

Workshop Introduction to Digital Mapping with QGIS

Instructor: Victoria Sarmiento victoria.sarmiento@temple.edu
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Access the data here:

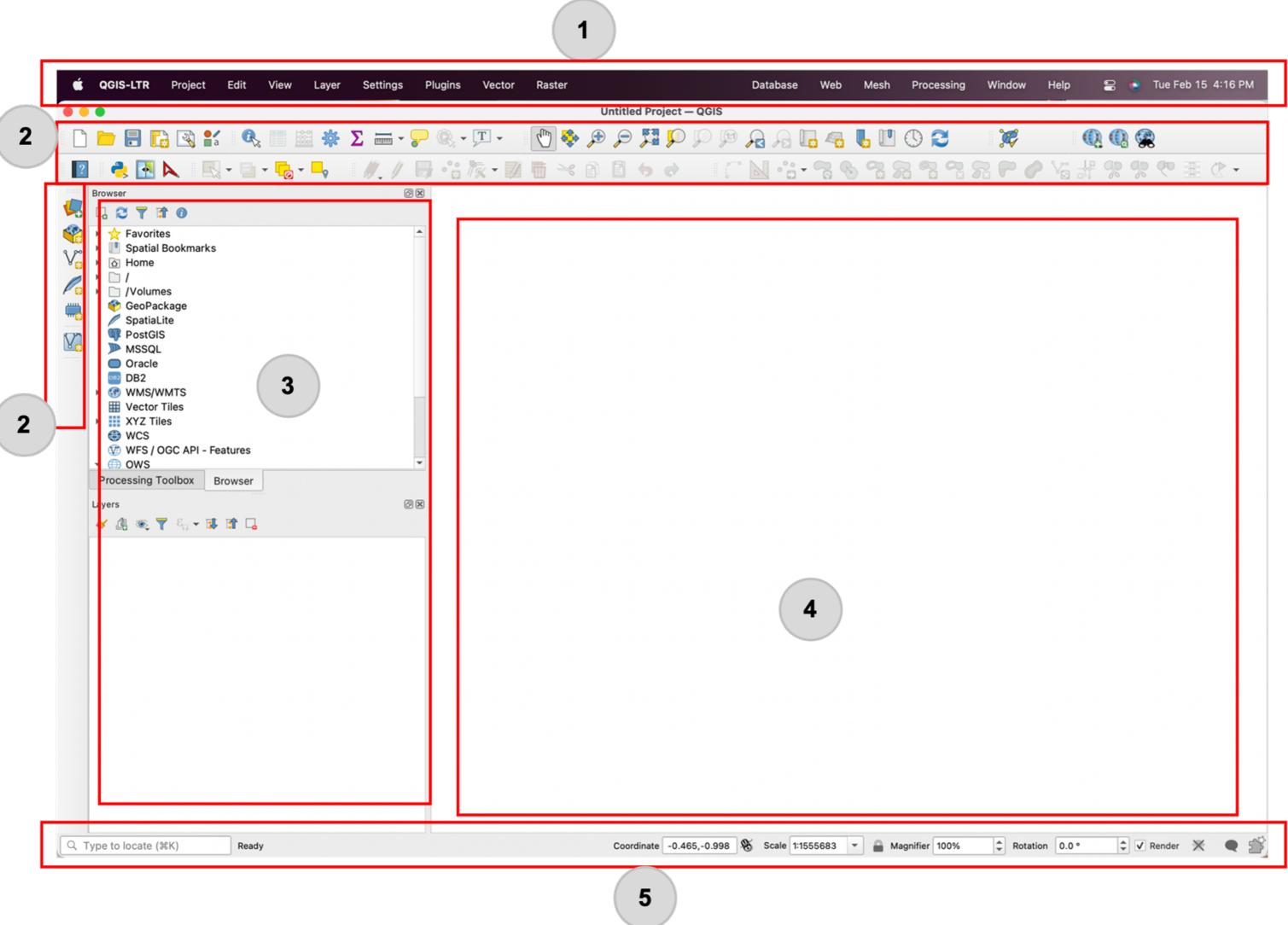
https://drive.google.com/file/d/1m_ACQZOv7RA2PRNWL-A02kmvDvO7CeFa/view?usp=sharing

Open QGIS, and let's start a new empty project.



Depending on your Operating System, you should be seeing a similar screen like the screenshot below. Let's get familiar with the main components of QGIS:

1. Menu Bar; 2. Toolbars; 3. Panels; 4. Map View; 5. Status Bar



Exercise 1. Adding data – Projections – Saving Project

1. Locate the box next to “Coordinate” in the status bar and type in “world.”

Coordinate -20.2,73.2



2. Let's play around with the projection. Again, in the status bar, locate the option

named EPSG and click on it.

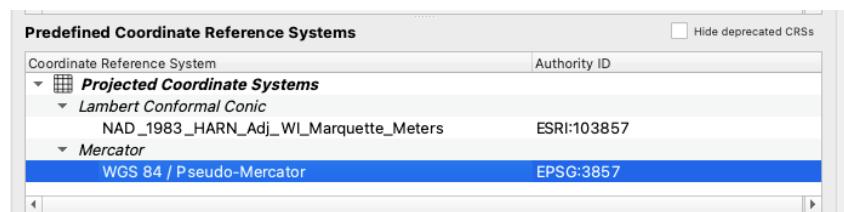
EPSG:4326

The new window displays information about the Coordinate Reference Systems or CRS set by the first layer added to the project. In this case, we are working with a Geographic Coordinate System called **WGS 84**. It uses degrees of latitude and longitude, and it is useful for representing spatial information on a global scale (small scale).

Trying to change the CRS by typing 3857 in the first box:

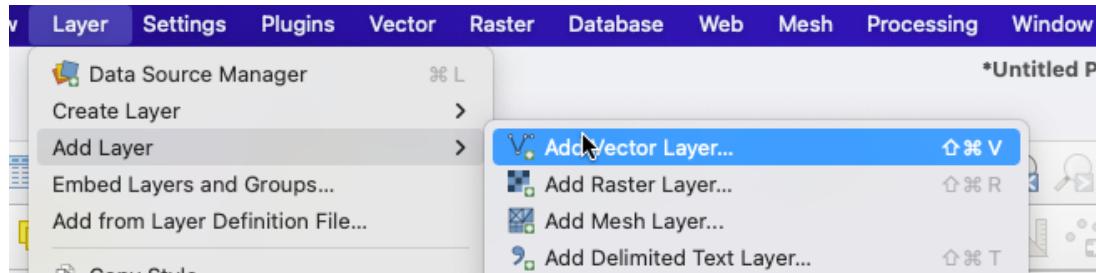


Then select the new CRS from the “Predefined Coordinate Reference Systems” menu, and hit the OK button. Now see how the global map changed in the map view.

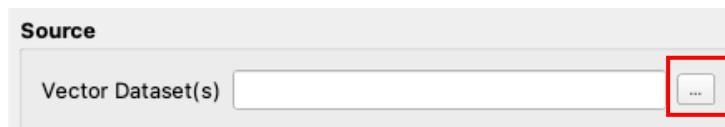


Change the CRS again to EPSG:4326, following the previous steps.

3. Adding the airport's layer: Locate the “Layer” option in the top menu. Then select “Add Vector Layer” from the drop-down menu.

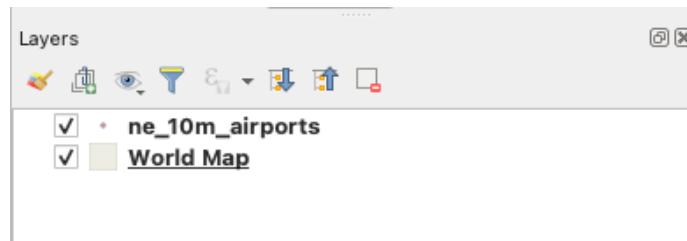


In the “Data Source Manager” window, locate the box next to “Vector Dataset” under the “Source” panel. Then hit the button with the ellipsis.

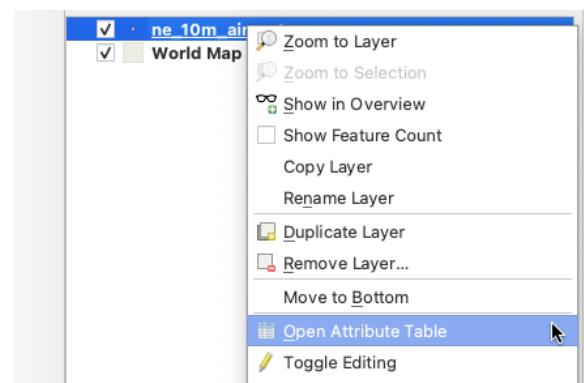


In the new window, locate the data folder provided for this workshop, and search for the “ne_10m_airports folder”. Open it and select the file “ne_10m_airports.shp”. Click open and then click Add.

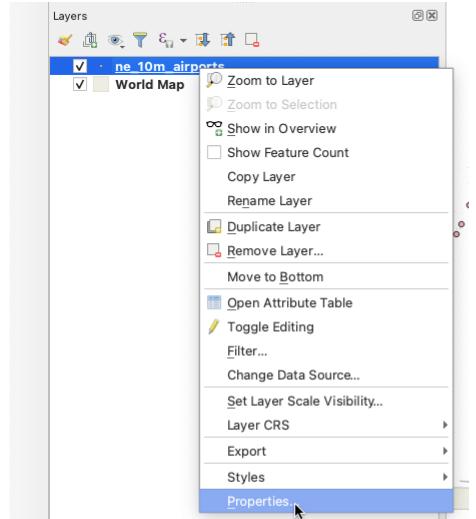
We have added a vector of points in the map view. Now focus on the panel Layers. You should have a list of two layers: airports and World map.



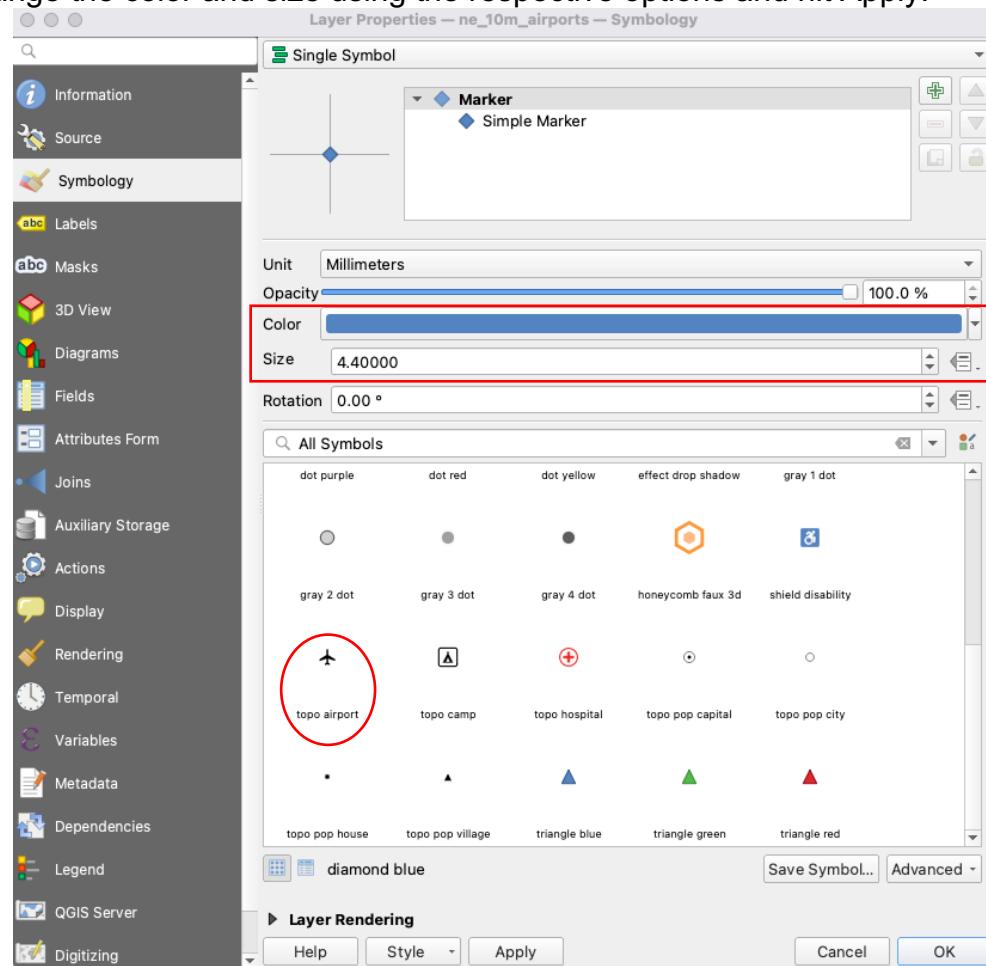
4. Getting familiar with the attributes of the airport's shapefile. Right-click on the layer airports and select “Open Attribute Table.”



5. Changing the color, size, and symbol. Right-click on the layer and select “Properties.”

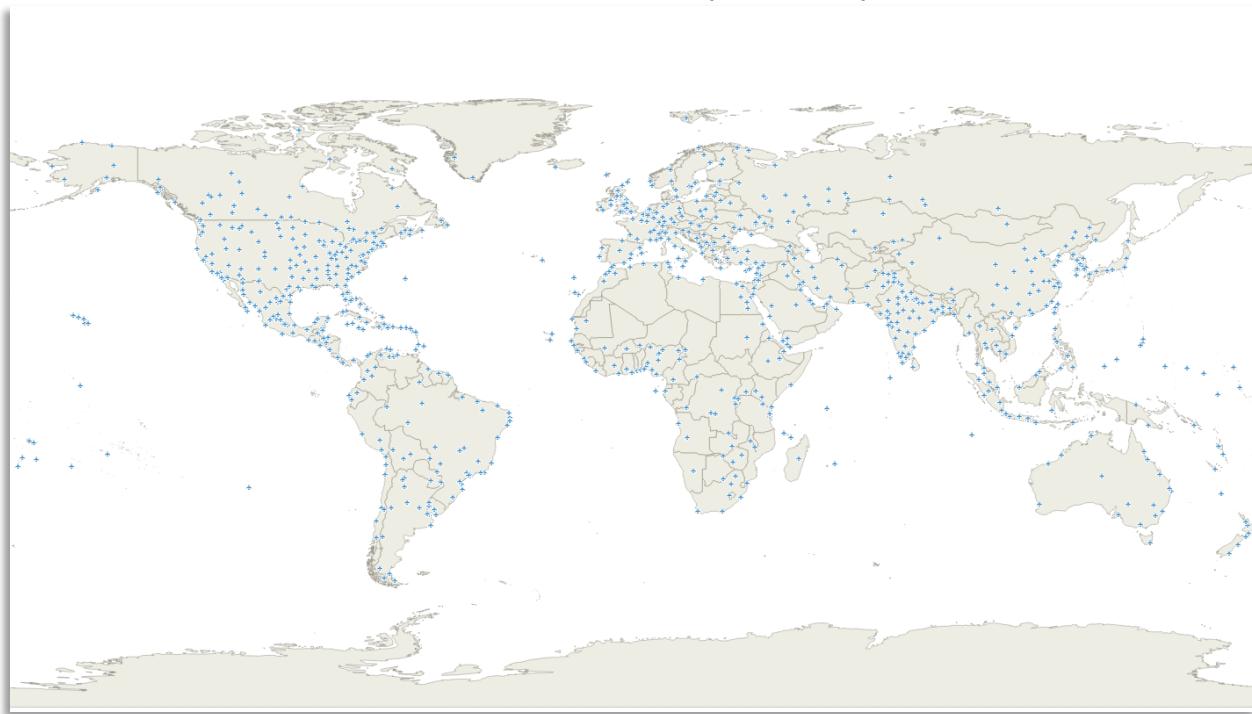


In the “Layer Properties” window, select the “Symbology” tab in the left panel, and locate the “All Symbols” menu with different markers options. Select the topo airport marker. Change the color and size using the respective options and hit Apply.



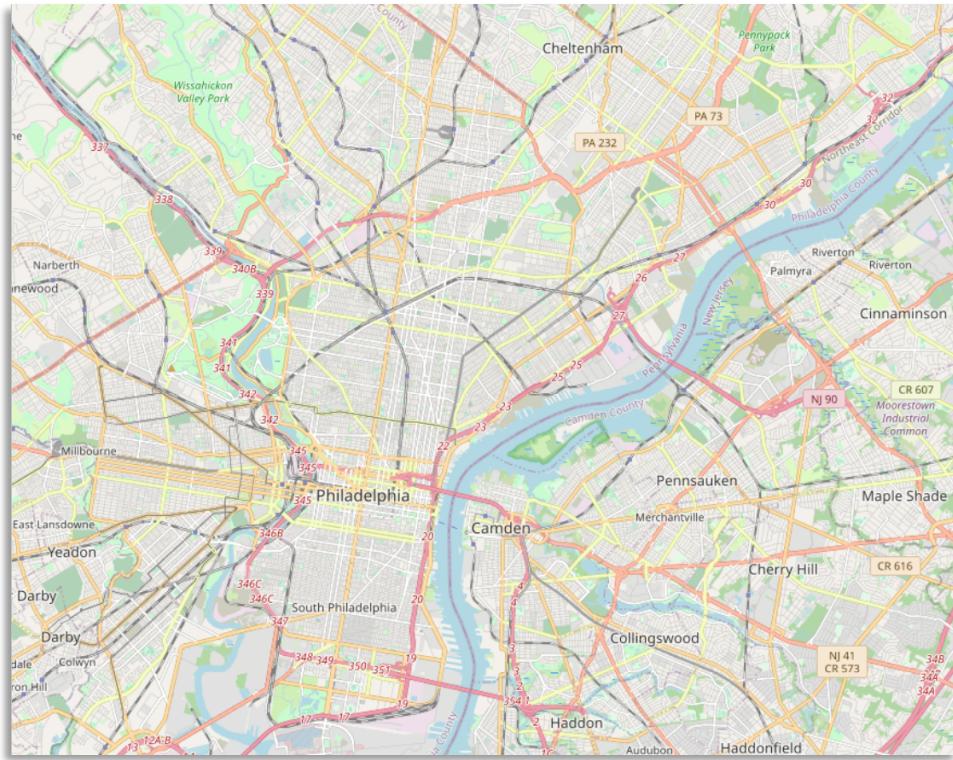
- Finally, save your project. Locate Project in the top menu > Select Save as. Create a new folder named outputs and name your project. Be sure to select '.qgz' as the format of your project. You can also use this  to save the project while you are progressing on it.

You have created a world map of the airports!



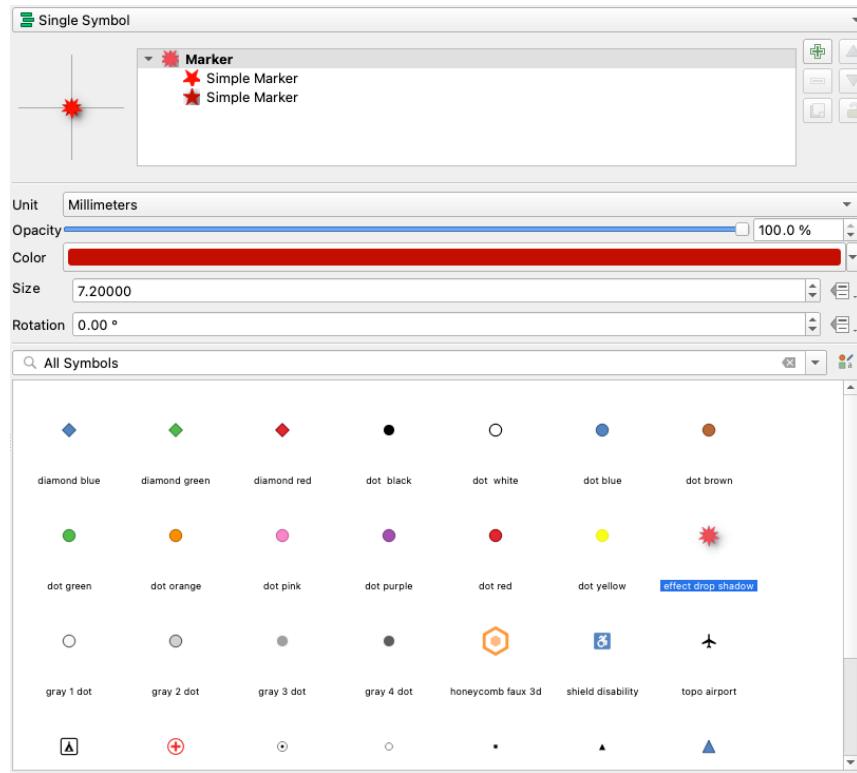
Exercise 2. Working with base maps – Installing plugins

- In the top Menu > Select Plugins> Manage and Install Plugins>Click tab All
- Search for “QuickMapServices” and then hit Install Plugin
- Locate your new tool in the Toolbar  , click  and explore the menu
- From the menu, select OSM and then double on OSM Standard
- Check Layer Properties: Select the layer from the Layer panel list>Right click>Properties
- Review tab “Information” on the left. What is the CRS?
- In the top menu, select “Project” > Properties
- In the window “Project Properties - CRS” search for “3857” and click OK.
- Explore the newly added base map!
- Locate the toolbar  to pan de map, zoom in, and zoom out.
- Zoom in to Philadelphia.

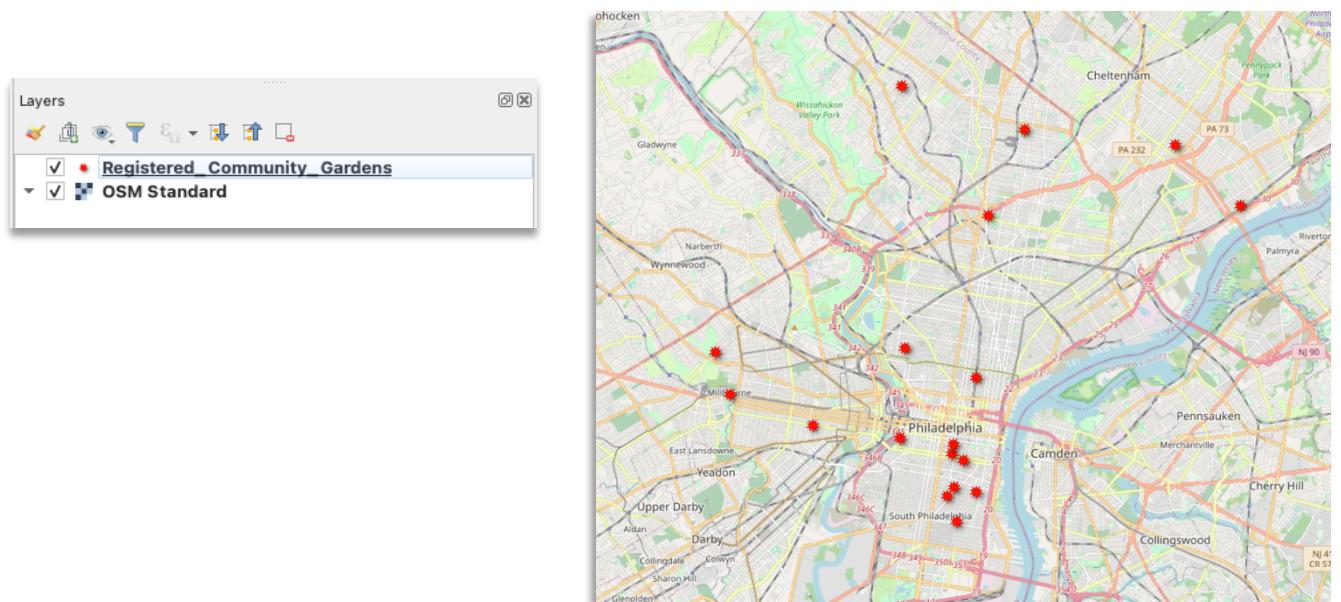


Exercise 3. Adding a CSV layer

1. Keep the base map added in the last exercise
 2. In the top menu select Layer> Add Layer > Add Delimited Text Layer
 3. Locate the Browse button next to "File name"
 4. In the data folder select "Registered_Community_Gardens.CSV". Click Open
 5. In the "Data Source Manager" window, make sure the CRS is set to EPSG:4326
- Geometry CRS EPSG:4326 - WGS 84 ▼ ⊕
6. From the Layer list, select the newly added layer and right-click >Properties>Zoom to Layer
 7. Zoom in or zoom out to locate the points in the map view
 8. Change symbology: Select layer from the Layer list panel> Right click>Properties
 9. Change the marker from the Symbols Menu. Change the size and color



10. In the Layer list panel, turn on and off the layers. Consider the order of the layers, it matters for visualization in the Map view.

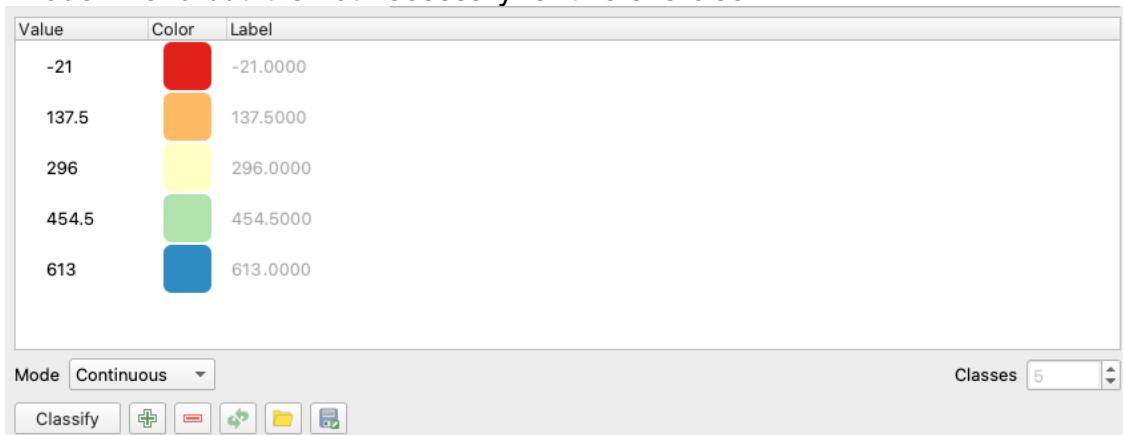


Exercise 4. DEM – Blending

1. Load the DEM twice: Layer> Add Layer>Add Raster Layer and browse the file in your data folder named “DEMPhilly.tif”
This raster represents elevation values from -21 to 613
2. Change the symbology of the top layer: Select layer from the Layer list> Right click>Properties> Symbology

In the “Render type” menu select ‘Singleband pseudocolor’

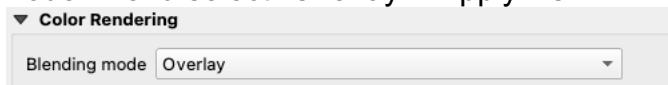
Make sure you have at least five classes. You can add or delete classes, with these buttons . If you need to eliminate classes, select them first and then use the minus button. * You can change the way the data is classified under the “Mode” menu but it is not necessary for this exercise.



In the “Color ramp” menu select “Create New Color Ramp”> Catalog: cpt-city

In the new window, locate “Topography” under the panel on the left side. Choose any color ramp and hit OK

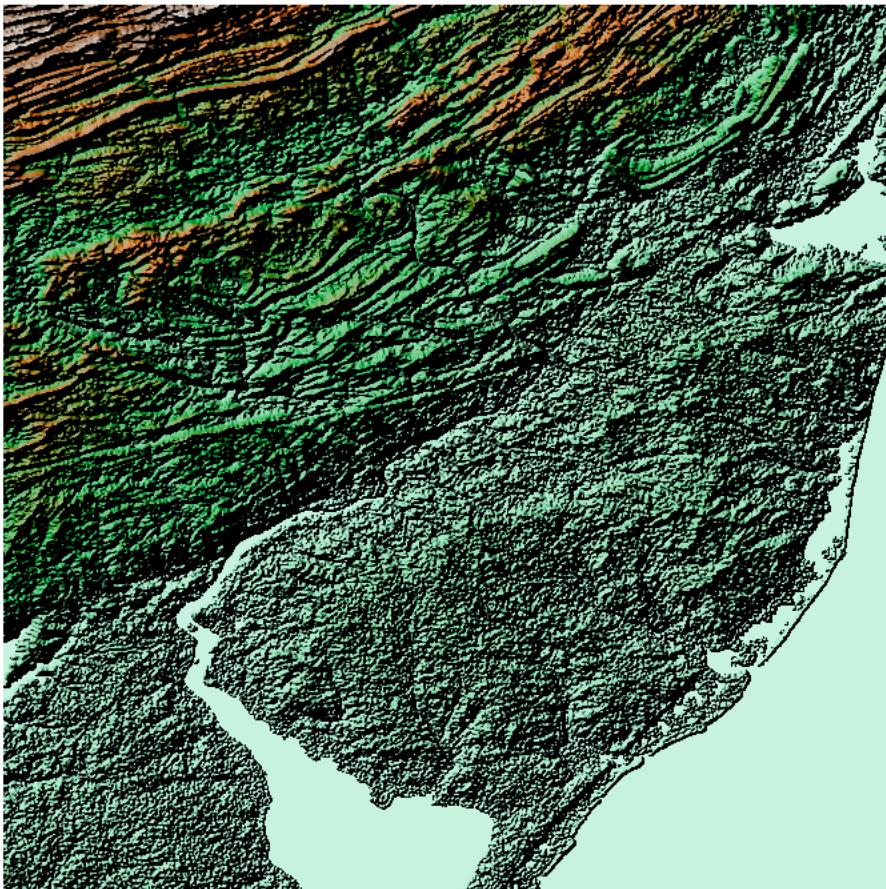
On the “Layer Properties” window, locate the “Color Rendering” section, and next to the “Blending mode” menu select “Overlay”> Apply> OK



3. Change the symbology of the second DEM layer (the layer underneath): Select layer from the Layer panel list > Right click> Properties> Symbology.

In the “Render type” menu select ‘Hillshade’. Leave the rest of the setting as default and hit Apply>OK

This is what your result should look like! The difference in elevation looks more dramatic now!

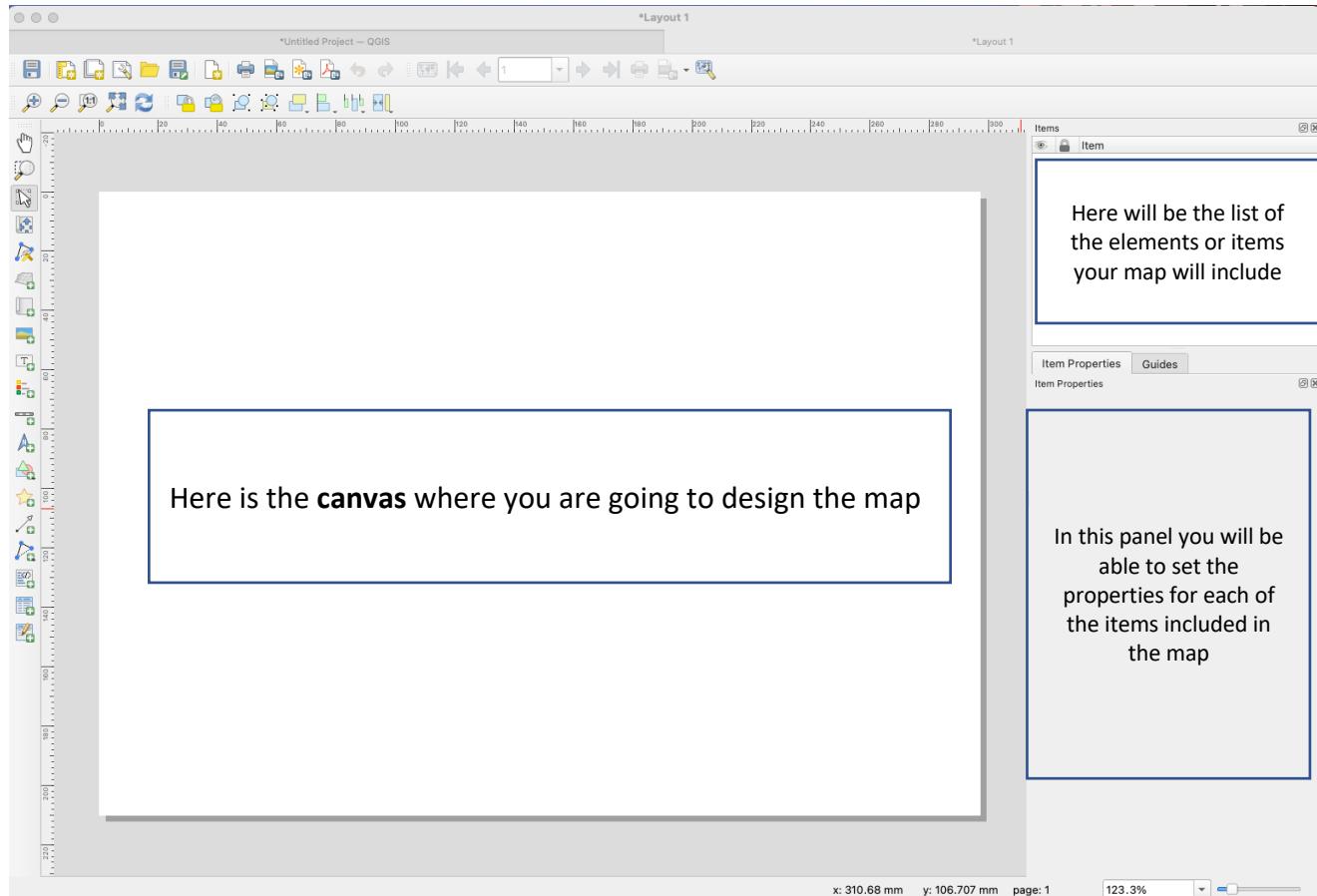


Exercise 5. Composing and Printing your Digital Map – Layout Composer

For this exercise, we are going to use the layers added in Exercise 3, the community gardens.csv, and the OSM base map.

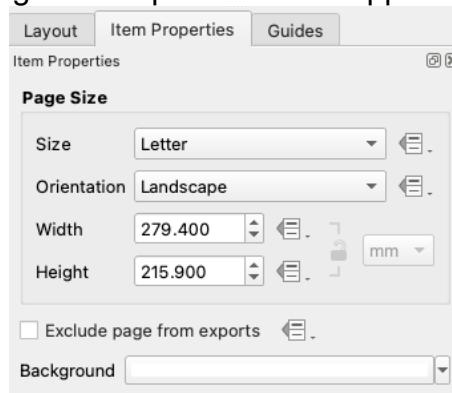


1. Locate the tool “New Print Layout” from the top toolbar. Give a name to your new map in the pop-up window “Create Print Layout” and hit OK.
2. There is a new view, with new tools and menus. Here is where you are going to design and create your map for printing.



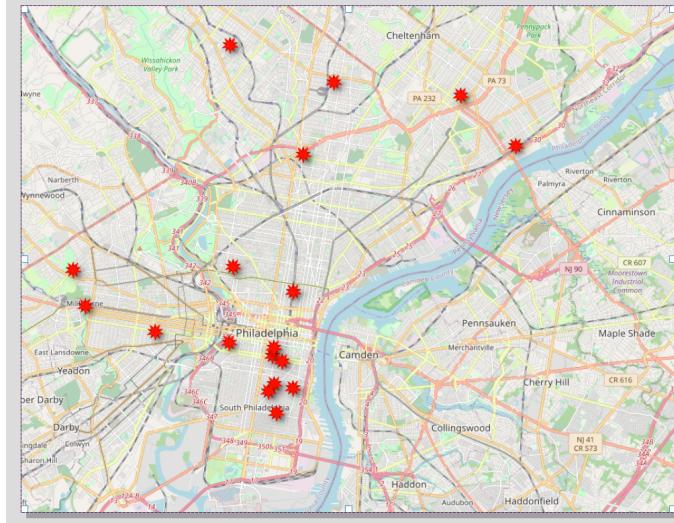
3. The first thing I recommend is to set the size of the page. Right-click on the main white area, the “canvas” and select “Page Properties...”

A new menu with the “Page size” options should appear on the right side.

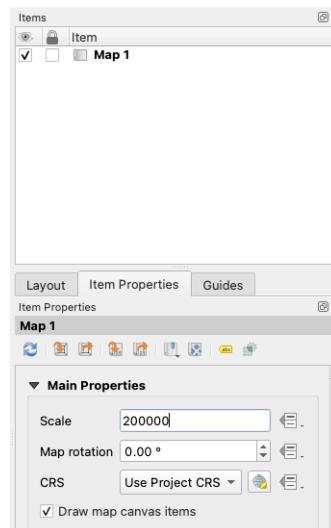


I use the size “Letter” for maps that I want to include in word documents. The orientation will depend on the configuration of the elements you want to show. For this case, we can use Landscape.

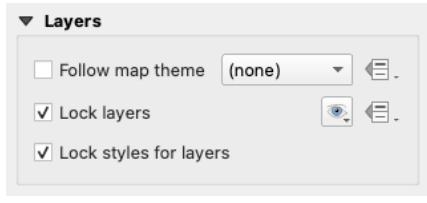
4. Add the map to the canvas: Locate the tool  “Add map”, from the toolbar on the left side. The cursor will change into a cross. Click and drag the cross over the canvas, drawing a box, covering as much area as you can. It is possible to resize the map later, by clicking and dragging the boxes on the edges.



5. On the left side panel, a new item called “Map 1” will appear. Set the scale as 200000 in the “Main Properties” options.



A useful feature in QGIS Layout composer is the ability to lock the items, both the position of the item in the map as well as the way it is displayed. This is useful because sometimes you would like to check something in the Map view, and you will pan over the map, zoom in or zoom out; but not necessarily want to make changes to the map you are composing in the canvas. The map view and the map composer are linked and whatever you do in the map view is going to change the map in the composer. If you don't want this to happen you can check the boxes “Lock layers” and “Lock styles for layers” in the Layers panel.



Also, you can check the box in the Items panel. This way the position of the item in the canvas will be locked. You will see that the boxes of the edges will disappear.

6. Useful tools:



This tool allows moving the elements/items in the canvas.

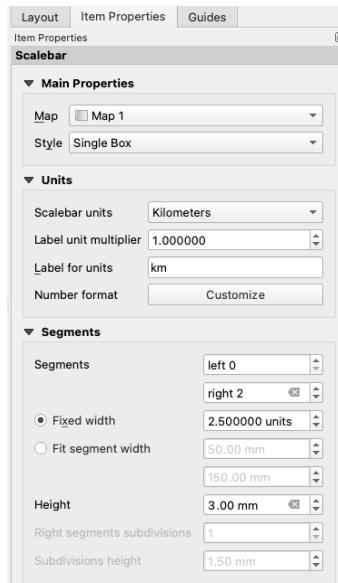


This tool allows resizing the items in the canvas



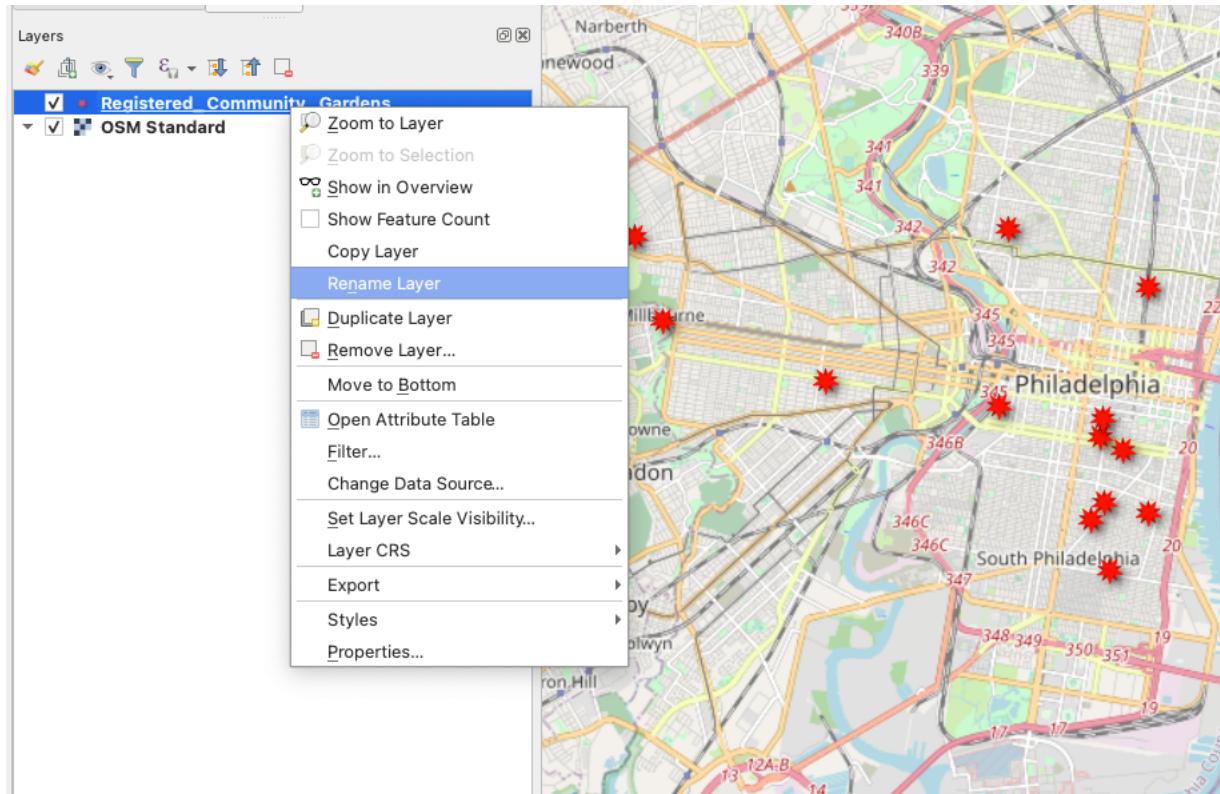
In this case, this tool allows for pan the Layout. Don't confuse it with Pan map

7. Add the north arrow by clicking . Click and drag a box over the canvas in the position you want the arrow to be located.
8. Add the bar scale by clicking . Click and drag a box over the canvas in the position you want the scale to be located. You can customize the scale bar in the left side panel, using the different options here.



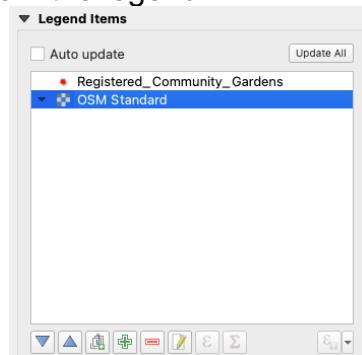
9. Add the legend  . Click and drag a box over the canvas in the position you want the legend to be located.

You can rename the Community Gardens layers by going back to the Project. Then select the layer from the Layers panel list > right click> Rename Layer and type Community Gardens or any other name that you like.



Back to the Layout composer, in the panel on the left, locate “Legend Items”, in case the legend hasn’t been updated, hit the button .

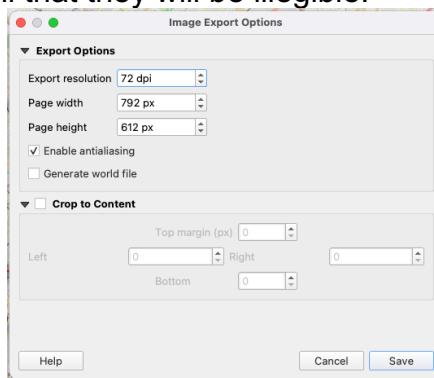
Uncheck the box “Auto update”. Then select the “OSM Standard” and click the minus button to eliminate that layer from the legend.



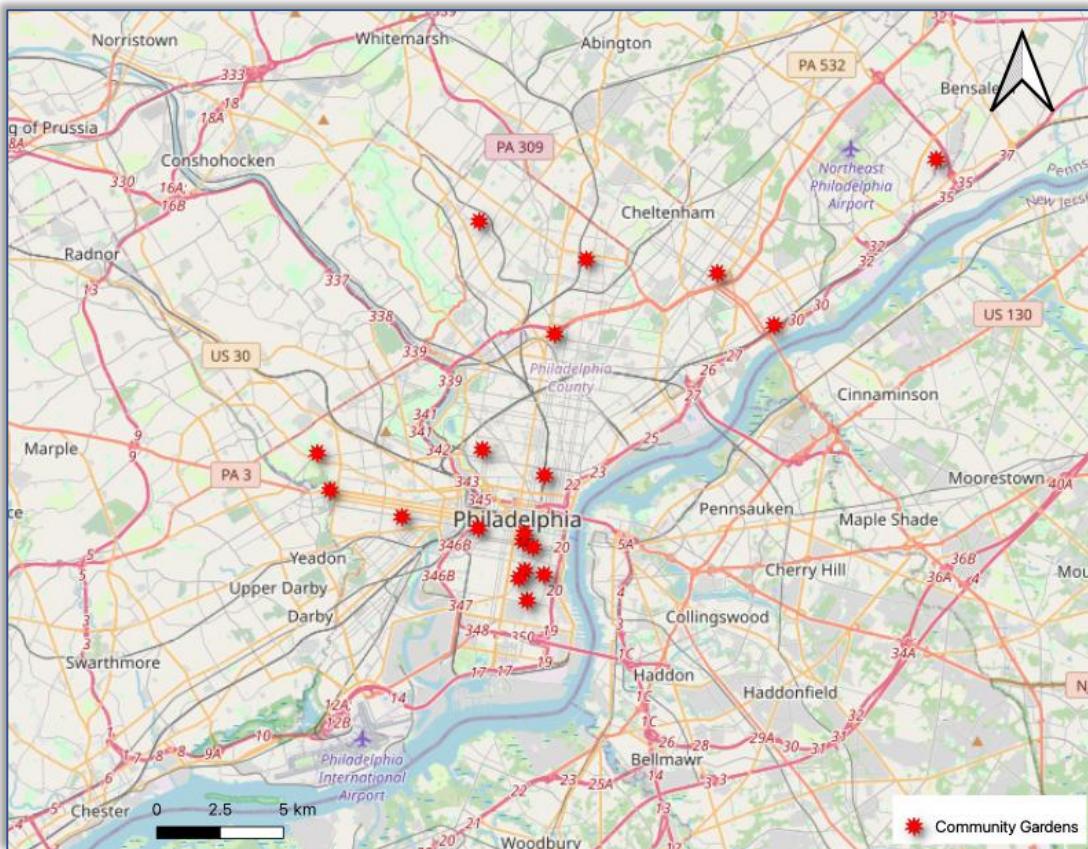
10. The above are the basic elements a map should have. You could explore more things to include in the toolbar on the left side. But at this point, the map is ready to print.

Using these tools  you can export the map in different formats. For this exercise select  which save as jpeg. Indicate the name and the location of the file, and save it.

A new window, “Image Exports Options” will appear. I recommend using 72 dpi for this map, to maintain the quality of the labels of the base map. If the resolution is higher the size of the labels will be so small that they will be illegible.



Voilà! Here is your Map



SOURCES

Airports

<https://www.naturalearthdata.com/downloads/10m-cultural-vectors/airports/>

Community gardens

<https://www.opendataphilly.org/dataset/registered-community-gardens/resource/d1c77b2a-1e48-4254-a1b7-a622eb630f88>

City landmarks (for Philadelphia)

<https://www.opendataphilly.org/dataset/city-landmarks/resource/2cd2eae7-4021-4a7f-87ab-b13c7d327ff7>

DEM – Digital Elevation Model for Philadelphia

<https://earthexplorer.usgs.gov/> You need to create an account to download the data

Information about the DEM

https://www.usgs.gov/centers/eros/science/usgs-eros-archive-digital-elevation-shuttle-radar-topography-mission-srtm-void?qt-science_center_objects=0#qt-science_center_objects

Open data for Philadelphia Region

<https://www.opendataphilly.org/>

QGIS user manual

QGIS training manual

https://docs.qgis.org/3.16/en/docs/training_manual/map_composer/map_composer.html#basic-fa-basic-map-composition

Climatic data

<https://www.worldclim.org/>

GIS data by Country

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