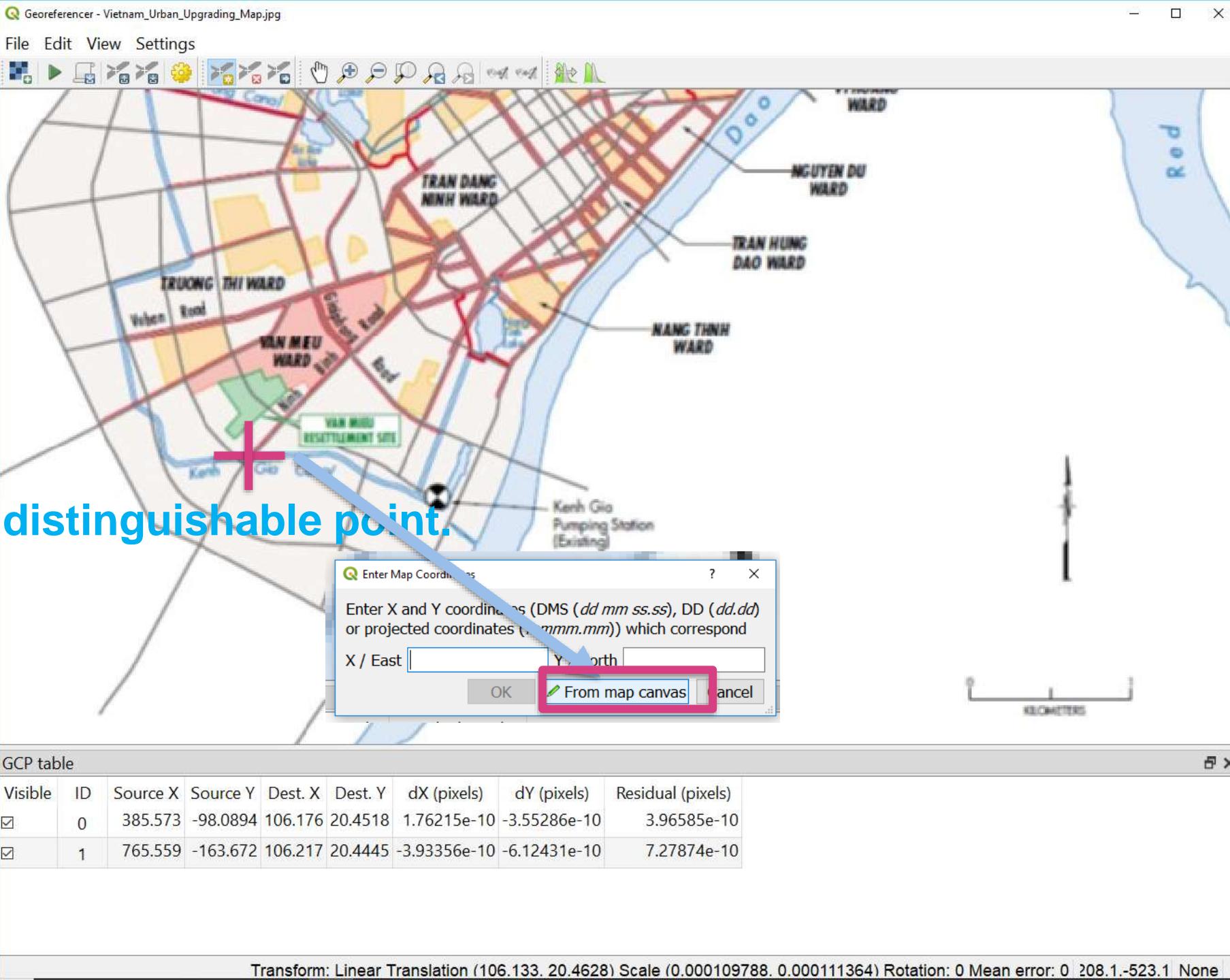
Coordinate 106.217306,20.444544 Scale 1:1558 Magnifier 100% Rotation 0.0° Render EPSG:4326

1 legend entries removed.

The screenshot shows the QGIS application interface. The main canvas displays a map with a prominent orange-red bridge feature labeled "Cầu Tân Đè". This bridge spans a river or valley. A red crosshair is overlaid on the bridge, indicating a specific point of interest. The bridge is labeled "QL.10" near its center. The background shows a light blue area representing water or a wetland. The Layers panel on the left shows two layers selected: "VNM\_adm0" and "OSM Standard". The Processing Toolbox on the right is open, displaying a list of geoprocessing tools categorized under "Recently used" and other sections like Cartography, Database, File tools, Graphics, Interpolation, Layer tools, Network analysis, Raster analysis, Raster terrain analysis, Raster tools, Vector analysis, Vector creation, Vector general, Vector geometry, Vector overlay, Vector selection, Vector table, Contour plugin, GDAL, GRASS, Qgis2threejs, and SAGA. The status bar at the bottom provides coordinate information (106.217306, 20.444544), scale (1:1558), and other settings.



# Add GCP3



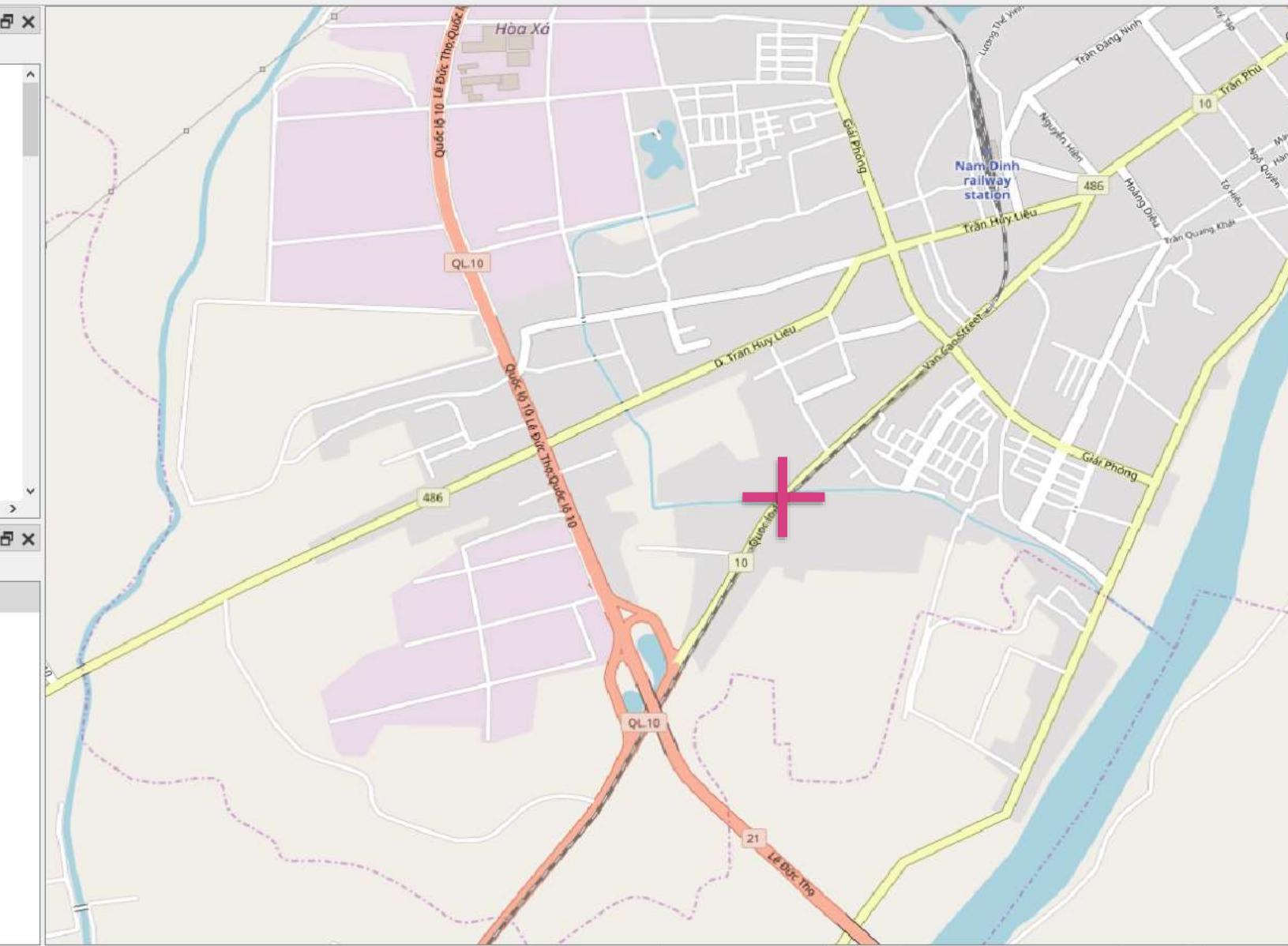


## Browser

- ▼ ★ Favorites
    - ▼ Desktop
      - > 📂 .ipynb\_checkpoints
      - > 📂 Adminbdy Shapefile
      - > 📂 ebooklib-0.15
      - > 📂 GPX data
      - > 📂 MOZ\_adm
      - > 📂 OneDrive - WBG - Shortcut.lnk
      - > 📂 Pakistan
      - > 📂 Populated Places
    - ▼ VNM\_adm
      - 🔗 license.txt
      - 🔗 VNM\_adm0.csv
      - 🔗 VNM\_adm0.shp

## Layers

- A screenshot of the ArcGIS ribbon interface. The 'Map' tab is highlighted in blue, indicating it is the active tab. Other tabs like 'Table of Contents', 'Search', 'Georeferencing', 'Print', and 'Help' are visible but not selected.

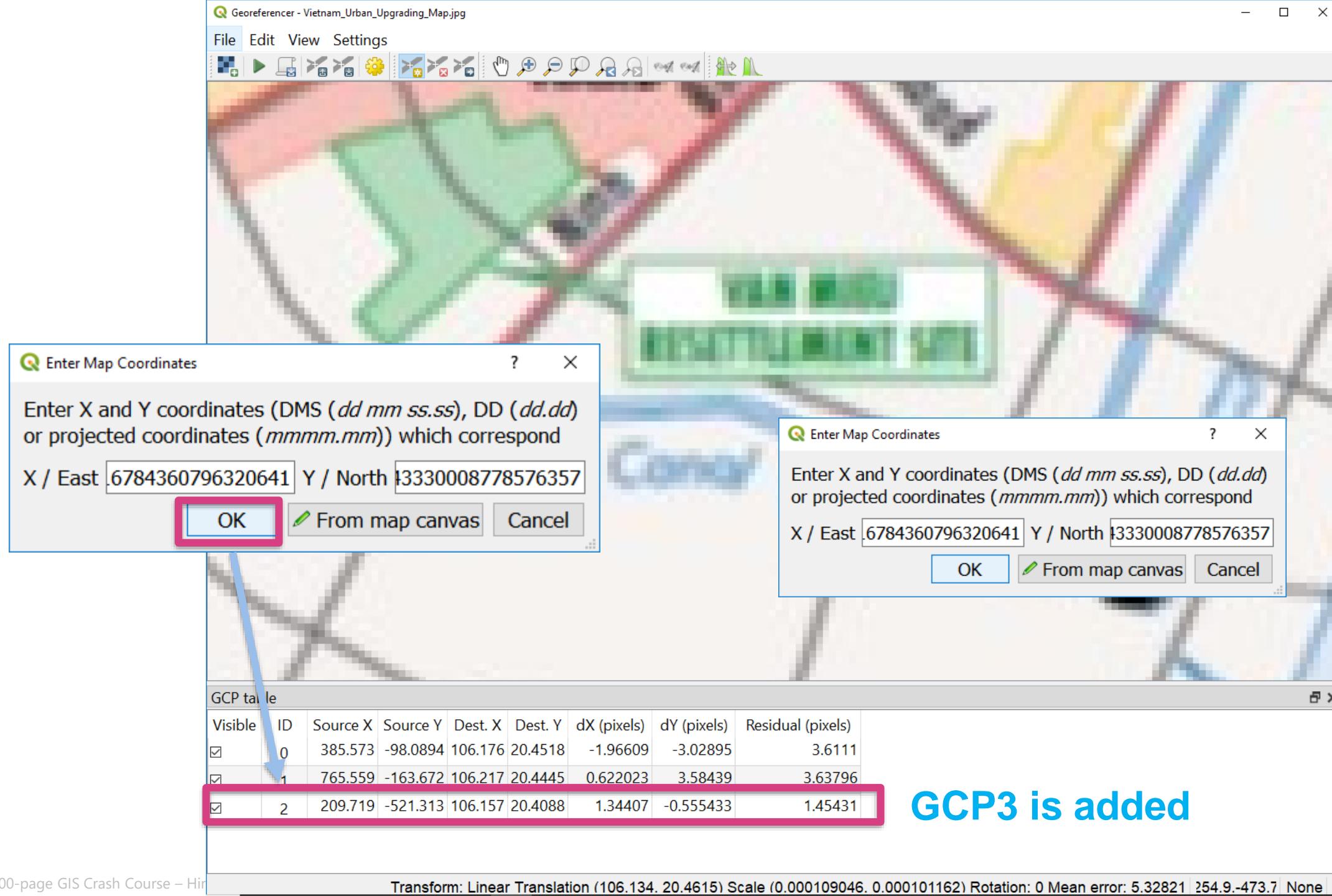


N Processing Toolbox

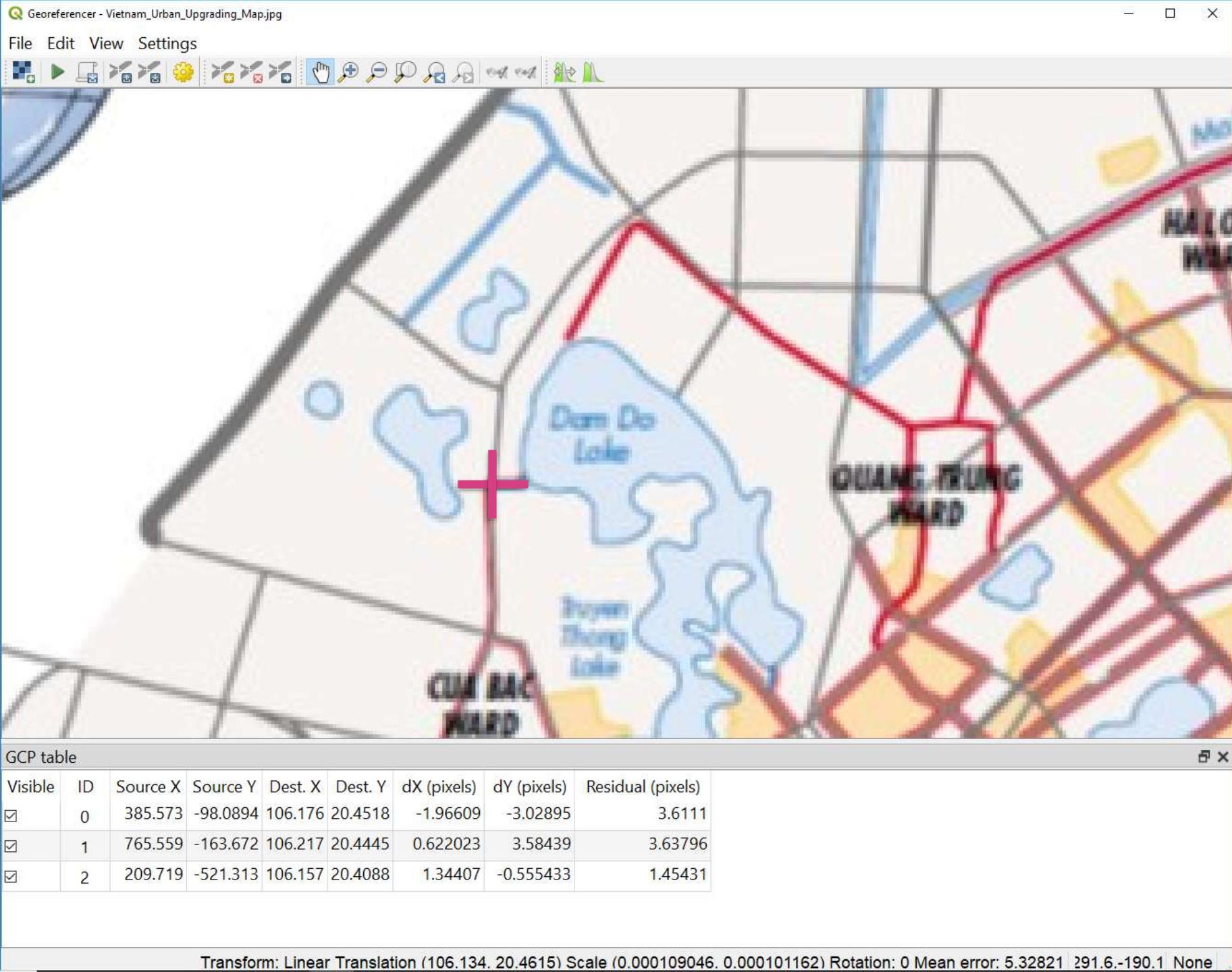


Search.

- > Recently used
  - > Cartography
  - > Database
  - > File tools
  - > Graphics
  - > Interpolation
  - > Layer tools
  - > Network analysis
  - > Raster analysis
  - > Raster terrain analysis
  - > Raster tools
  - > Vector analysis
  - > Vector creation
  - > Vector general
  - > Vector geometry
  - > Vector overlay
  - > Vector selection
  - > Vector table
  - > Contour plugin
  - > GDAL
  - > GRASS
  - > Qgis2threejs
  - > SAGA



# Add GCP4



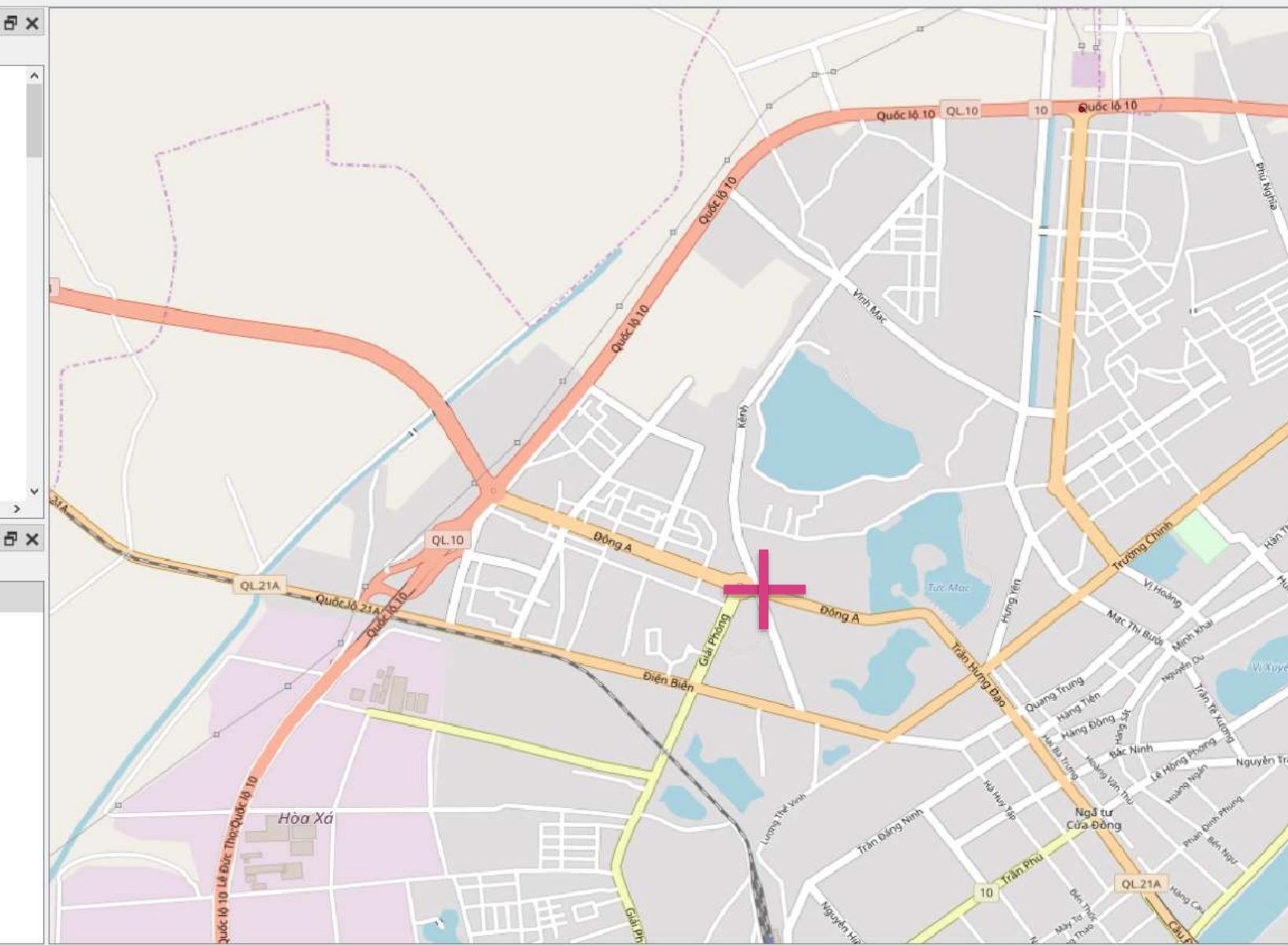


## Browser

- ▼ Favorites
  - Desktop
    - > .ipynb\_checkpoints
    - > Adminbndy Shapefile
    - > ebooklib-0.15
    - > GPX data
    - > MOZ\_adm
    - > OneDrive - WBG - Shortcut.lnk
    - > Pakistan
    - > Populated Places
  - VNM\_adm
    - license.txt
    - VNM\_adm0.csv
    - VNM\_adm0.shp

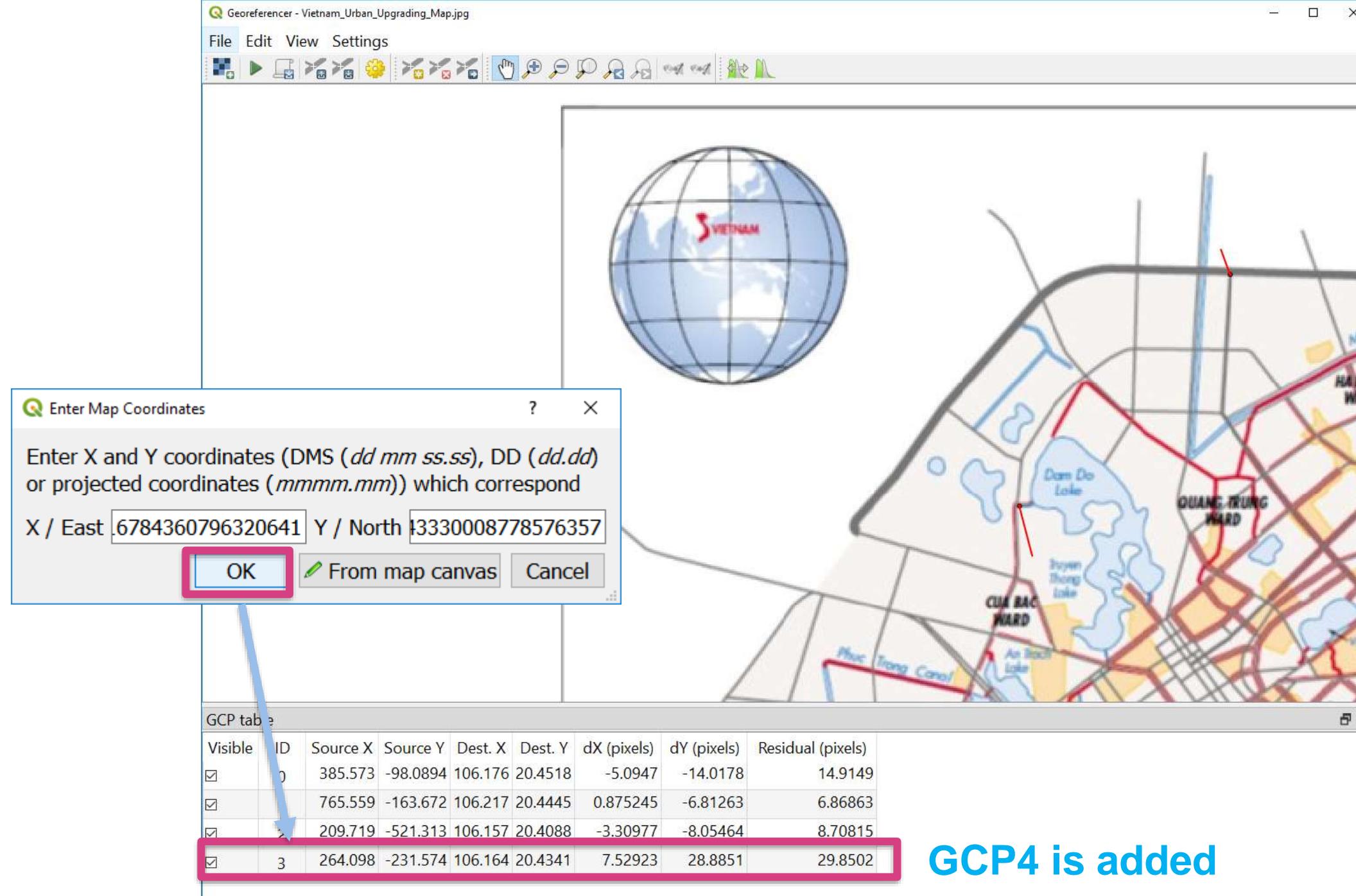
## Layers

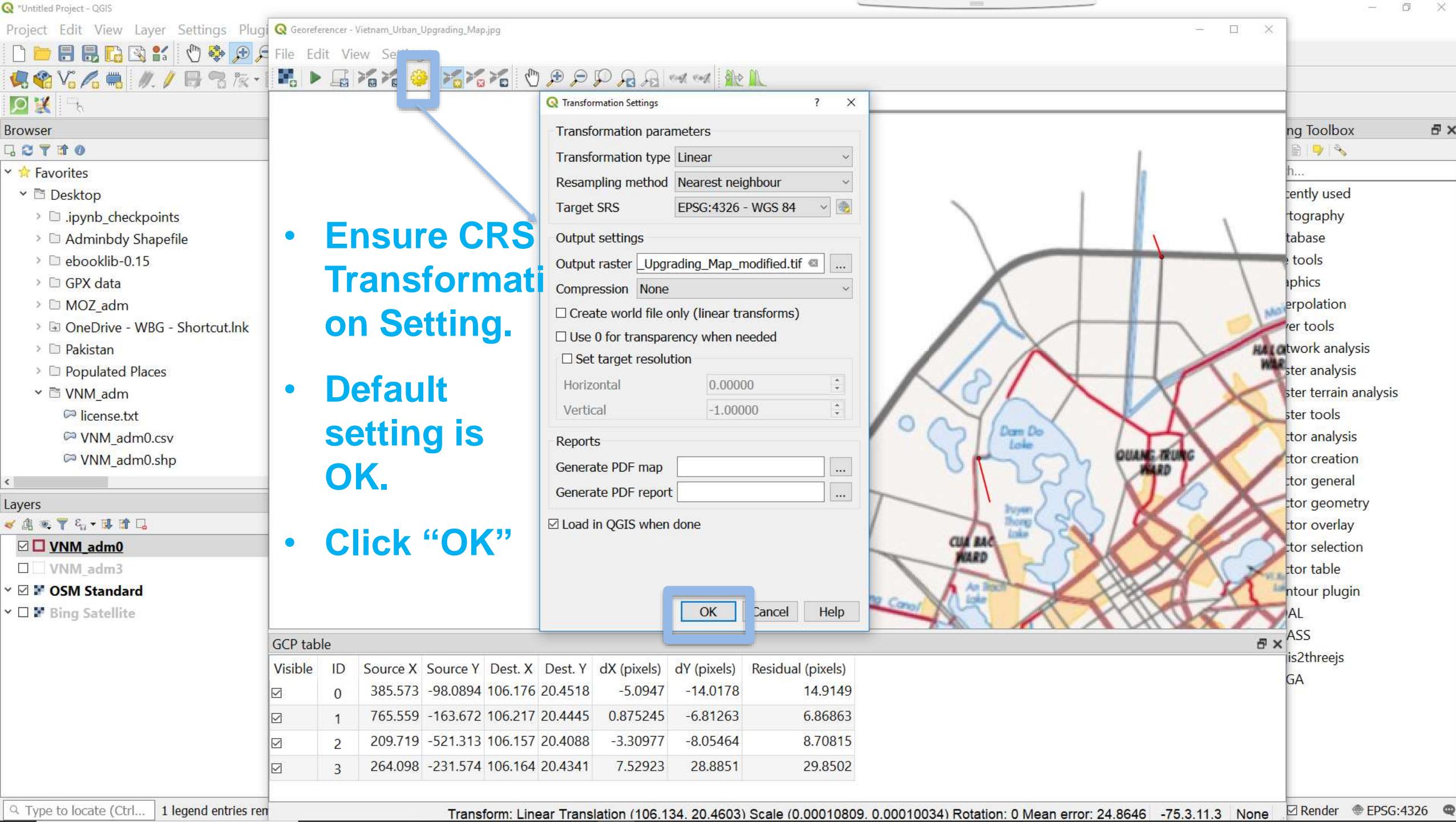
- **VNM\_adm0**
- VNM\_adm3
- **OSM Standard**
- **Bing Satellite**

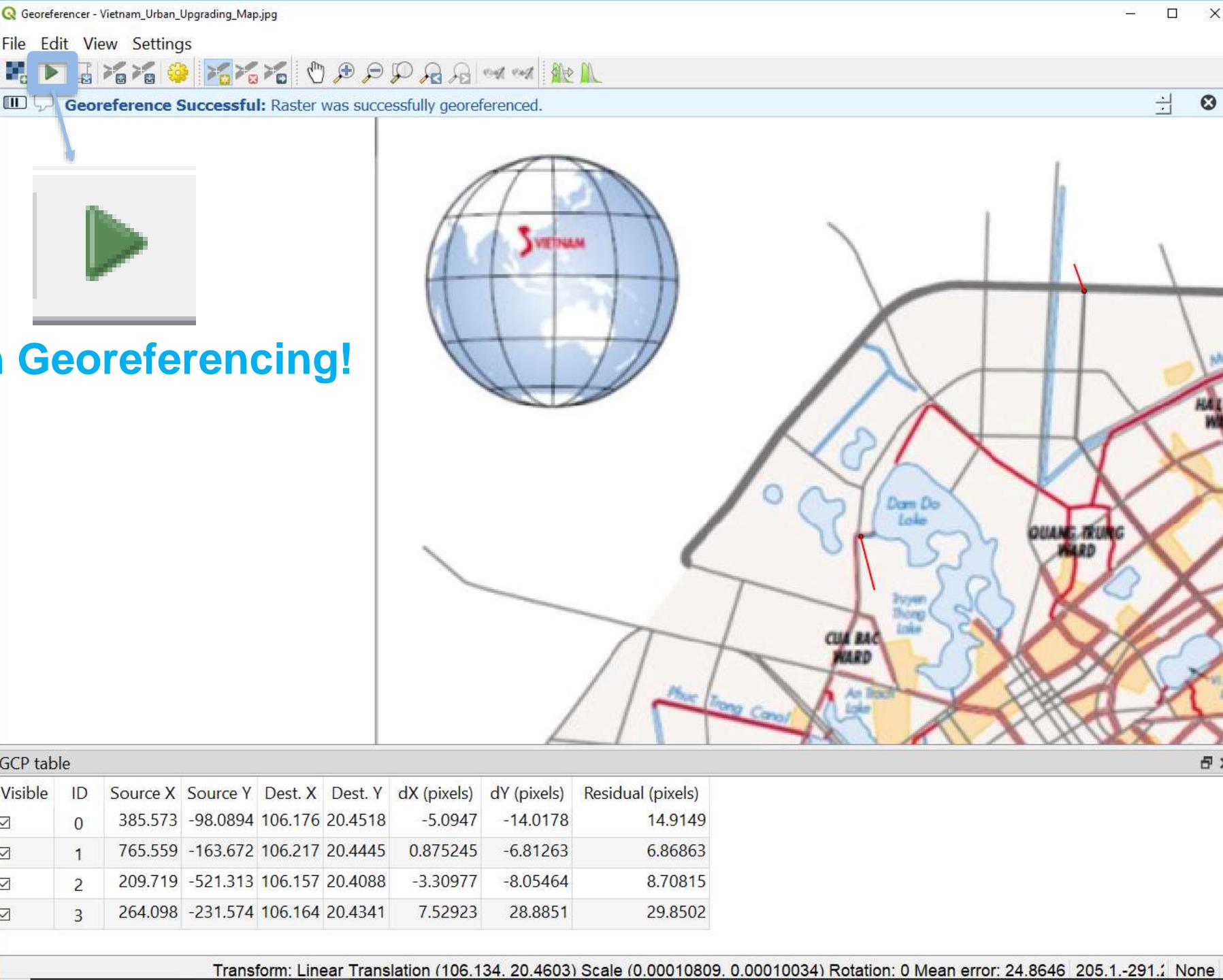


## Processing Toolbox

- Search...
- > ⓘ Recently used
- > ⓘ Cartography
- > ⓘ Database
- > ⓘ File tools
- > ⓘ Graphics
- > ⓘ Interpolation
- > ⓘ Layer tools
- > ⓘ Network analysis
- > ⓘ Raster analysis
- > ⓘ Raster terrain analysis
- > ⓘ Raster tools
- > ⓘ Vector analysis
- > ⓘ Vector creation
- > ⓘ Vector general
- > ⓘ Vector geometry
- > ⓘ Vector overlay
- > ⓘ Vector selection
- > ⓘ Vector table
- > ⓘ Contour plugin
- > ⓘ GDAL
- > ⓘ GRASS
- > ⓘ Qgis2threejs
- > ⓘ SAGA







\*Untitled Project - QGIS

Project Edit View Layer Settings Plugins Vector Raster Database Web MMQGIS Processing Help

Browser

Favorites

- Desktop
  - .ipynb\_checkpoints
  - Adminbdy Shapefile
  - ebooklib-0.15
  - New folder
  - OneDrive - WBG - Shortcut.lnk
- VNM\_adm
  - license.txt
  - VNM\_adm0.csv
  - VNM\_adm0.shp**
  - VNM\_adm1.csv
  - VNM\_adm1.shp
  - VNM\_adm2.csv
  - VNM\_adm2.shp
  - VNM\_adm3.csv
  - VNM\_adm3.shp

Assessing Physical Environment of TOD Communities around...

Assessing Physical Environment of TOD Communities around...

BP\_Development Dataset Acquisition, Archiving and Disse...

BP\_Development Dataset Acquisition, Archiving and Disse...

Layers

- Vietnam\_Urban\_Upgrading\_Map\_modified
- OSM Standard
- Bing Satellite

Processing Toolbox

Search...

- Recently used
- Cartography
- Database
- File tools
- Graphics
- Interpolation
- Layer tools
- Network analysis
- Raster analysis
- Raster terrain analysis
- Raster tools
- Vector analysis
- Vector creation
- Vector general
- Vector geometry
- Vector overlay
- Vector selection
- Vector table
- Contour plugin
- GDAL
- GRASS
- Qgis2threejs
- SAGA

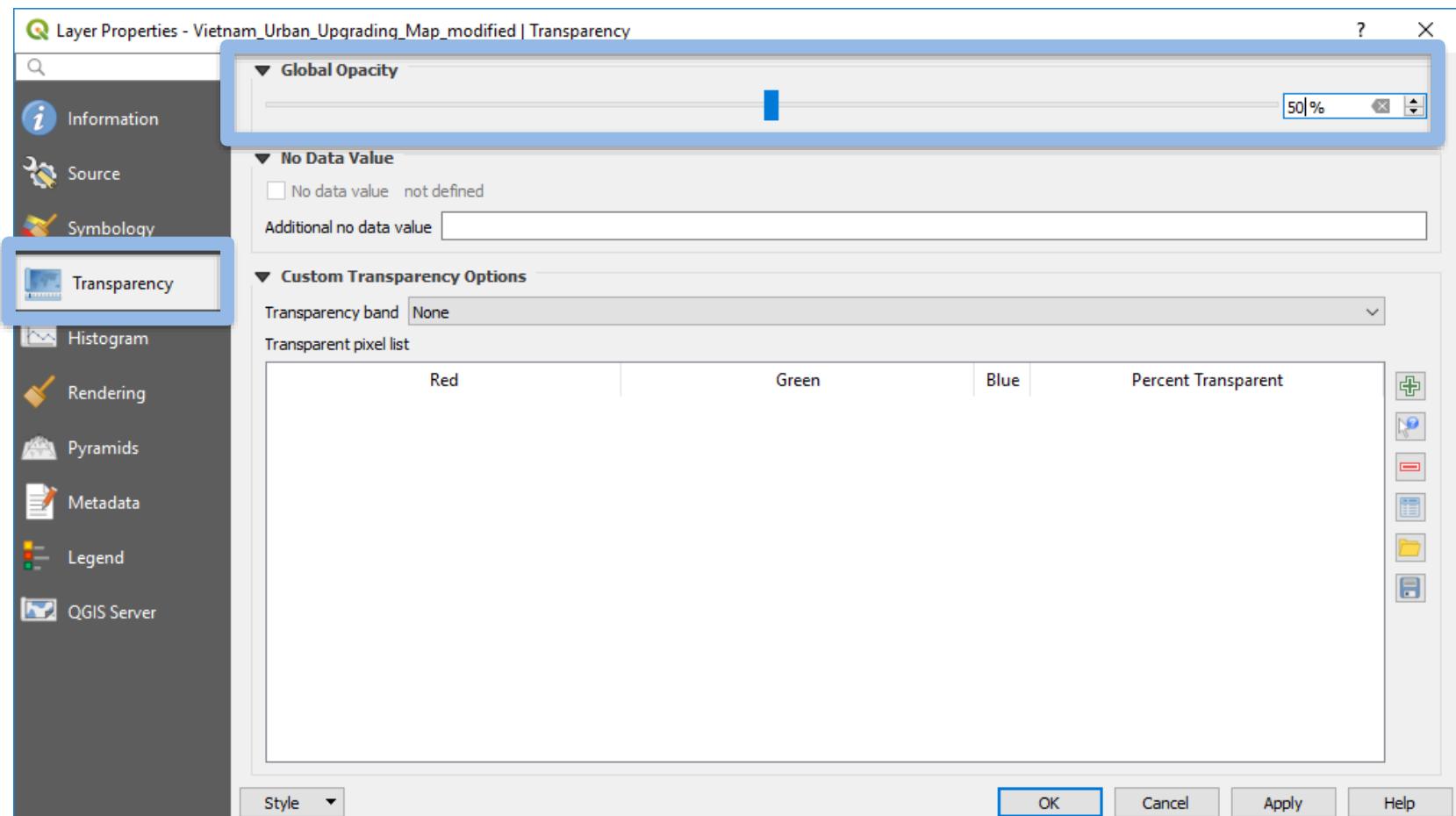
Georeferenced JPEG map is added.

Projected as Raster File

Coordinate 106.1628,20.4240 Scale 1:42536 Magnifier 100% Rotation 0.0° Render EPSG:4326

# Adjust Transparency.

- Double click georeferenced map.



\*Untitled Project - QGIS

Project Edit View Layer Settings Plugins Vector Raster Database Web MMQGIS Processing Help

Browser

Favorites

- Desktop
  - .ipynb\_checkpoints
  - Adminbdy Shapefile
  - ebooklib-0.15
  - New folder
  - OneDrive - WBG - Shortcut.lnk
- VNM\_adm
  - license.txt
  - VNM\_adm0.csv
  - VNM\_adm0.shp**
  - VNM\_adm1.csv
  - VNM\_adm1.shp
  - VNM\_adm2.csv
  - VNM\_adm2.shp
  - VNM\_adm3.csv
  - VNM\_adm3.shp

Assessing Physical Environment of TOD Communities around Hanoi

Assessing Physical Environment of TOD Communities around Hanoi

BP\_Development Dataset Acquisition, Archiving and Dissemination

BP\_Development Dataset Acquisition, Archiving and Dissemination

Layers

Vietnam Urban Upgrading Map Georeferenced

**Vietnam Urban Upgrading Map modified**

VNM\_adm

OSM Standard

Bing Satellite

Processing Toolbox

Search...

Recently used

Cartography

Database

File tools

Graphics

Interpolation

Layer tools

Network analysis

Raster analysis

Raster terrain analysis

Raster tools

Vector analysis

Vector creation

Vector general

Vector geometry

Vector overlay

Vector selection

Vector table

Contour plugin

GDAL

GRASS

Qgis2threejs

SAGA

This area is well projected.

This area is not well projected.

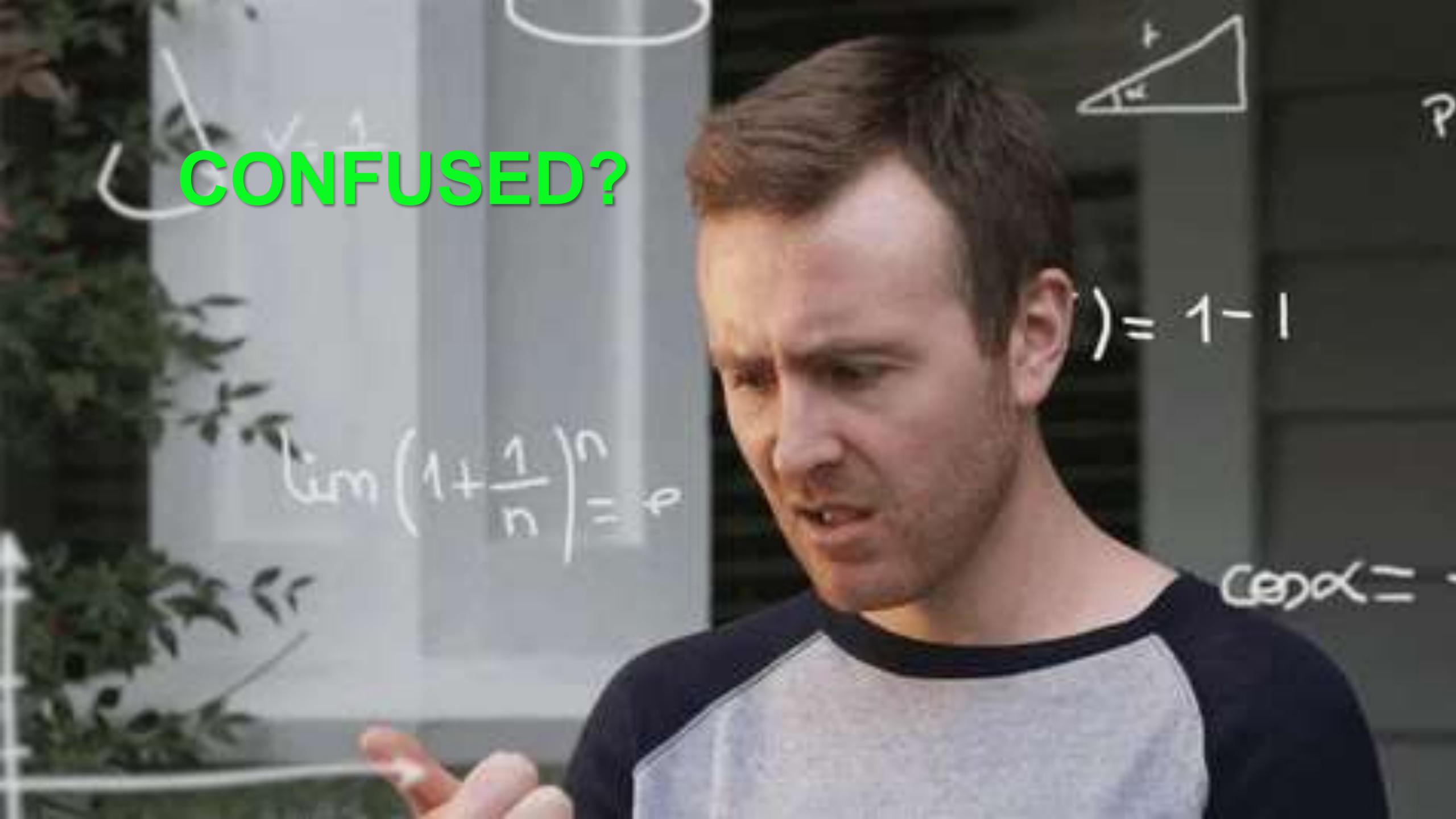
Coordinate 106.2151,20.4447 Scale 1:33860 Magnifier 100% Rotation 0.0° Render EPSG:4326

A close-up portrait of Matt Damon's face from the movie The Bourne Identity. He has short brown hair and a serious, intense expression. His eyes are looking slightly to the left of the camera. The background is blurred, showing what appears to be a forest or outdoor setting.

EASY?

AWESOME

CONFUSED?



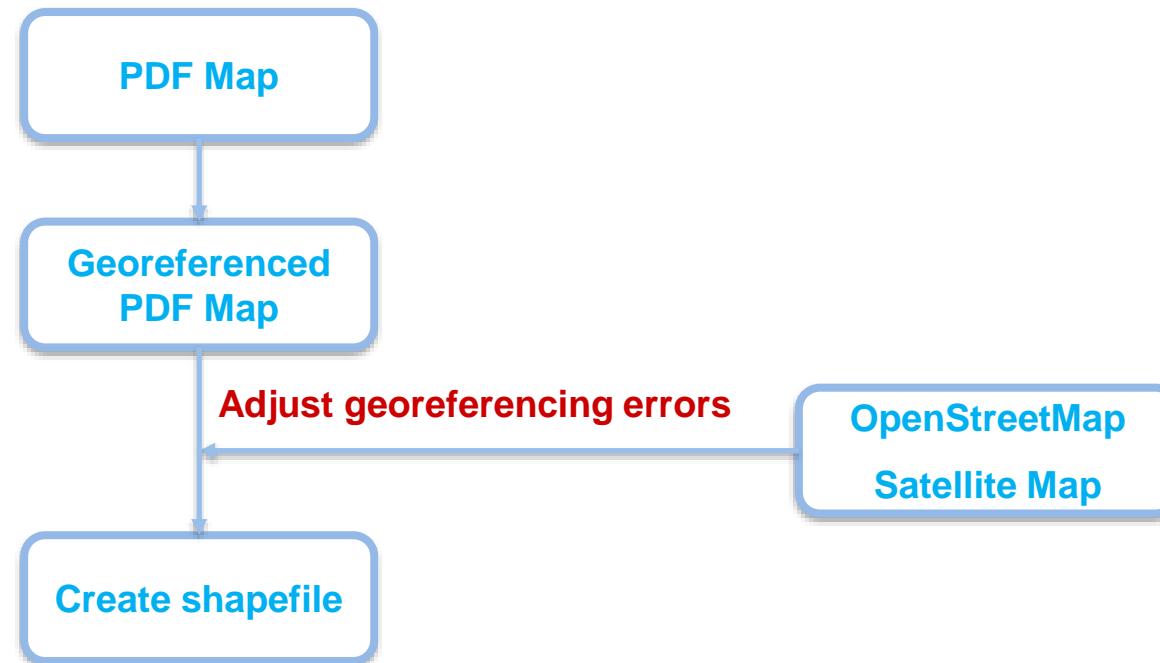


## Exercise

1. Set up working environment
2. Create a new shapefile (line)
3. Create a new shapefile (polygon)
4. Save your map
5. Load your map

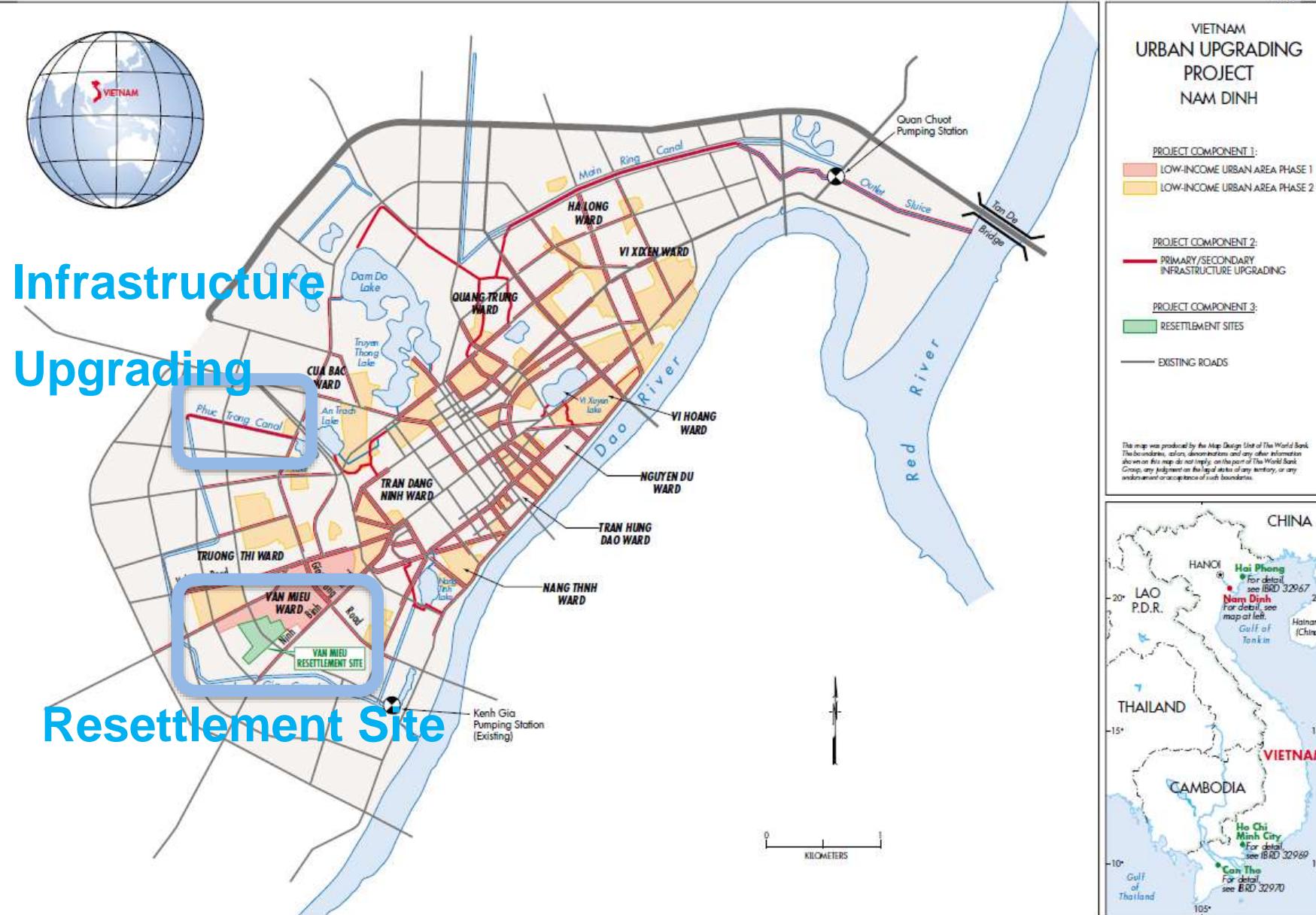
# Create a new shapefile

- The previous process is to project the JPEG/PDF map on QGIS.
- To conduct spatial analysis, you need to create a shapefile of the project location.



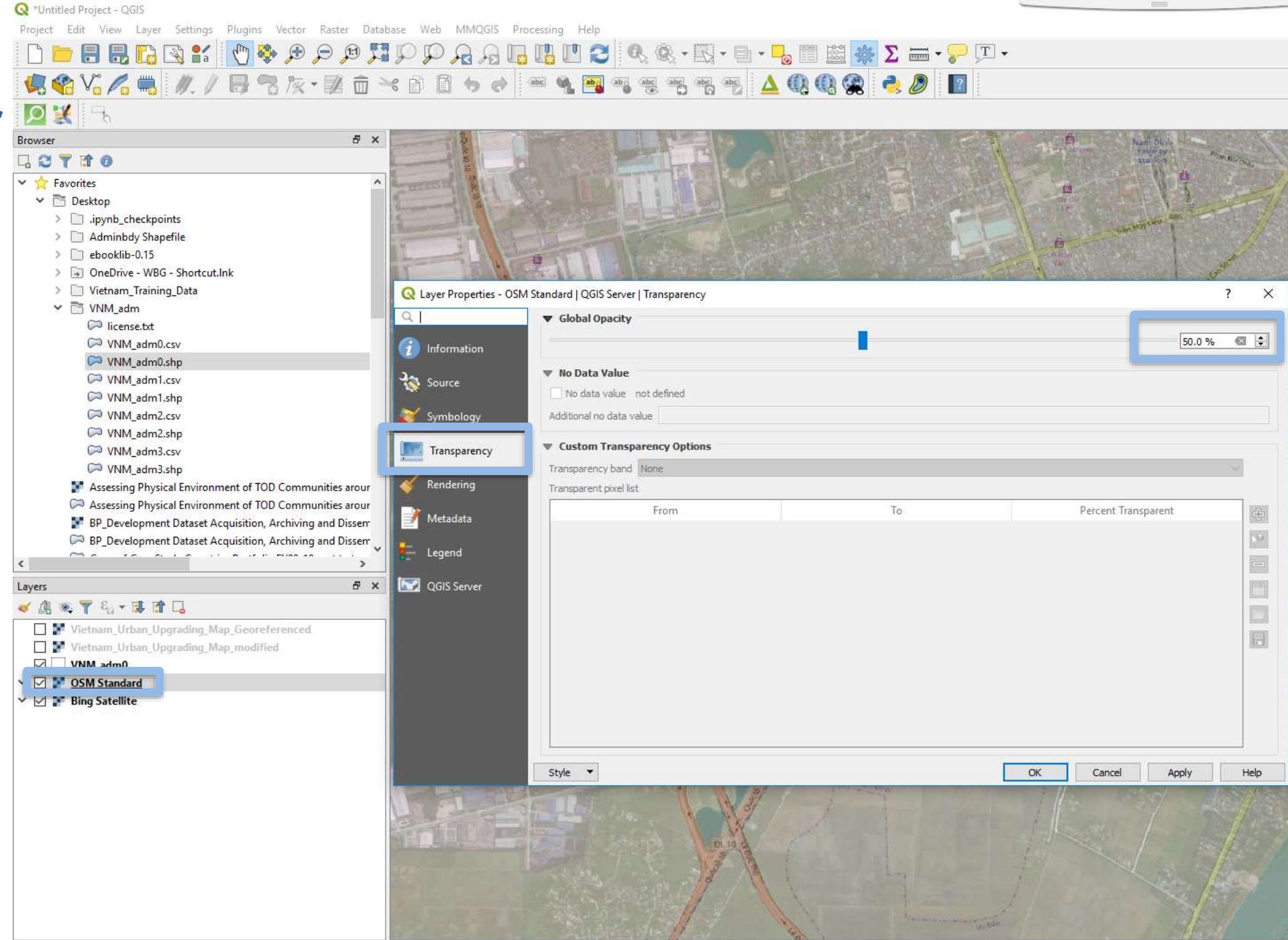
# Create shp file

- Create two shapes
  - Infrastructure upgrading (Line)
  - Resettlement Site (Polygon)



1. Set up working environment
2. Create a new shapefile (line)
3. Create a new shapefile (polygon)
4. Save your map
5. Publish your map

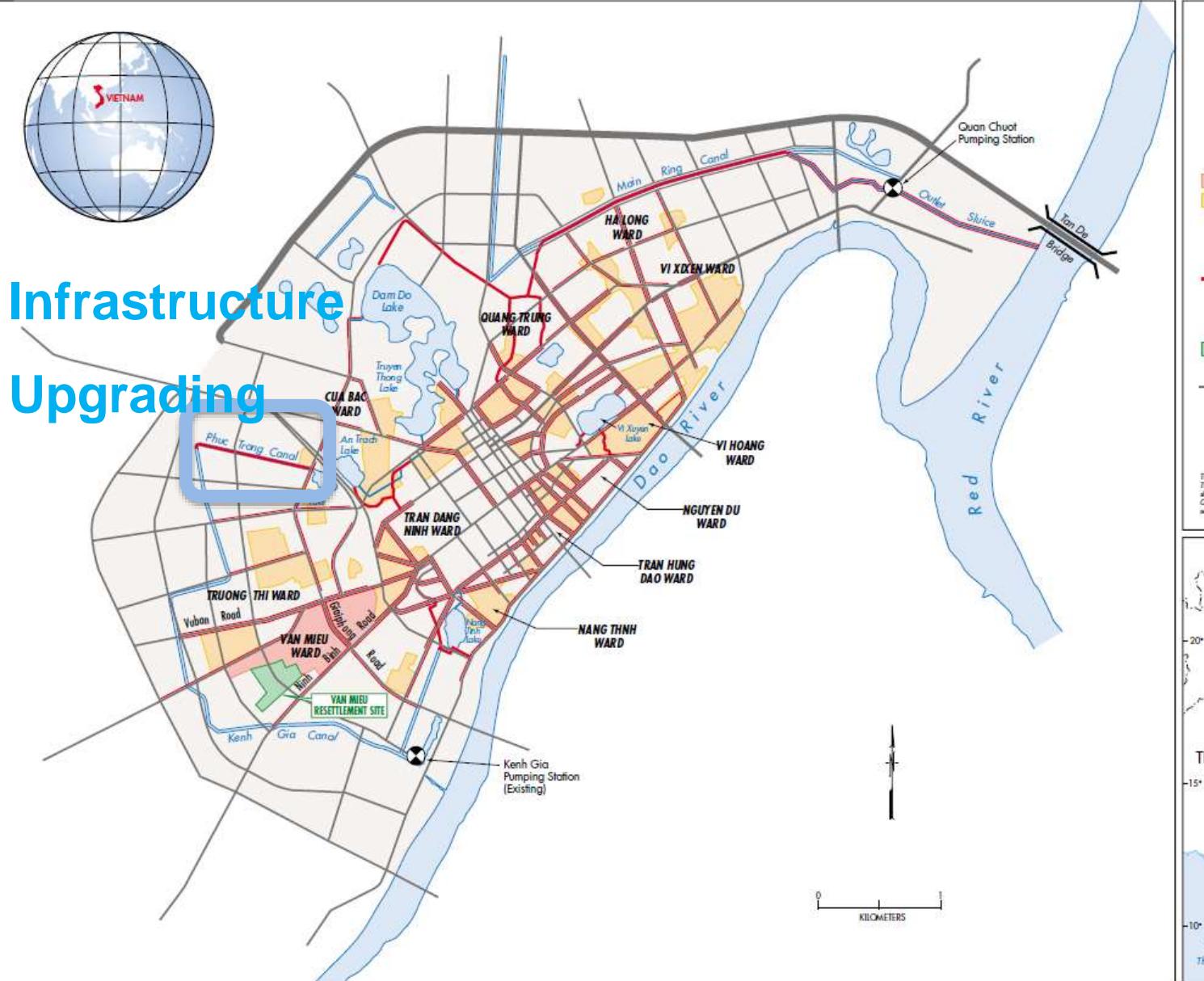
# Prepare a better



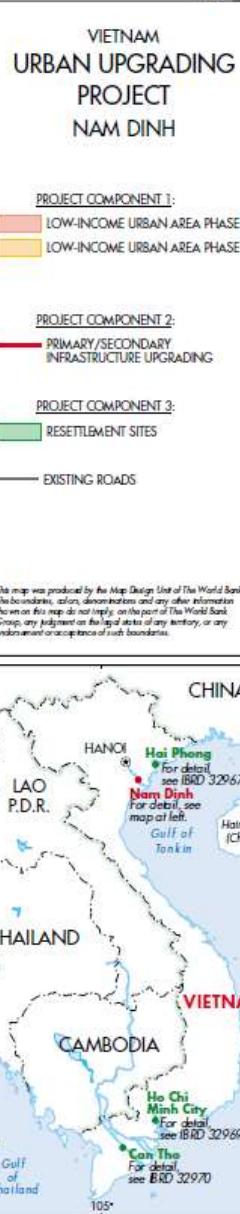
1. Set up working environment
2. Create a new shapefile (line)
3. Create a new shapefile (polygon)
4. Save your map
5. Publish your map

# Create shp file

- Create two shapes
  - Infrastructure upgrading (Line)
  - Resettlement Site (Polygon)



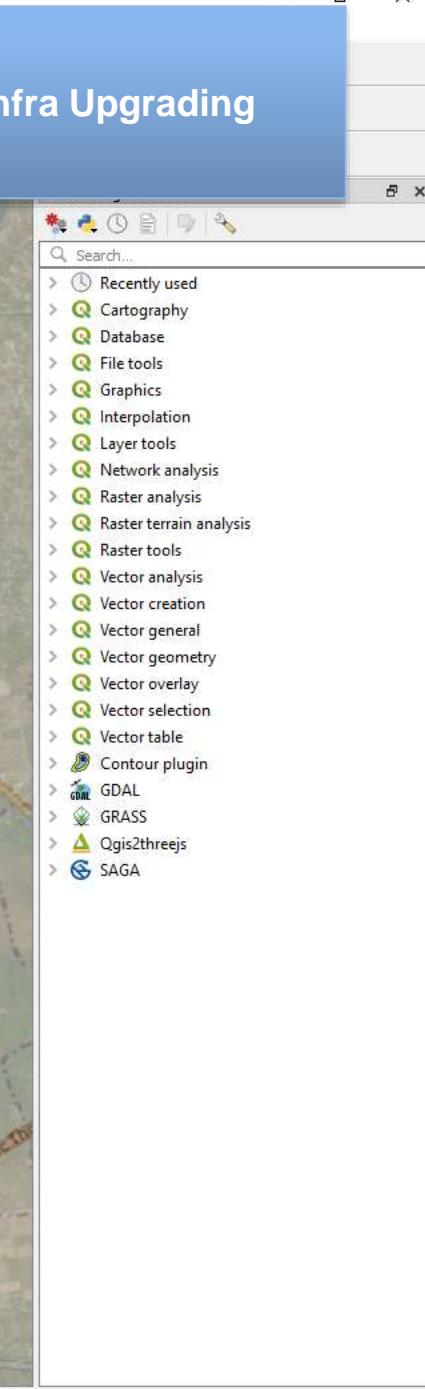
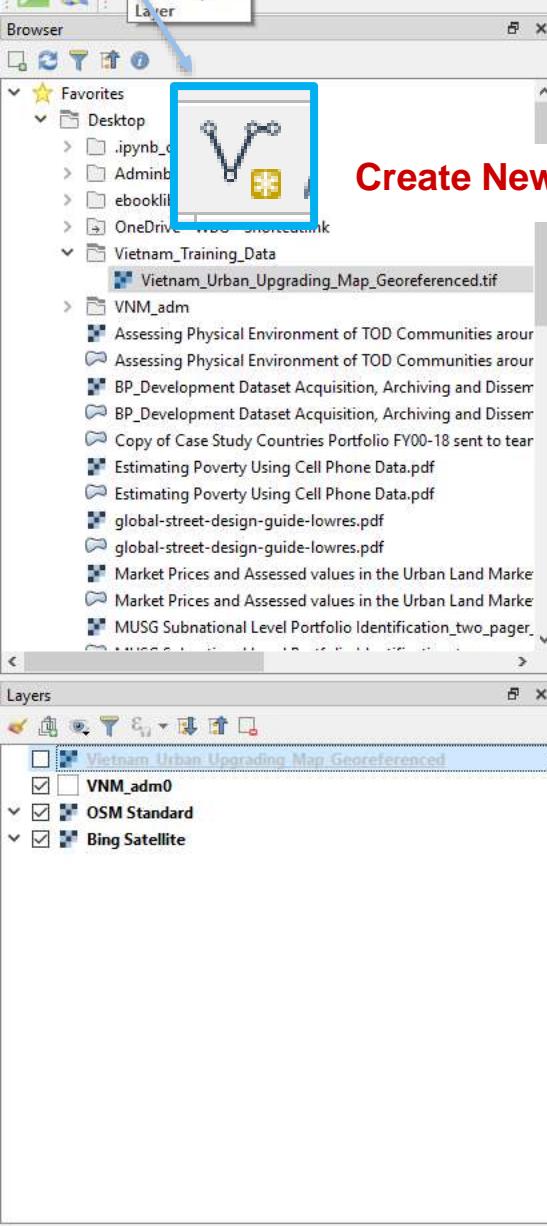
Infrastructure  
Upgrading



1. Set up working environment
2. Create a new shapefile (line)
3. Create a new shapefile (polygon)
4. Save your map
5. Publish your map

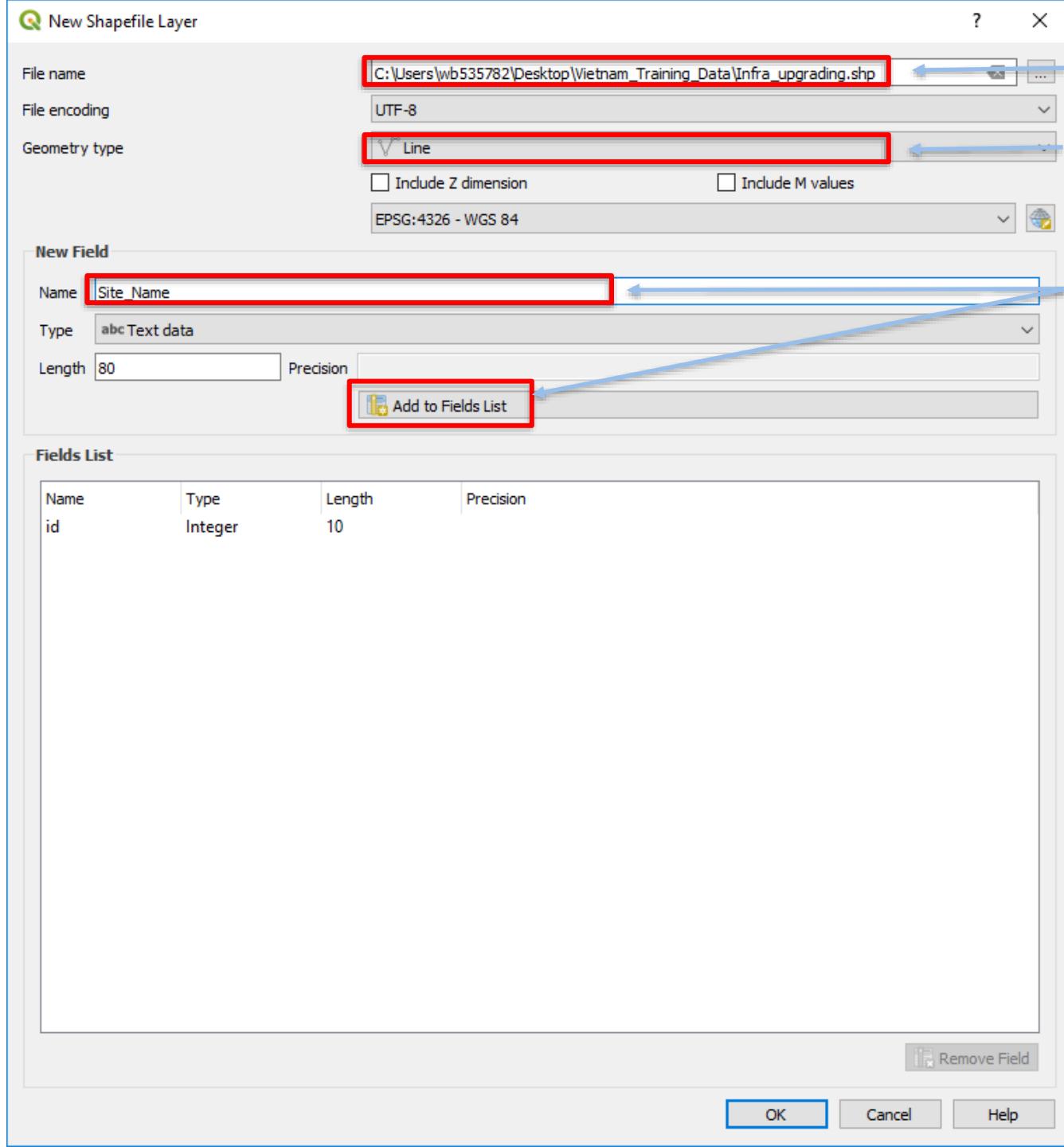


## Infra Upgrading



File name and location  
Select “Line”

You can add a column



Infra Upgrading

\*Untitled Project - QGIS

Project Edit View Layer Settings Plugins Vector Raster Database Web MMQGIS Processing Help

Browser

Favorites

- Desktop
  - .ipynb\_checkpoints
  - Adminbdy Shapefile
  - ebooklib-0.15
  - OneDrive - WBG - Shortcut.lnk
- Vietnam\_Training\_Data
  - Infra\_upgrading.shp
  - Resettlement\_Site.shp
  - Vietnam\_Urban\_Upgrading\_Map\_Georeferenced.tif
- VNM\_adm
  - Assessing Physical Environment of TOD Communities arour
  - Assessing Physical Environment of TOD Communities arour
  - BP\_Development Dataset Acquisition, Archiving and Dissem
  - BP\_Development Dataset Acquisition, Archiving and Dissem
  - Copy of Case Study Countries Portfolio FY00-18 sent to tear
  - Estimating Poverty Using Cell Phone Data.pdf
  - Estimating Poverty Using Cell Phone Data.pdf
  - global-street-design-guide-lowres.pdf
  - global-street-design-guide-lowres.pdf
  - Market Prices and Assessed values in the Urban Land Marke

Layers

- Infra upgrading
- Vietnam\_Urban\_Upgrading\_Map\_Georeferenced
- VNM\_adm0
- OSM Standard
- Bing Satellite
- Resettlement\_Site

New blank shapefile is added.

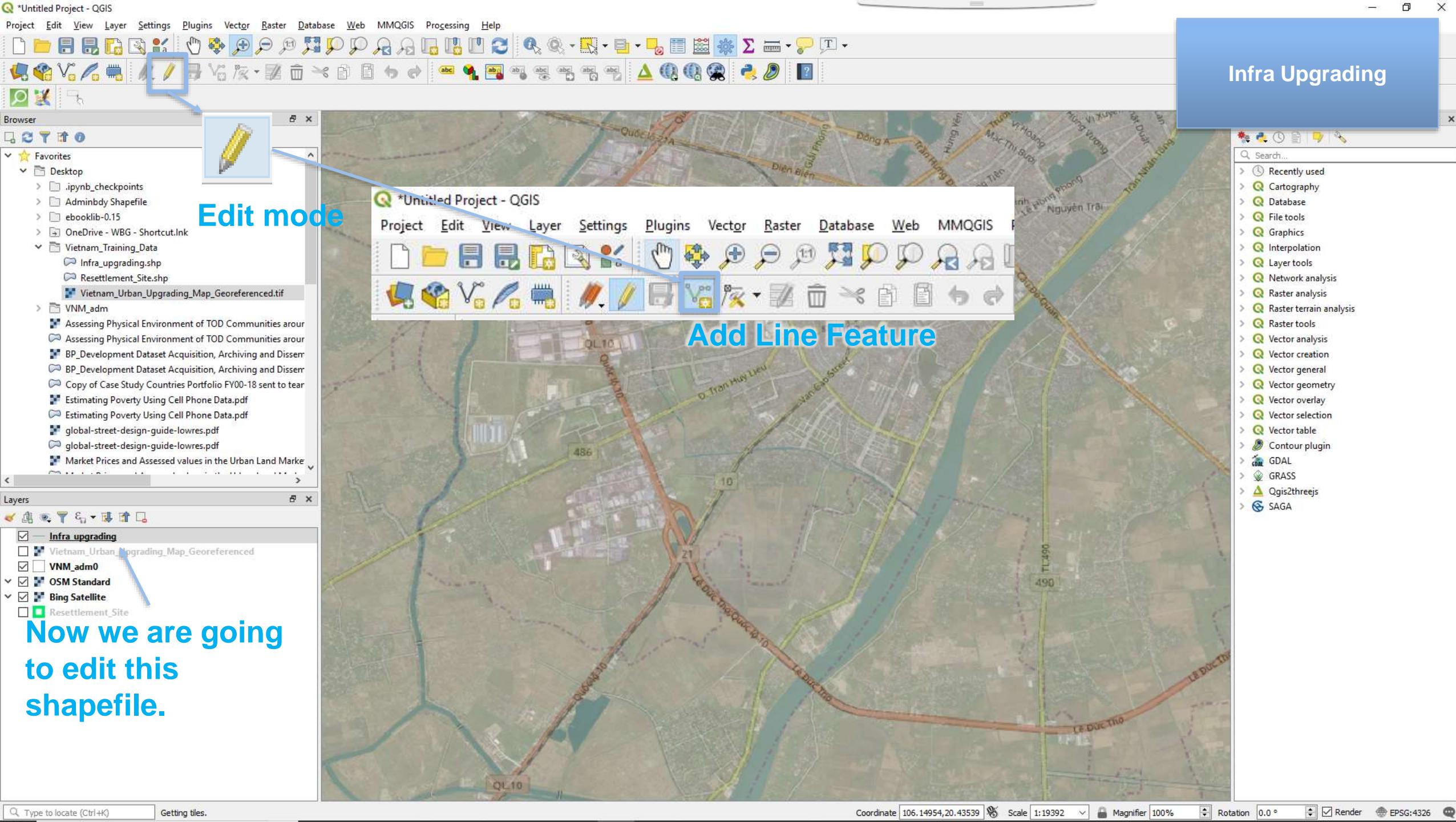
Infra Upgrading

Search...

- Recently used
- Cartography
- Database
- File tools
- Graphics
- Interpolation
- Layer tools
- Network analysis
- Raster analysis
- Raster terrain analysis
- Raster tools
- Vector analysis
- Vector creation
- Vector general
- Vector geometry
- Vector overlay
- Vector selection
- Vector table
- Contour plugin
- GDAL
- GRASS
- Qgis2threejs
- SAGA

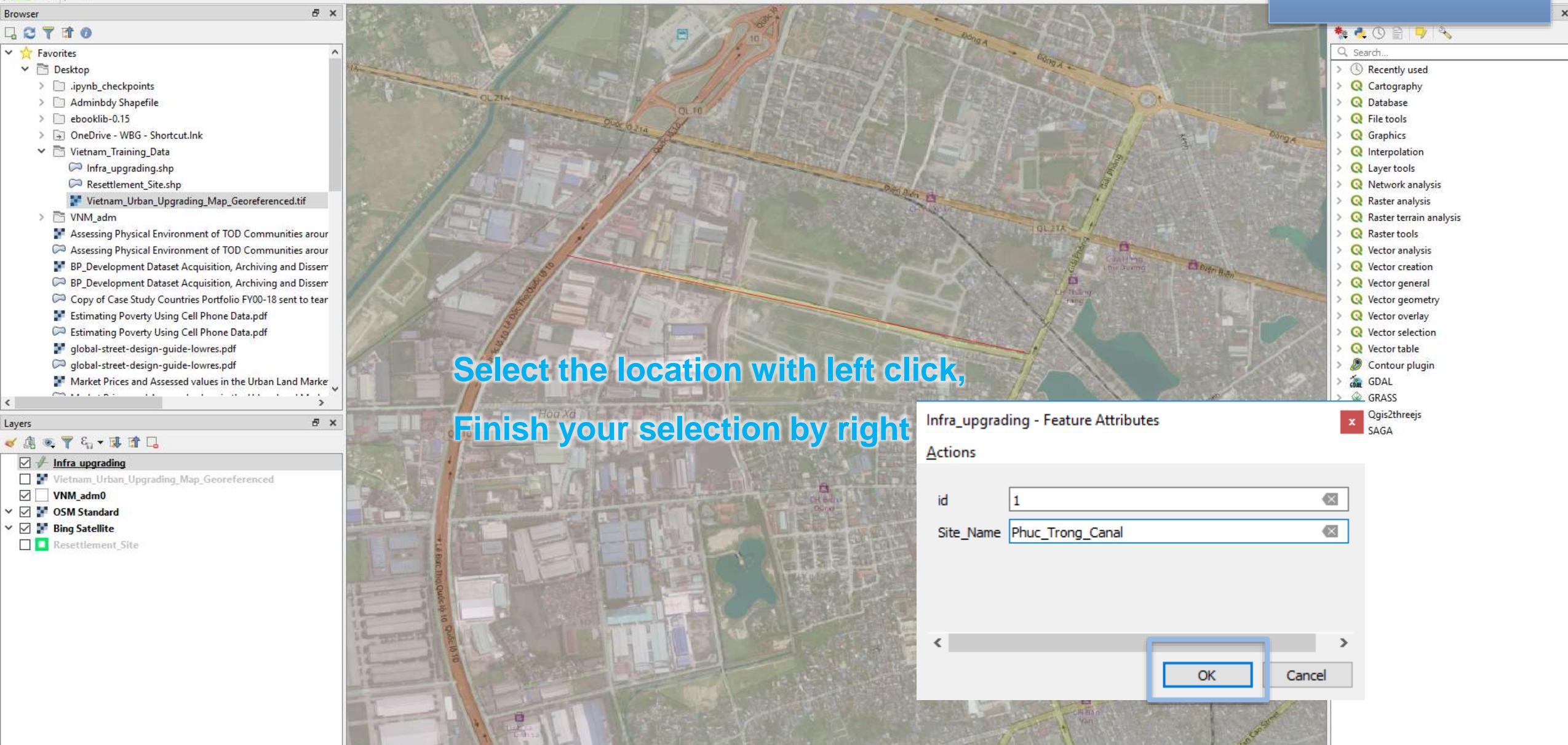
Type to locate (Ctrl+K) Getting tiles.

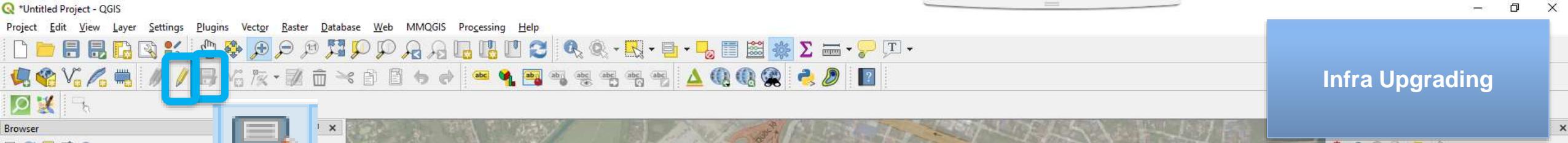
Coordinate 106.14954, 20.43539 Scale 1:19392 Magnifier 100% Rotation 0.0° Render EPSG:4326





## Infra Upgrading





Infra Upgrading

Project Desktop Favorites

- Desktop
- .ipynb\_checkpoints
- Adminbdy Shapefile
- ebooklib-0.15
- OneDrive - WBG - Shortcut.lnk
- Vietnam\_Training\_Data
  - Infra\_upgrading.shp
  - Resettlement\_Site.shp
  - Vietnam\_Urban\_Upgrading\_Map\_Georeferenced.tif
- VNM\_adm
  - Assessing Physical Environment of TOD Communities arou
  - Assessing Physical Environment of TOD Communities arou
  - BP\_Development Dataset Acquisition, Archiving and Dissem
  - BP\_Development Dataset Acquisition, Archiving and Dissem
  - Copy of Case Study Countries Portfolio FY00-18 sent to tear
  - Estimating Poverty Using Cell Phone Data.pdf
  - Estimating Poverty Using Cell Phone Data.pdf
  - global-street-design-guide-lowres.pdf
  - global-street-design-guide-lowres.pdf
  - Market Prices and Assessed values in the Urban Land Marke

Layers

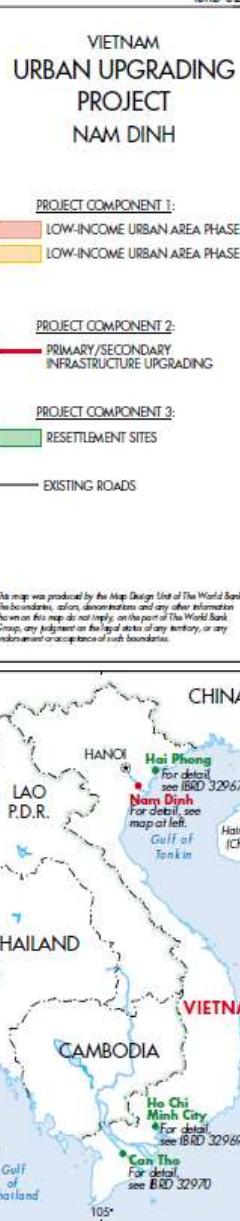
- Infra upgrading
- Vietnam\_Urban\_Upgrading\_Map\_Georeferenced
- VNM\_adm0
- OSM Standard
- Bing Satellite
- Resettlement\_Site

- Search...
- Recently used
  - Cartography
  - Database
  - File tools
  - Graphics
  - Interpolation
  - Layer tools
  - Network analysis
  - Raster analysis
  - Raster terrain analysis
  - Raster tools
  - Vector analysis
  - Vector creation
  - Vector general
  - Vector geometry
  - Vector overlay
  - Vector selection
  - Vector table
  - Contour plugin
  - GDAL
  - GRASS
  - Qgis2threejs
  - SAGA

# Create shp file

- Create two shapes
  - Infrastructure upgrading (Line)
  - Resettlement Site (Polygon)

1. Set up working environment
2. Create a new shapefile (line)
3. Create a new shapefile (polygon)
4. Save your map
5. Publish your map



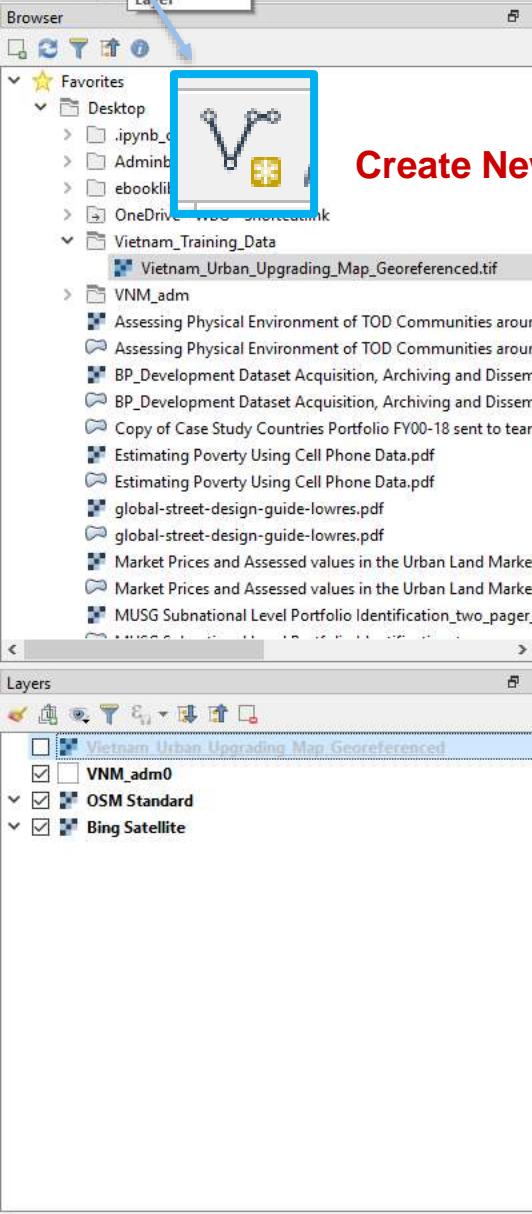


## Resettlement Site

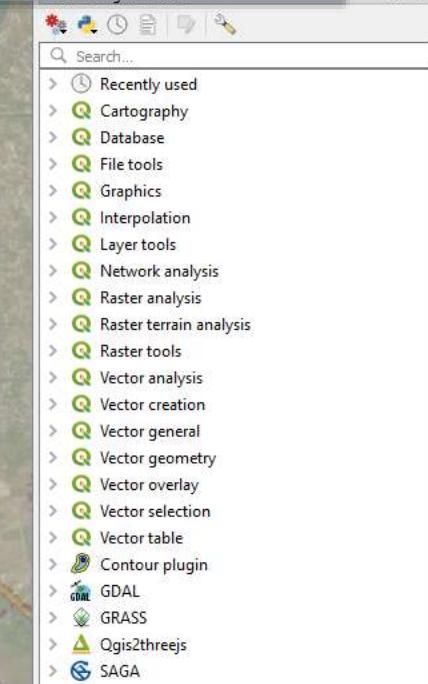
The figure is a screenshot of the QGIS application interface. The main area displays a map of a city in Vietnam, specifically Hanoi, with a grid overlay. Several layers are visible, including roads, water bodies, and administrative boundaries. A blue rectangular selection box highlights a specific area in the center-left of the map. An arrow points from this highlighted area towards the bottom left of the map. The left sidebar contains a 'Browser' panel with a tree view of files and a 'Layers' panel listing the currently loaded layers: 'Vietnam Urban Upgrading Map Georeferenced' (checked), 'VNM\_adm0' (unchecked), 'OSM Standard' (checked), and 'Bing Satellite' (checked). The right sidebar contains a 'Search...' field and a list of recently used and available QGIS tools, such as Cartography, Database, File tools, Graphics, Interpolation, Layer tools, Network analysis, Raster analysis, Raster terrain analysis, Raster tools, Vector analysis, Vector creation, Vector general, Vector geometry, Vector overlay, Vector selection, Vector table, Contour plugin, GDAL, GRASS, Oqis2threejs, and SAGA.



## Create New Shapefile

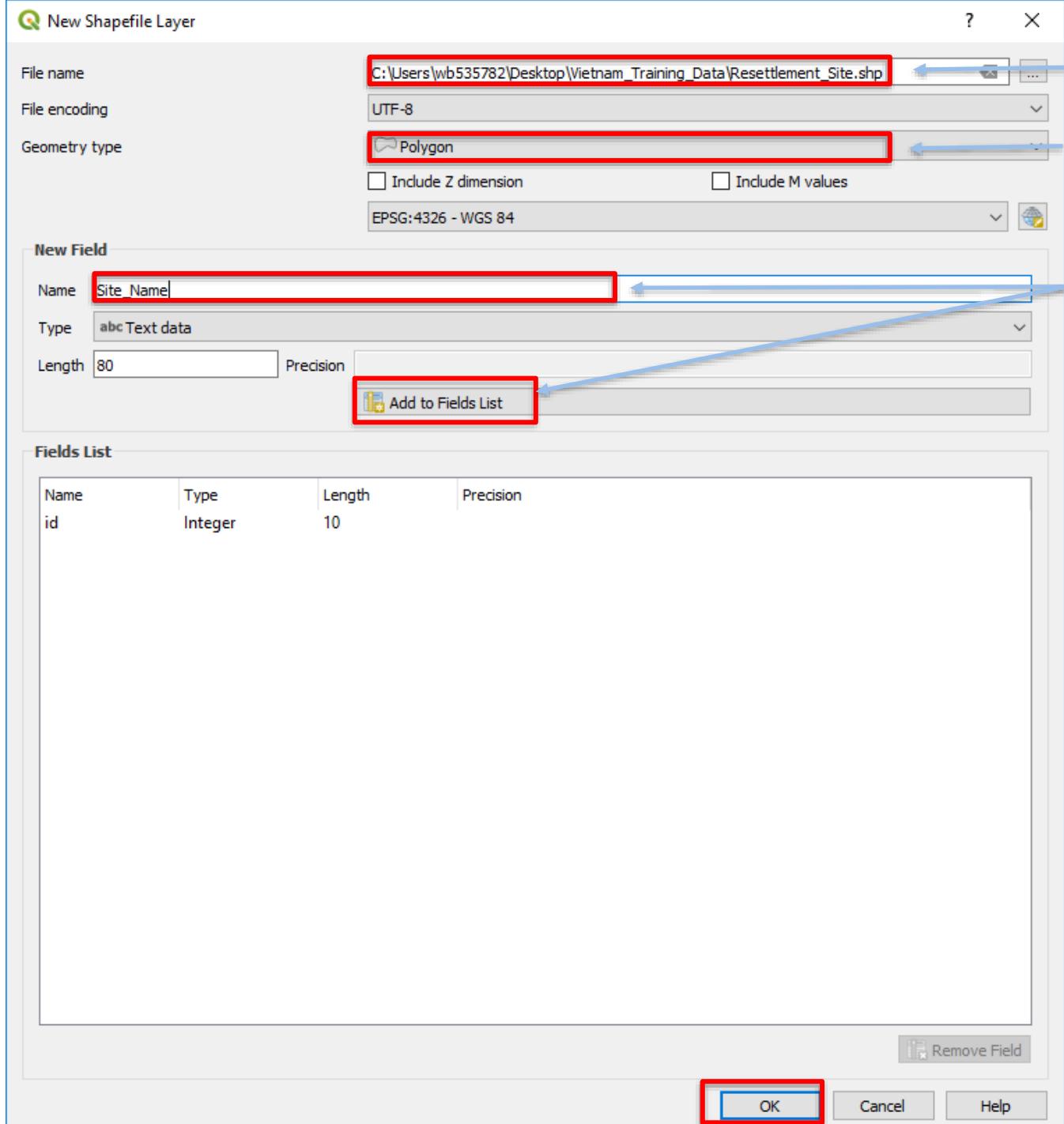


## Resettlement Site



File name and location  
Select “Polygon”

You can add a column



Resettlement Site

\*Untitled Project - QGIS

Project Edit View Layer Settings Plugins Vector Raster Database Web MMQGIS Processing Help

Browser

Favorites

- Desktop
  - .ipynb\_checkpoints
  - Adminbdy Shapefile
  - ebooklib-0.15
  - OneDrive - WBG - Shortcut.lnk
- Vietnam\_Training\_Data
  - Resettlement\_Site.shp
  - Vietnam\_Urban\_Upgrading\_Map\_Georeferenced.tif
- VNM\_adm
  - Assessing Physical Environment of TOD Communities arour
  - Assessing Physical Environment of TOD Communities arour
  - BP\_Development Dataset Acquisition, Archiving and Disserr
  - BP\_Development Dataset Acquisition, Archiving and Dissem
  - Copy of Case Study Countries Portfolio FY00-18 sent to tear
  - Estimating Poverty Using Cell Phone Data.pdf
  - Estimating Poverty Using Cell Phone Data.pdf
  - global-street-design-guide-lowres.pdf
  - global-street-design-guide-lowres.pdf
  - Market Prices and Assessed values in the Urban Land Marke
  - Market Prices and Assessed values in the Urban Land Marke

Layers

- Resettlement Site
- Vietnam\_Urban\_Upgrading\_Map\_Georeferenced
- VNM\_adm0
- OSM Standard
- Bing Satellite

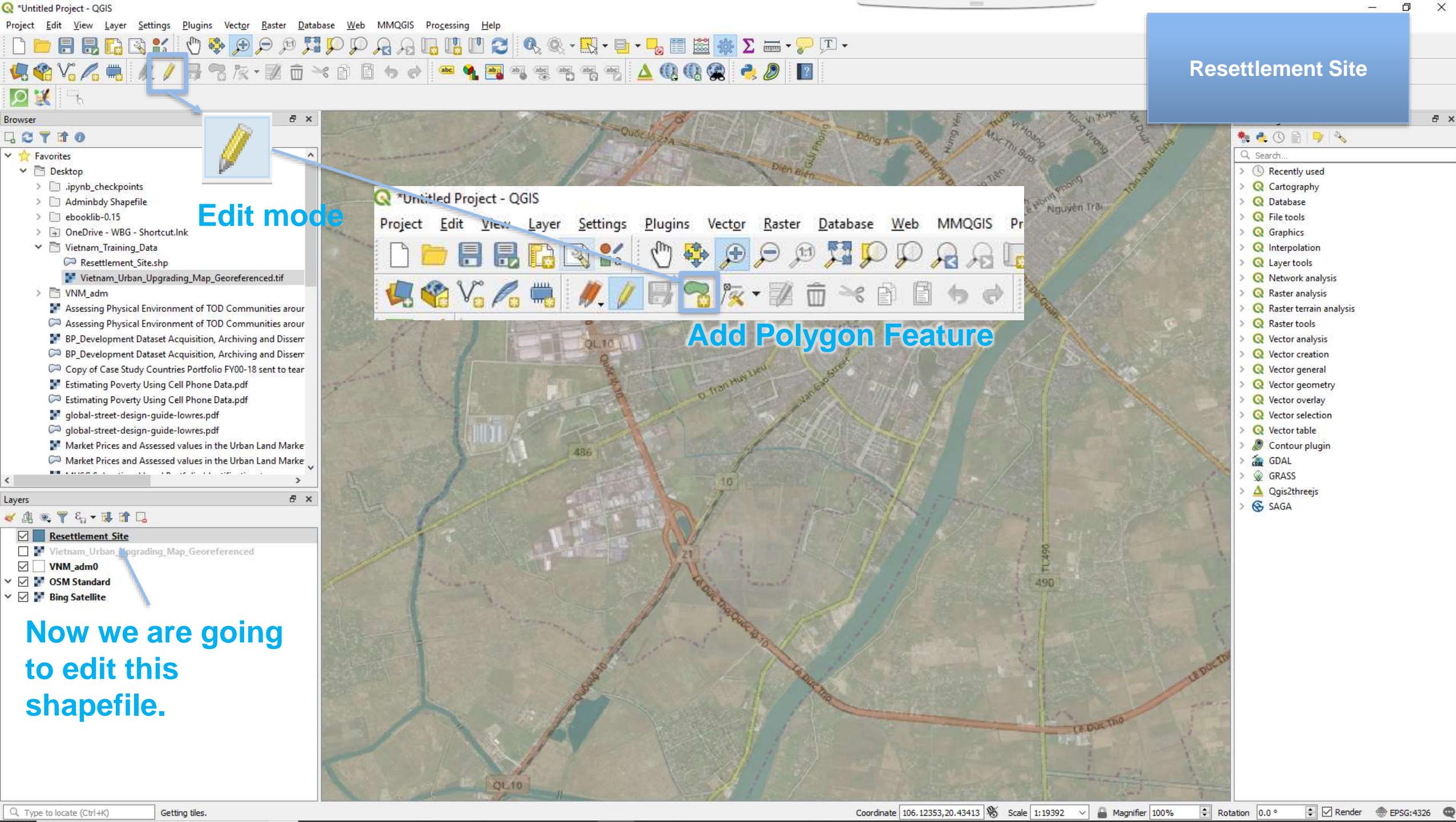
New blank shapefile is added.

Resettlement Site

Search... Recently used Cartography Database File tools Graphics Interpolation Layer tools Network analysis Raster analysis Raster terrain analysis Raster tools Vector analysis Vector creation Vector general Vector geometry Vector overlay Vector selection Vector table Contour plugin GDAL GRASS Qgis2threejs SAGA

Type to locate (Ctrl+K) Getting tiles.

Coordinate 106,12353,20,43413 Scale 1:19392 Magnifier 100% Rotation 0.0° Render EPSG:4326





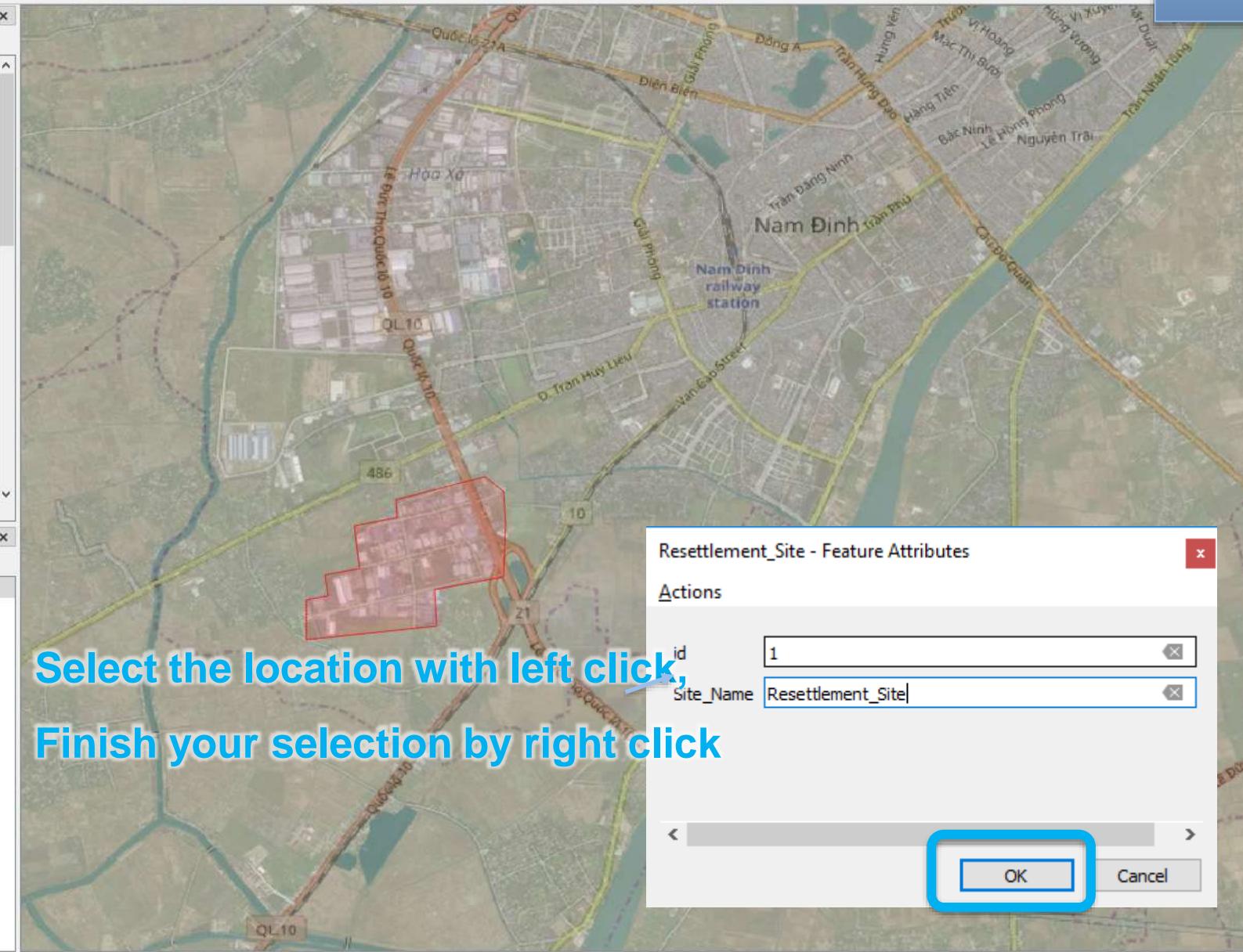
## Resettlement Site

Browser

- Favorites
  - Desktop
    - .ipynb\_checkpoints
    - Adminbdy Shapefile
    - ebooklib-0.15
    - OneDrive - WBG - Shortcut.lnk
  - Vietnam\_Training\_Data
    - Resettlement\_Site.shp
    - Vietnam\_Urban\_Upgrading\_Map\_Georeferenced.tif
  - VNM\_adm
    - Assessing Physical Environment of TOD Communities arour
    - Assessing Physical Environment of TOD Communities arour
    - BP\_Development Dataset Acquisition, Archiving and Disserr
    - BP\_Development Dataset Acquisition, Archiving and Dissen
    - Copy of Case Study Countries Portfolio FY00-18 sent to tear
    - Estimating Poverty Using Cell Phone Data.pdf
    - Estimating Poverty Using Cell Phone Data.pdf
    - global-street-design-guide-lowres.pdf
    - global-street-design-guide-lowres.pdf
    - Market Prices and Assessed values in the Urban Land Marke
    - Market Prices and Assessed values in the Urban Land Marke

## Layers

- Resettlement Site
- Vietnam\_Urban\_Upgrading\_Map\_Georeferenced
- VNM\_adm0
- OSM Standard
- Bing Satellite



Select the location with left click,  
Finish your selection by right click

## Resettlement\_Site - Feature Attributes

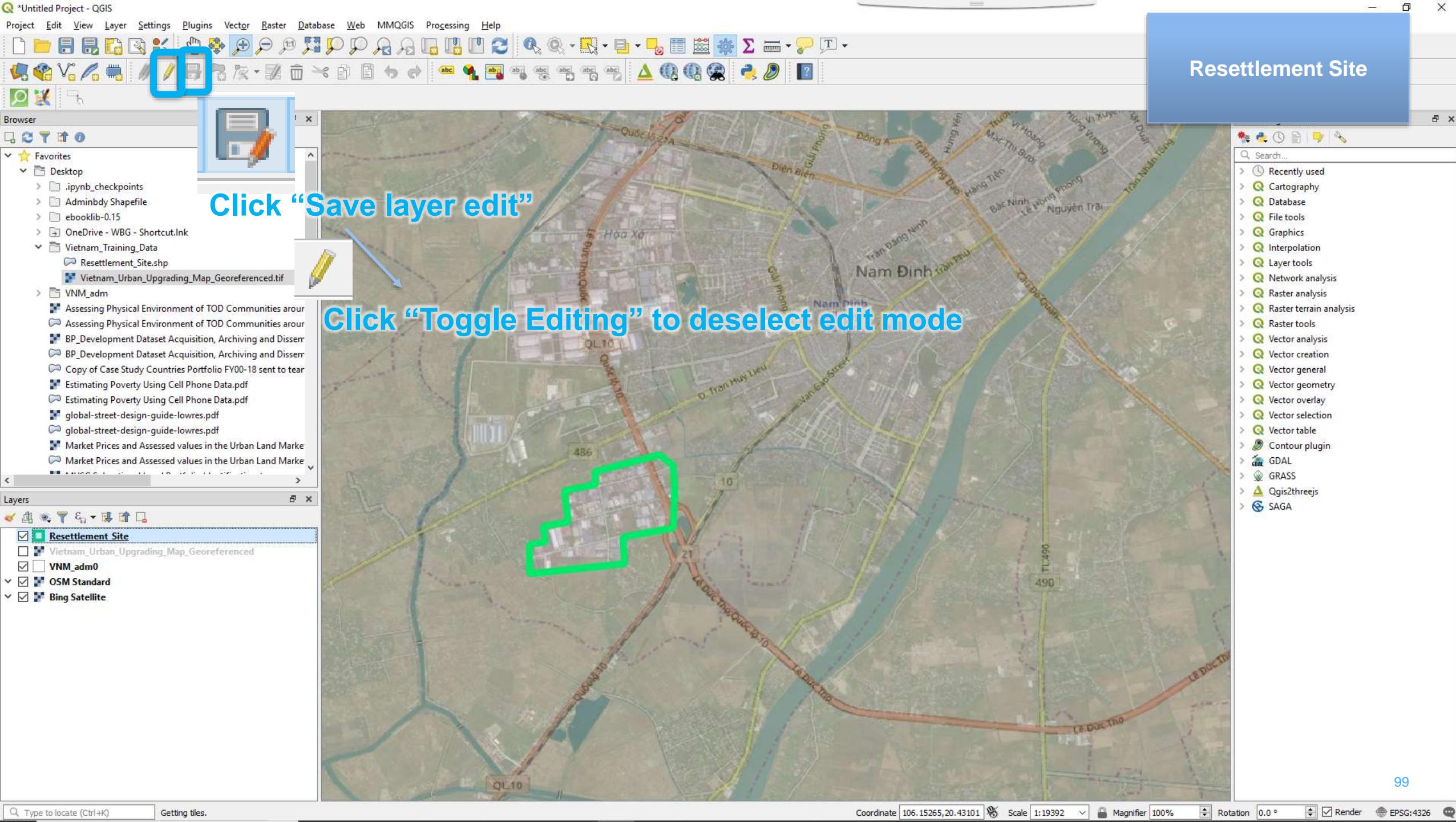
## Actions

<input type="text" value="1"/>	<input type="button" value="X"/>	
Site_Name	<input type="text" value="Resettlement_Site"/>	<input type="button" value="X"/>

OK Cancel



- Recently used
- Cartography
- Database
- File tools
- Graphics
- Interpolation
- Layer tools
- Network analysis
- Raster analysis
- Raster terrain analysis
- Raster tools
- Vector analysis
- Vector creation
- Vector general
- Vector geometry
- Vector overlay
- Vector selection
- Vector table
- Contour plugin
- GDAL
- GRASS
- Qgis2threejs
- SAGA



\*Untitled Project - QGIS

Project Edit View Layer Settings Plugins Vector Raster Database Web MMQGIS Processing Help

Browser

Processing Toolbox

Search... Recently used Cartography Database File tools Graphics Interpolation Layer tools Network analysis Raster analysis Raster terrain analysis Raster tools Vector analysis Vector creation Vector general Vector geometry Vector overlay Vector selection Vector table Contour plugin GDAL GRASS Qgis2threejs SAGA

Now you can see two shapefiles.

Layers

Infra\_upgrading Resettlement\_Site Vietnam\_Urban\_Upgrading\_Map\_Georeferenced VNM\_adm0 Bing Satellite OSM Standard

Type to locate (Ctrl+K) Getting tiles Coordinate 106.11963,20.43190 Scale 1:15352 Magnifier 100% Rotation 0.0° Render EPSG:4326

The screenshot displays the QGIS desktop environment with a satellite map of a urban and rural landscape. Two vector layers are visible as highlighted areas: one in orange labeled 'Infra\_upgrading' and one in green labeled 'Resettlement\_Site'. The 'Layers' panel on the left shows these layers are currently selected. The 'Processing Toolbox' on the right lists various geospatial analysis tools. A large blue text overlay 'Now you can see two shapefiles.' is centered over the map. The bottom status bar shows coordinates, scale, and other metadata.

# More Accurate Georeferencing (1) – Snapping Options to OSM road network

(1) Go to “<https://extract.bbbike.org/>” (3) Click “add points to polygon”

Then, find Nam Dinh interactively.

(2) Input Format: Shapefile

Input your email address

\_Click “here” to make bounding

box

en fr - intro - about

t +

Format Shapefile (Esri)

Name of area to extract or search

Your email address hyokoi@worldbank.org

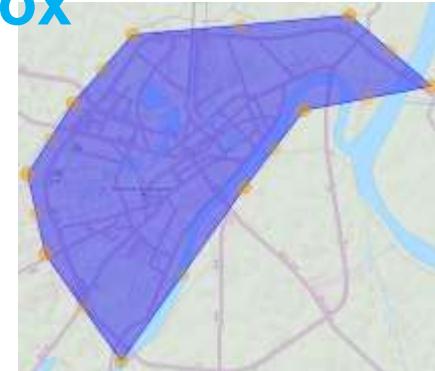
Now move the map to your desired location.  
Then click to create the bounding box.

- add points to polygon
- resize or drag polygon

(4) Click the orange bounding box



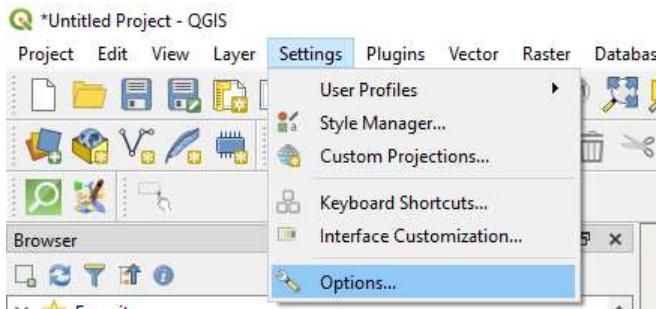
(5) Click the orange circles to edit the bbox



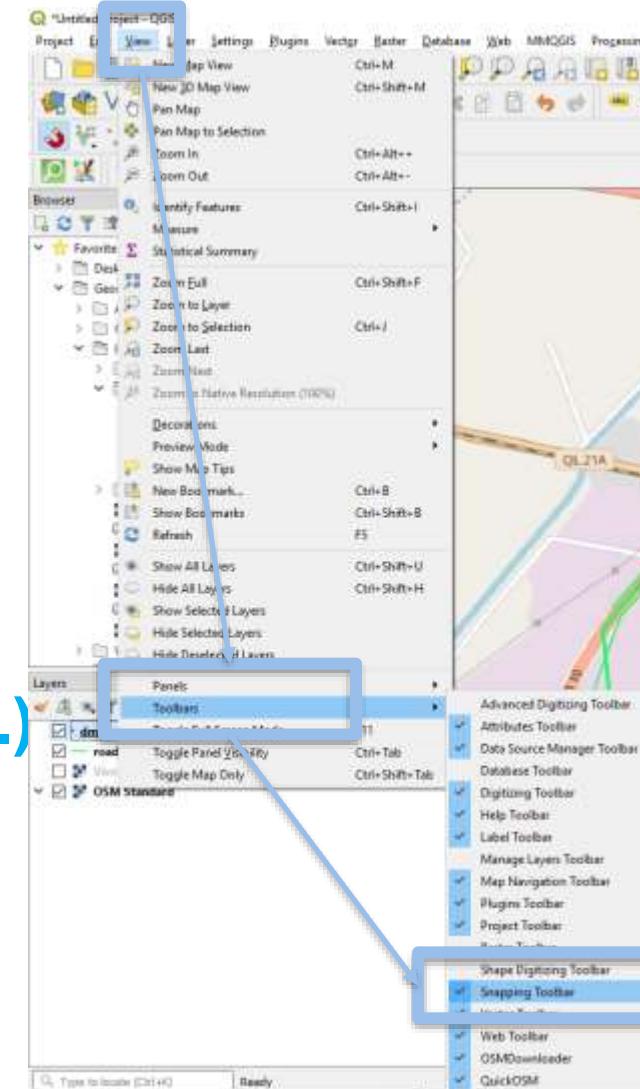
(6) Click “Extract”, then an email will be sent to download shp file (takes 5-7 min)

# More Accurate Georeferencing (2) – Snapping Options to OSM road network

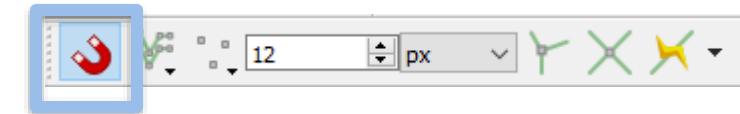
## (1) Settings > Options



## (3) View > Toolbars > Snapping Toolbar



## (4) Click a Magnet button



## (5) Add downloaded OSM shapefile layer.

## (2) Digitizing Tab > Click

“Enable snapping by default”

(No need to change other settings, default settings are fine.)

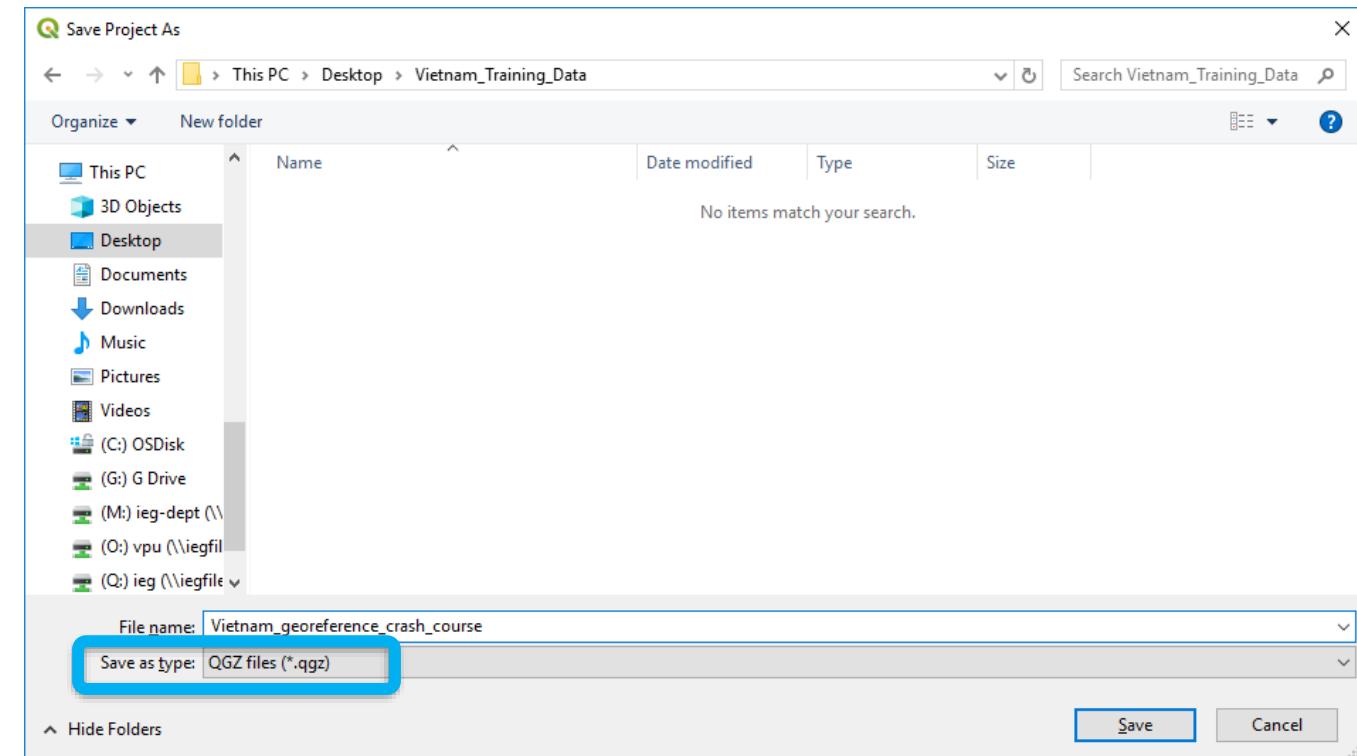
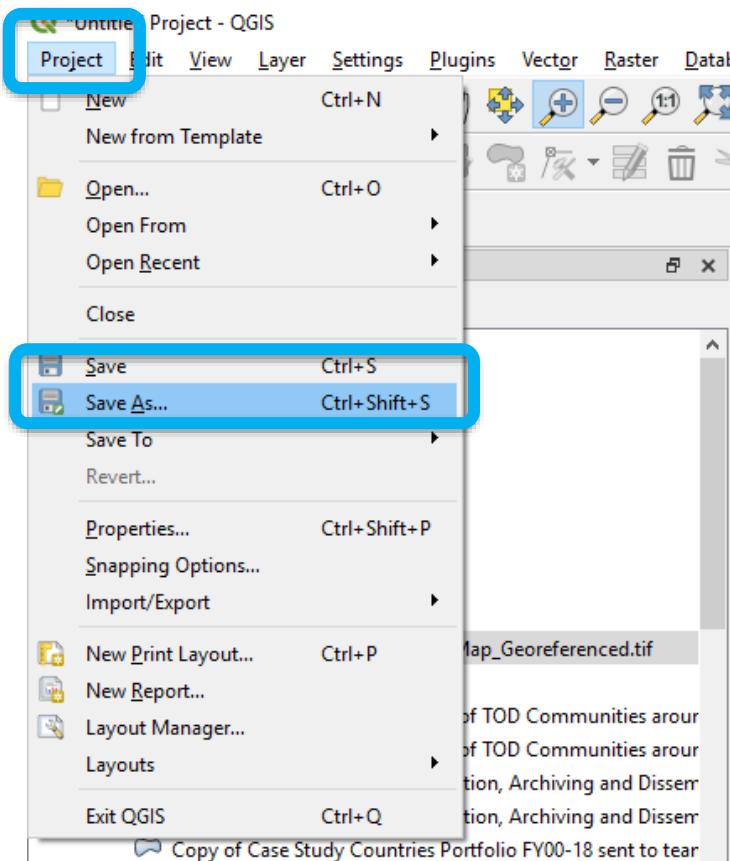


## (6) In creating a new shapefile (Ref. slide 83-99), snapping options are enabled, and you can easily digitize.



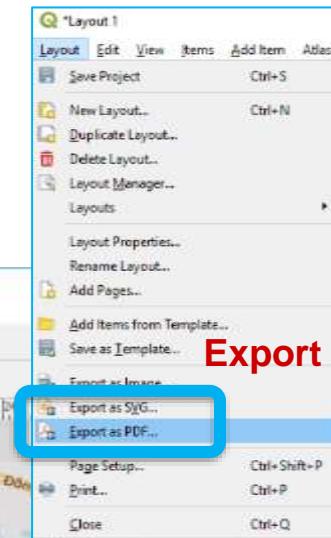
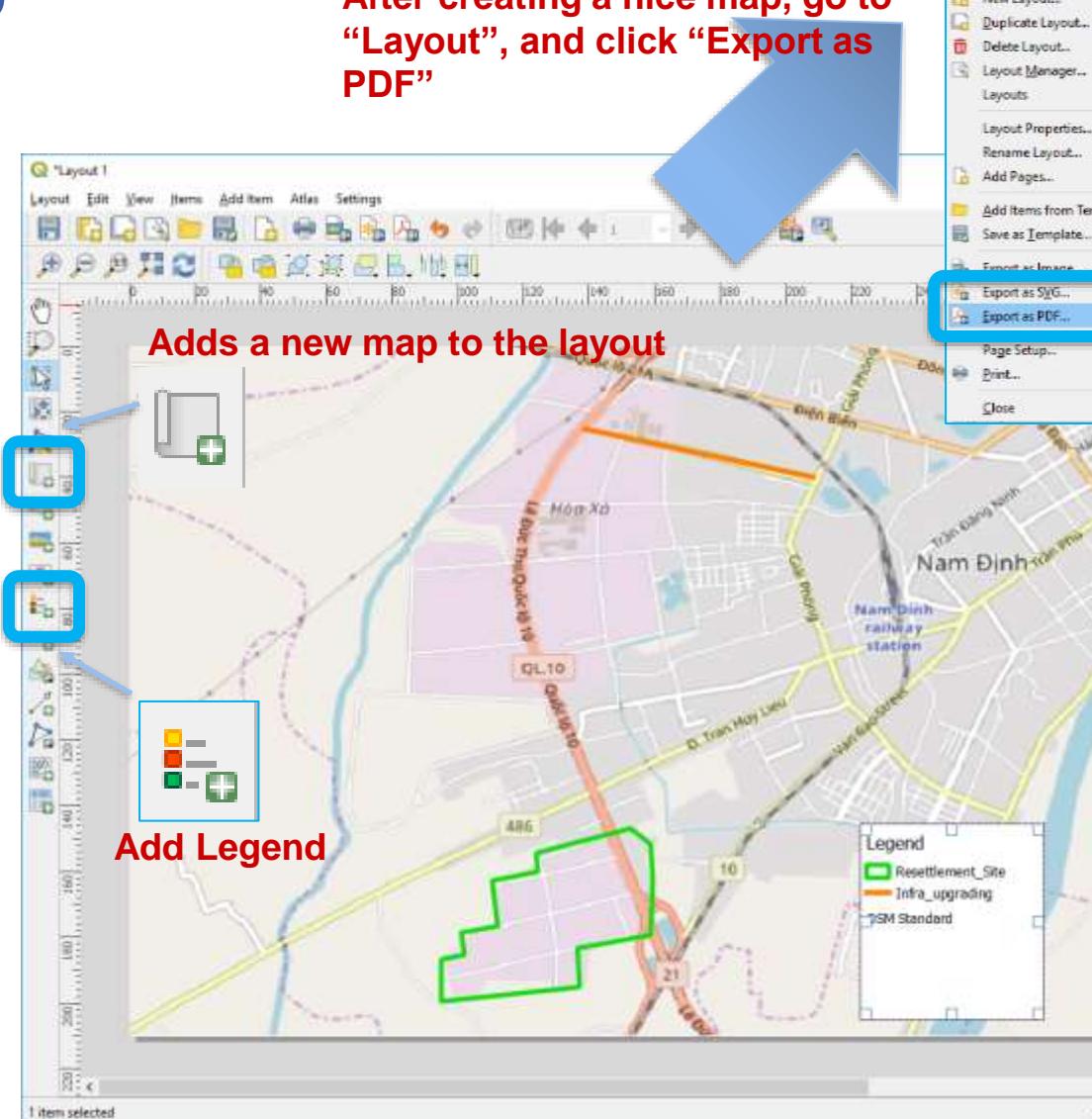
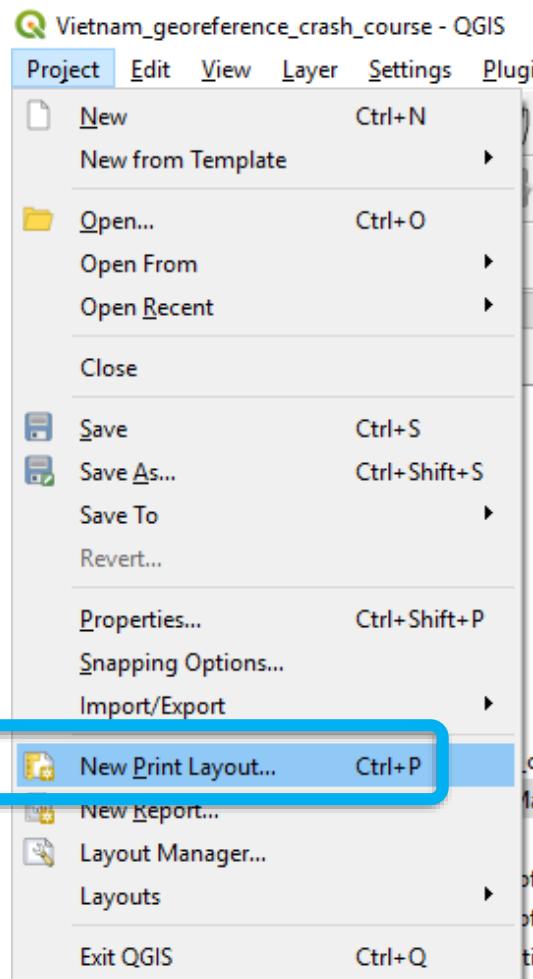
# Save your map

1. Set up working environment
2. Create a new shapefile (line)
3. Create a new shapefile (polygons)
4. Save your map
5. Publish your map

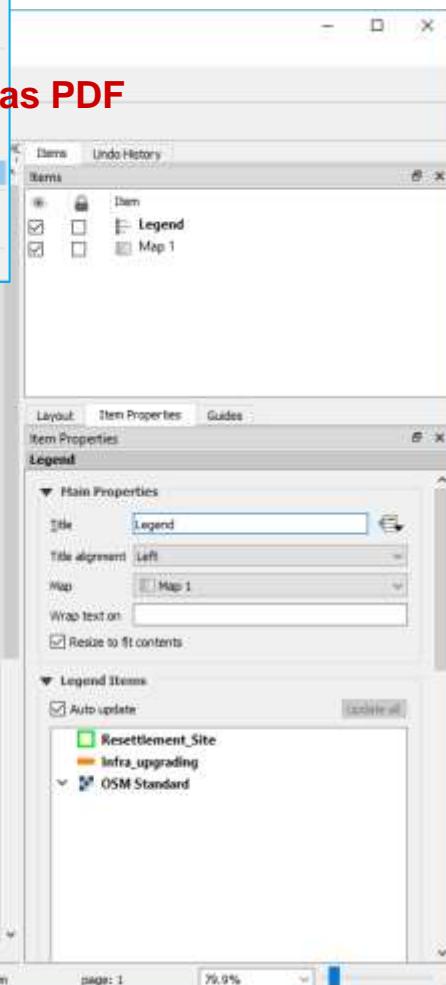


**QGZ file possesses visualization and layers. The file path is relative, so you cannot change the location of dependent files (e.g., shapefile)**

# Publish your map



Export as PDF



1. Set up working environment
2. Create a new shapefile (line)
3. Create a new shapefile (polygon)
4. Save your map
5. Publish your map

# Reference

- QGIS Learning Resources

[https://www.qgistutorials.com/en/docs/learning\\_resources.html](https://www.qgistutorials.com/en/docs/learning_resources.html)

- QGIS 3 for Absolute Beginners Video

<https://www.youtube.com/watch?v=kCnNWyl9qSE>

- QGIS Training Manual

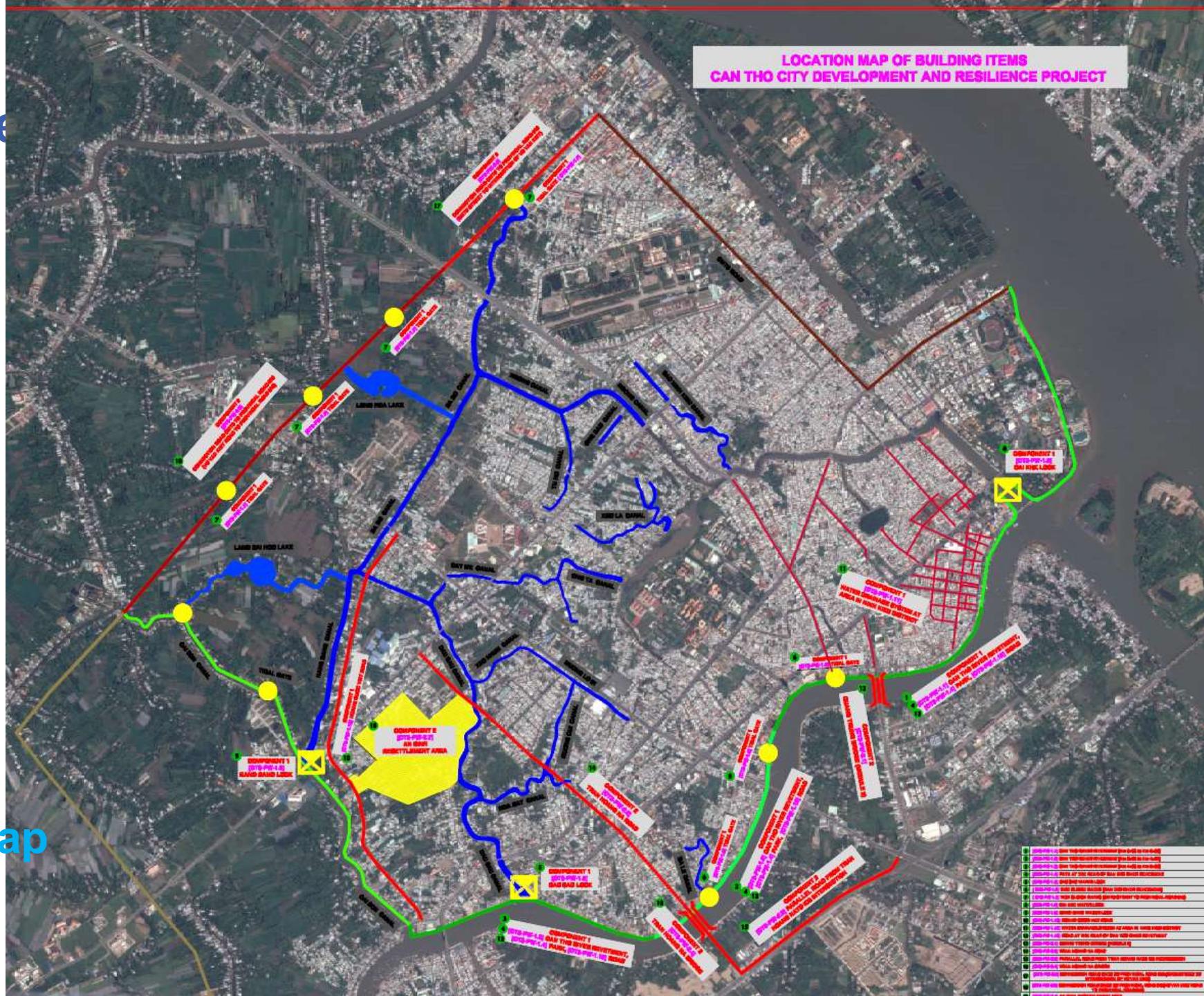
[https://docs.qgis.org/3.4/en/docs/training\\_manual/index.html](https://docs.qgis.org/3.4/en/docs/training_manual/index.html)

Before closing,,,

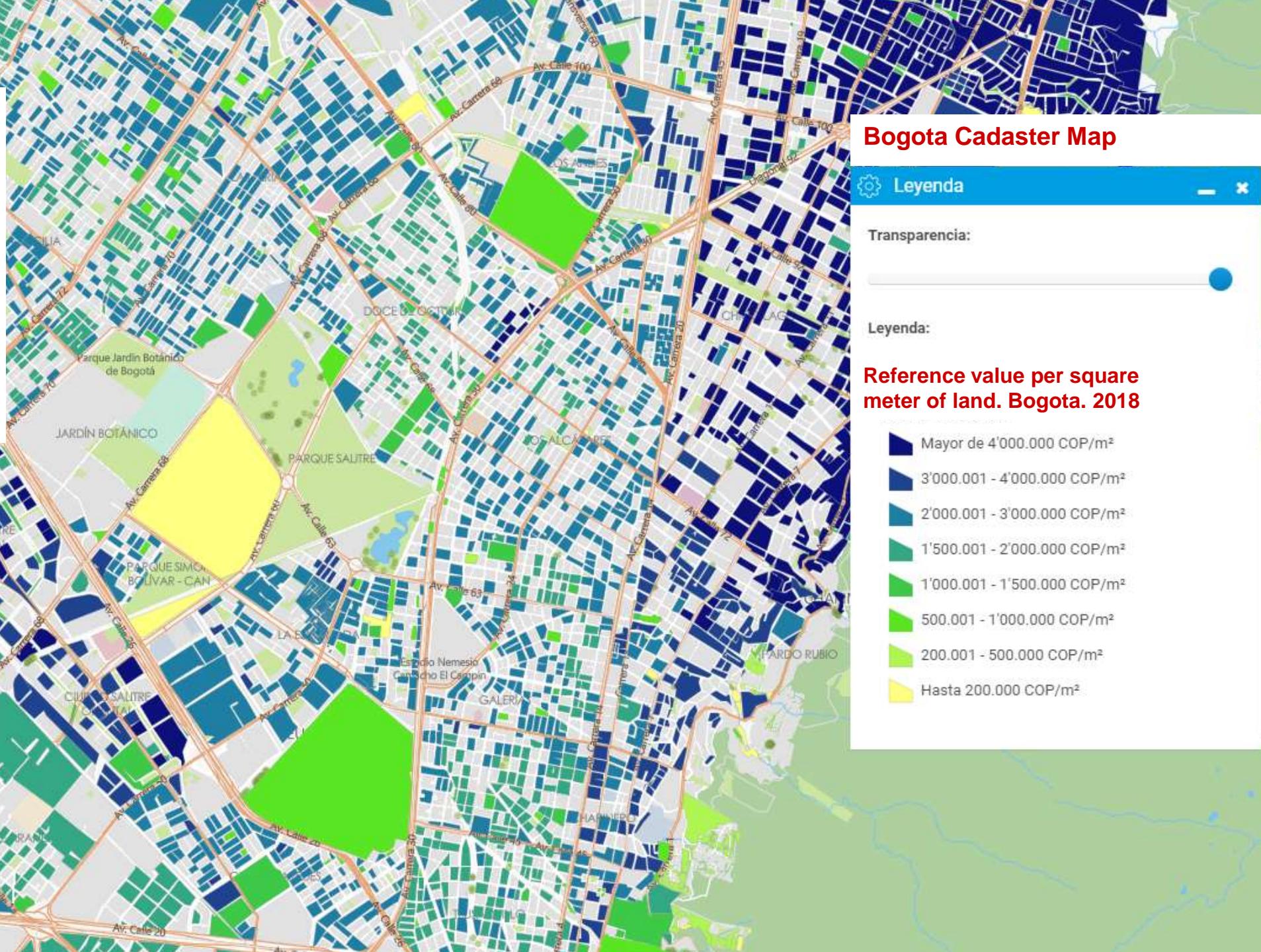


## We need to make

# Can Tho Project Map



We need land price data to quantify the wealth created by the Bank's interventions.

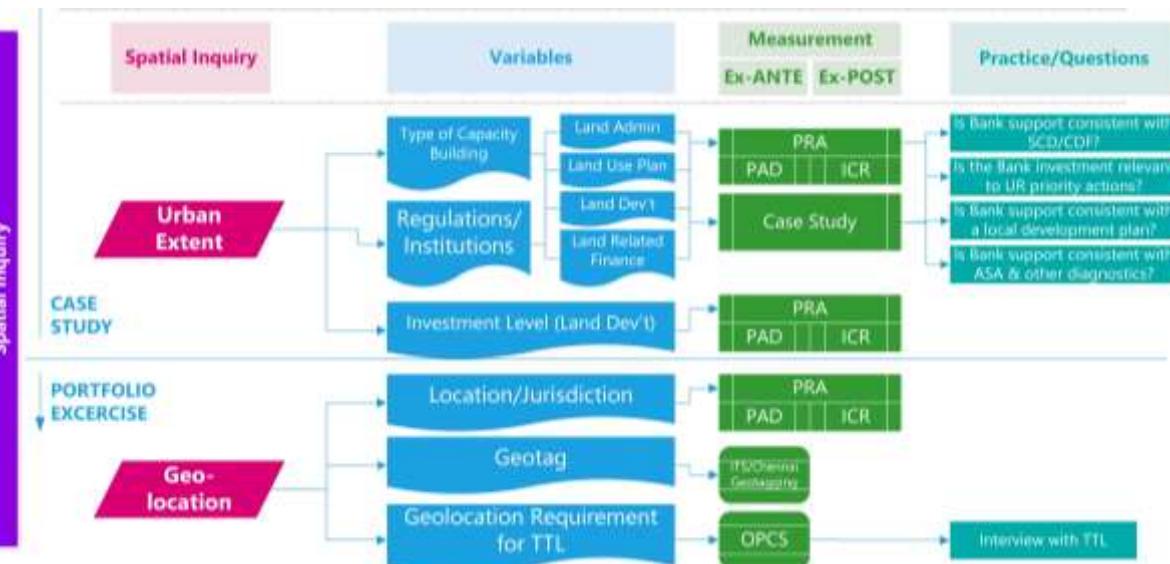


# Spatial Analysis Methodological Approach

Spatial Analysis



Spatial Inquiry



## We need to get following geospatial data.

- Coordinate of the project location (point, line, polygon)
- Land price (Cadaster, land sales registry, rental value)
- Commercial/Industrial activities (Building/Commercial license)
- Poverty/Income (Georeferenced Census data/household survey)
- Gentrification/Displacement (Georeferenced Census data/household survey)



# Digital transformation

**Thank you!**

