Introduction to OpenStreetMap

By Kent Jacobs

OpenStreetMap (OSM) is the most prominent crowd-sourced web-based mapping platform. The OSM database is a project by the OpenStreetMap Foundation (OSMF), an international non-profit organization supporting, but not totally governing, the OSM Project. The OSM Project was launched in 2004 and aims to develop a free map of the world available to everyone. You might be asking, "Why use OSM when I can use Google Maps?". The inherent difference between OSM and Google Maps brings forward a philosophical approach of how data is collected and distributed. OSM has taken an "open" approach to the methods of data collection and distribution. Google is a billion-dollar corporation that has taken a "closed" approach to data collection and is proprietary. Ultimately, both OSM and Google Maps try to answer the question of "where". Today, OSM has millions of contributions with mapping communities around the world that use local knowledge to maintain the temporal accuracy of the dataset. OSM users aim to achieve this goal by gathering geographic data from government open data portals, GPS devices, digitizing aerial imagery or using paper maps.

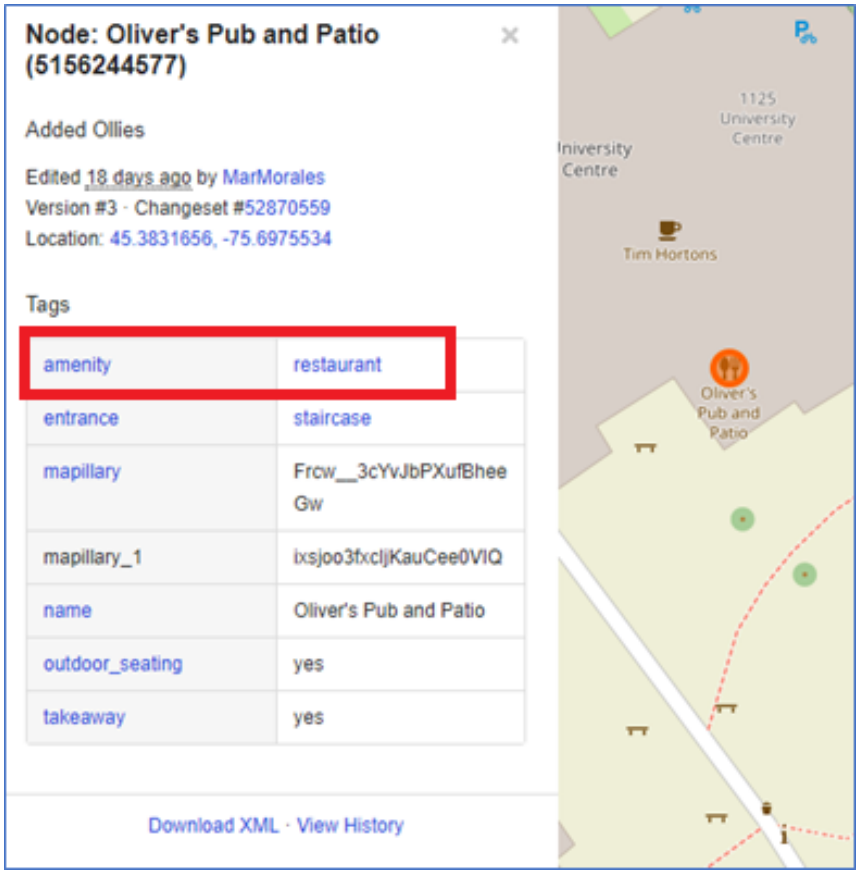
Searching and Extracting OpenStreetMap (OSM) Data

This tutorial will outline two methods to search and extract (download) OSM data using:

- QGIS, creating an OSM database (.osm.db file)
- Dropchop.io

This tutorial will involve searching and extracting three amenity types (restaurants, hospitals, schools). These features will be extracted as points and polygons in QGIS. These points of interest are represented as points and polygons, the formats uploaded by OSM contributors.

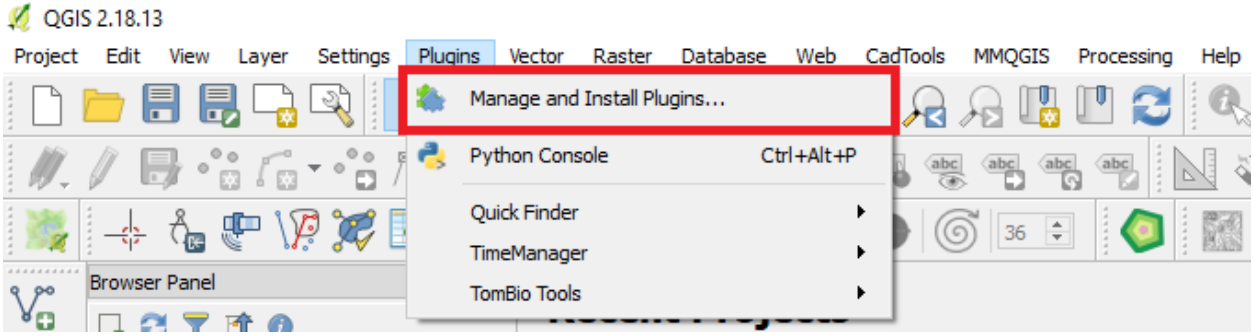
http://wiki.openstreetmap.org/wiki/Tag:amenity%3Drestaurant
http://wiki.openstreetmap.org/wiki/Tag:amenity%3Dschool
http://wiki.openstreetmap.org/wiki/Tag:amenity%3Dhospital



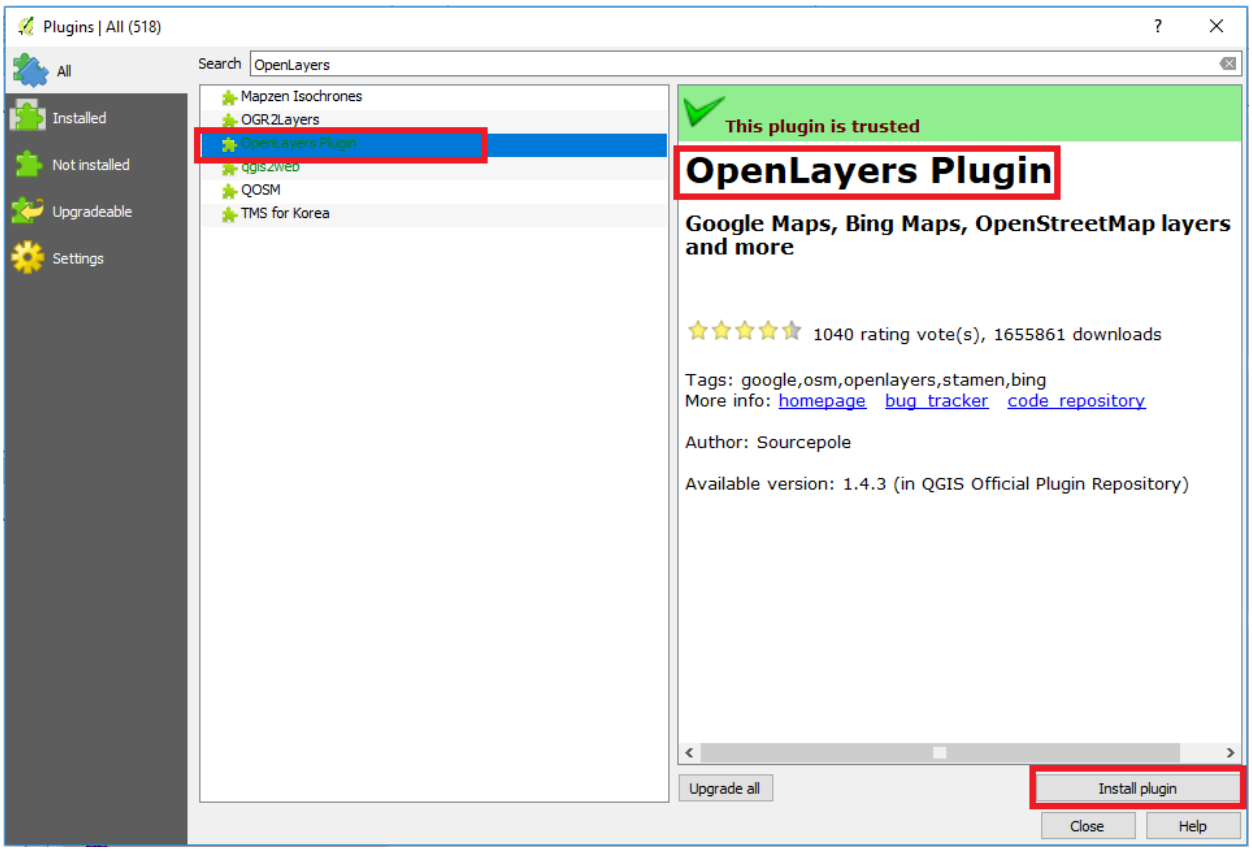
Creating an OSM Database File with QGIS

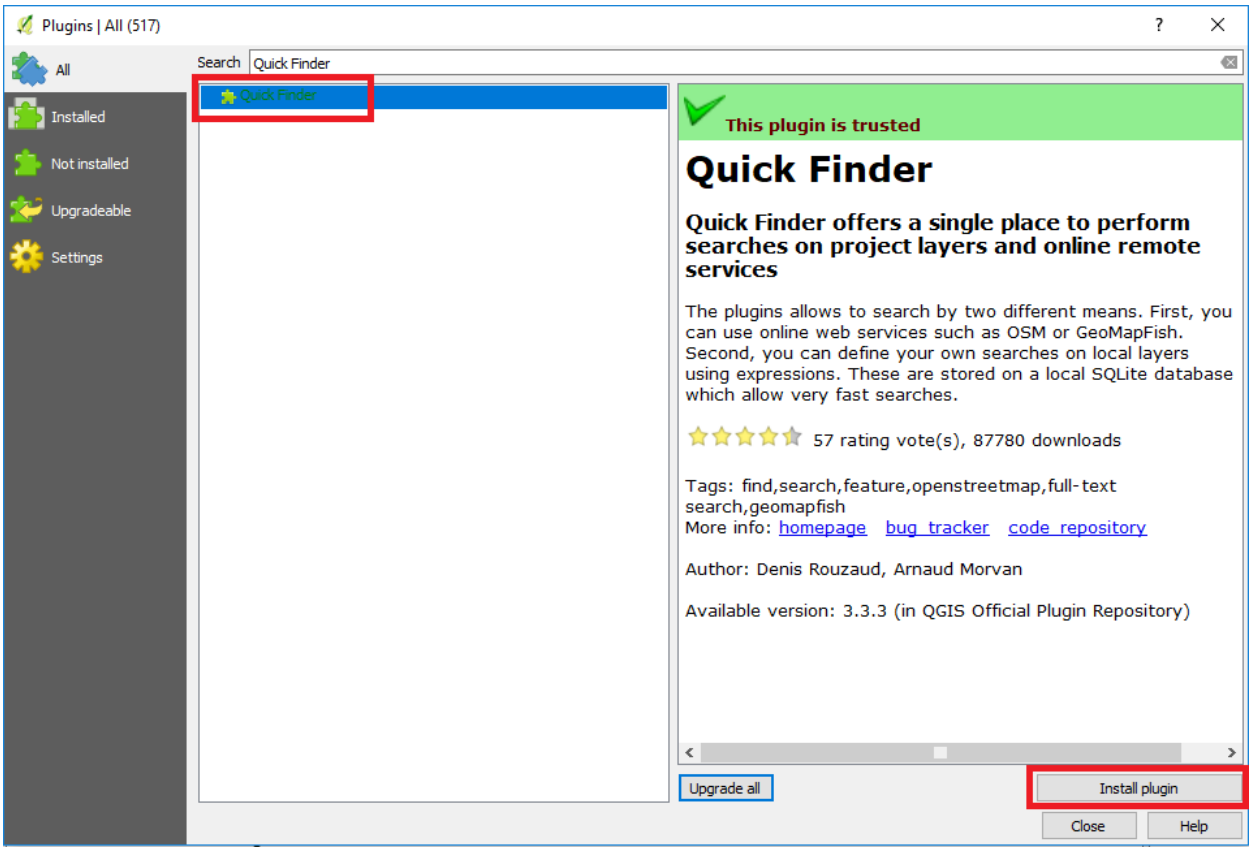
1. Open QGIS version 2.18.*. This tutorial was conducted using QGIS version 2.18.13.

2. For the purposes of this tutorial you will need to download the **OpenLayers** and **Quick Finder** plugins. These can be downloaded by navigating to the **Plugins** menu bar and **Manage and Install Plugins…**

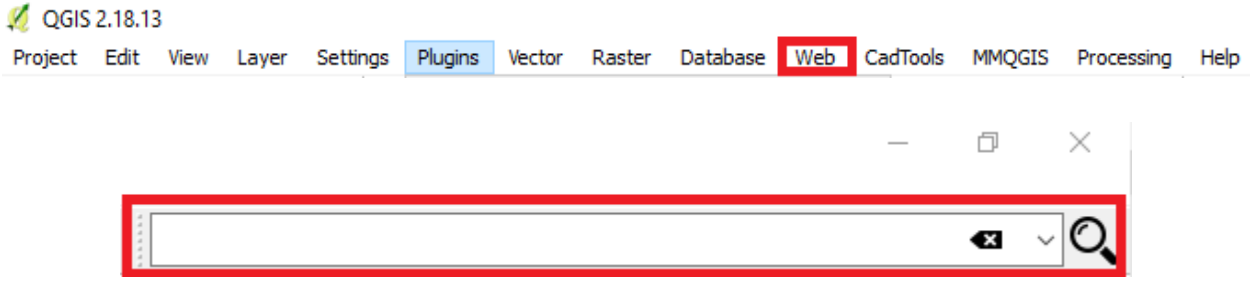


3. Search for the **OpenLayers** and **Quick Finder** plug-ins. To install each of the plugins, click **Install plugin.**


Plugins | All (518)
All
Installed
Not installed
Upgradeable
Settings
Search
OpenLayers
Mapzen Isochrones
OGR2Layers
OpenLayers Plugin
qgis2web
QOSM
TMS for Korea
This plugin is trusted
OpenLayers Plugin
Google Maps, Bing Maps, OpenStreetMap layers and more
1040 rating vote(s), 1655861 downloads
Tags: google,osm,openlayers,stamen,bing
More info: homepage bug tracker code repository
Author: Sourcepole
Available version: 1.4.3 (in QGIS Official Plugin Repository)
Upgrade all
Install plugin
Close
Help



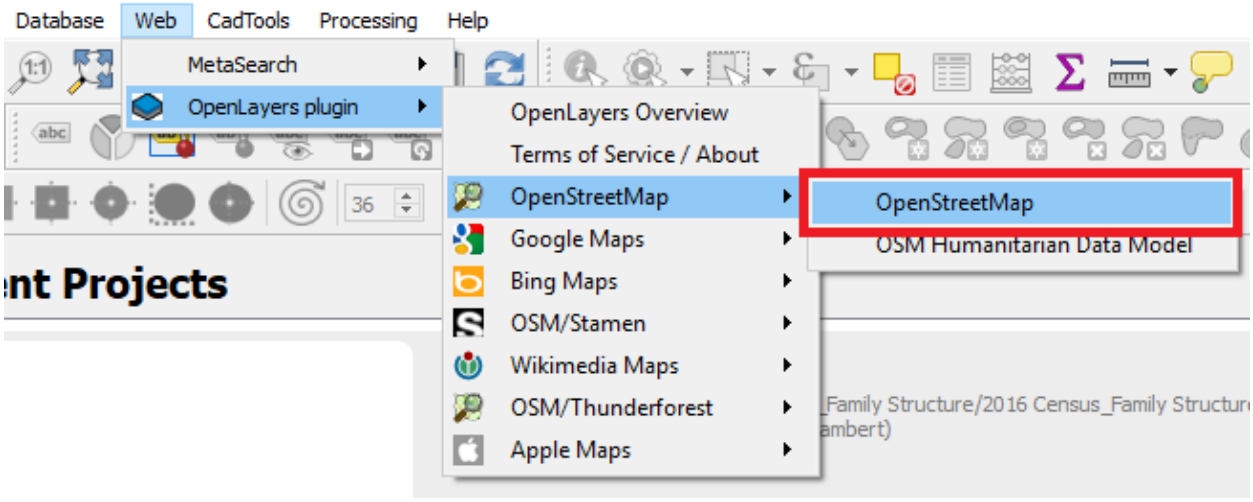
4. Once installed, you should see a search bar and **Web** menu added to the QGIS panel.

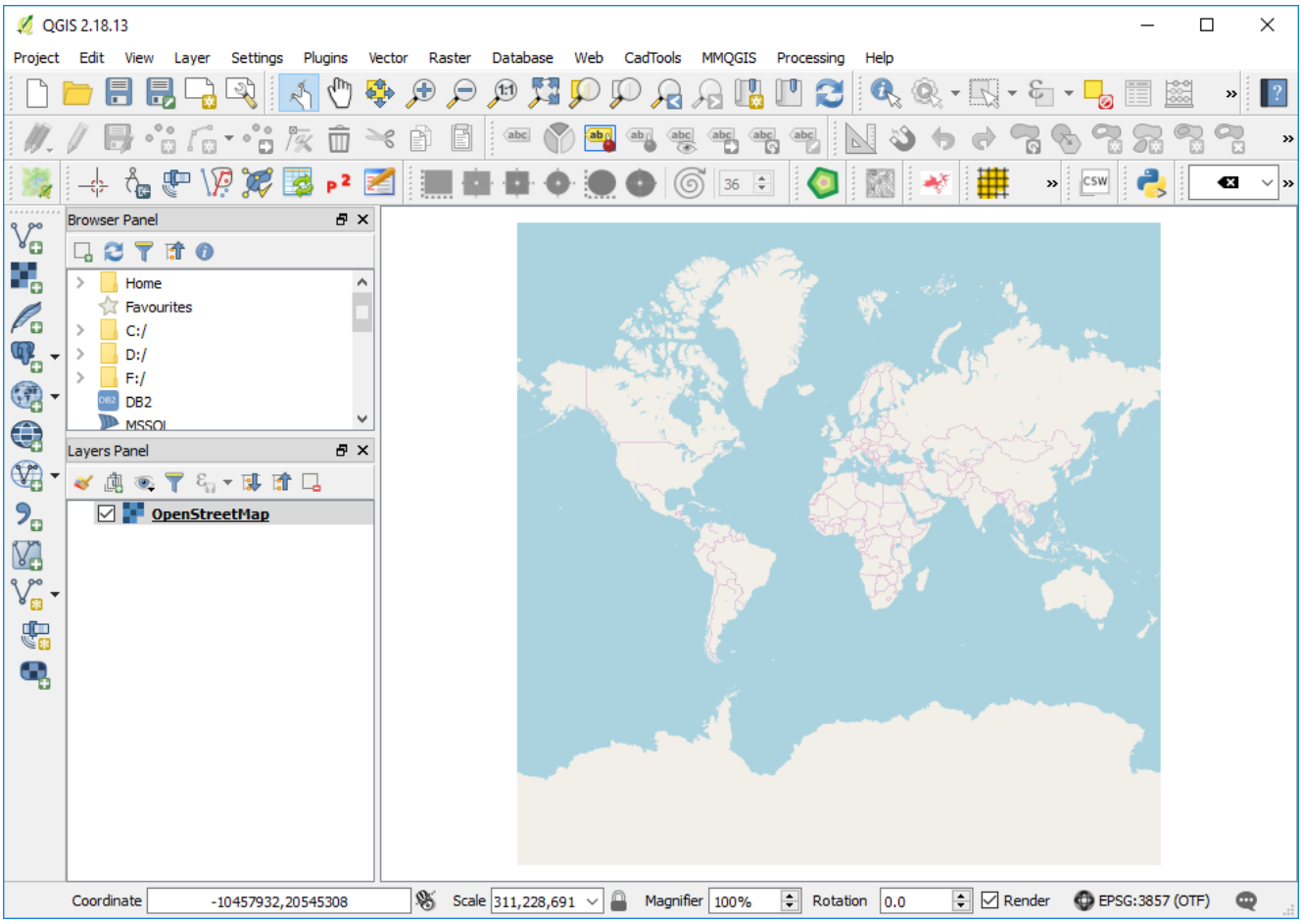


5. Add the **OpenStreetMap** as a base map to your current QGIS project.

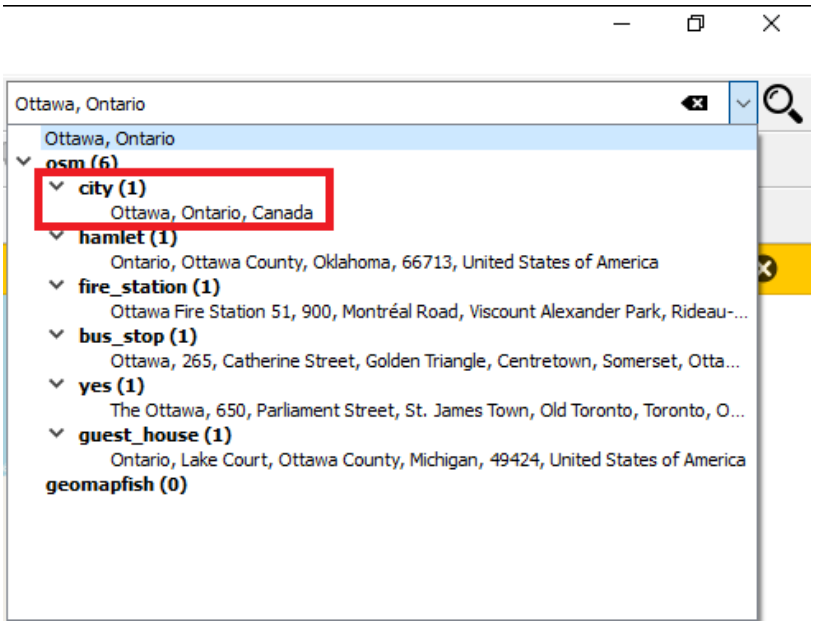
   Web > OpenLayers plugin > OpenStreetMap.

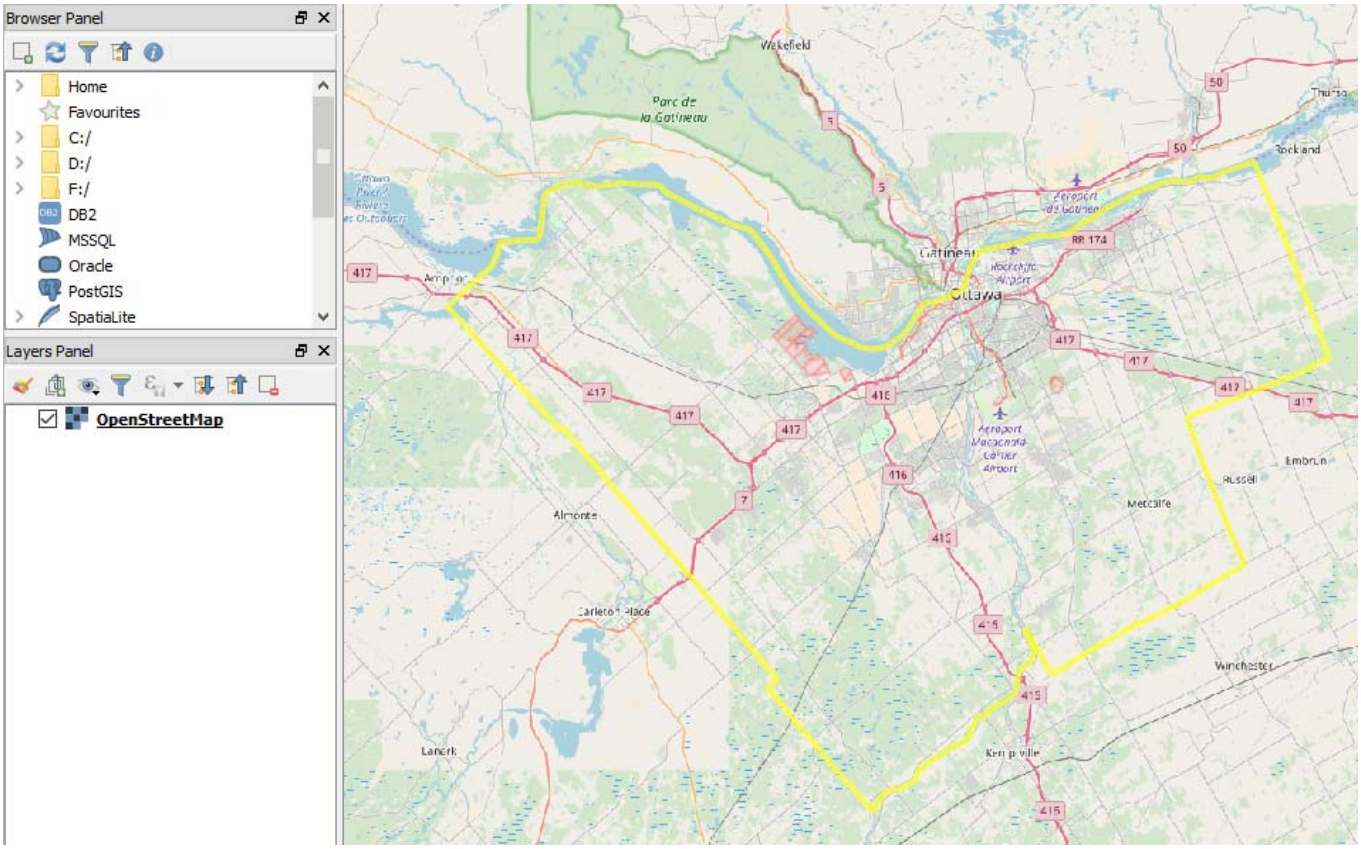
   You should now see a world map loaded in QGIS.



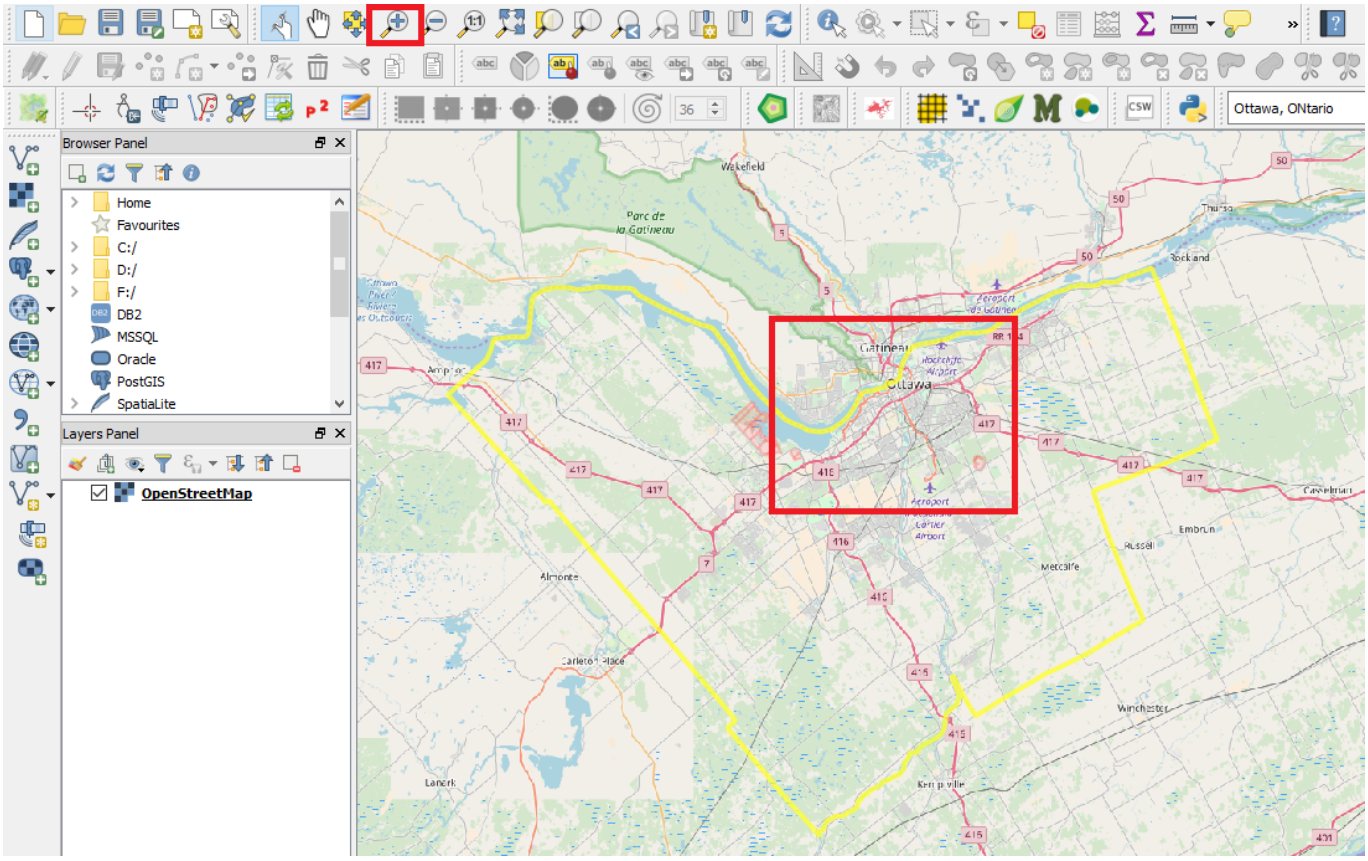


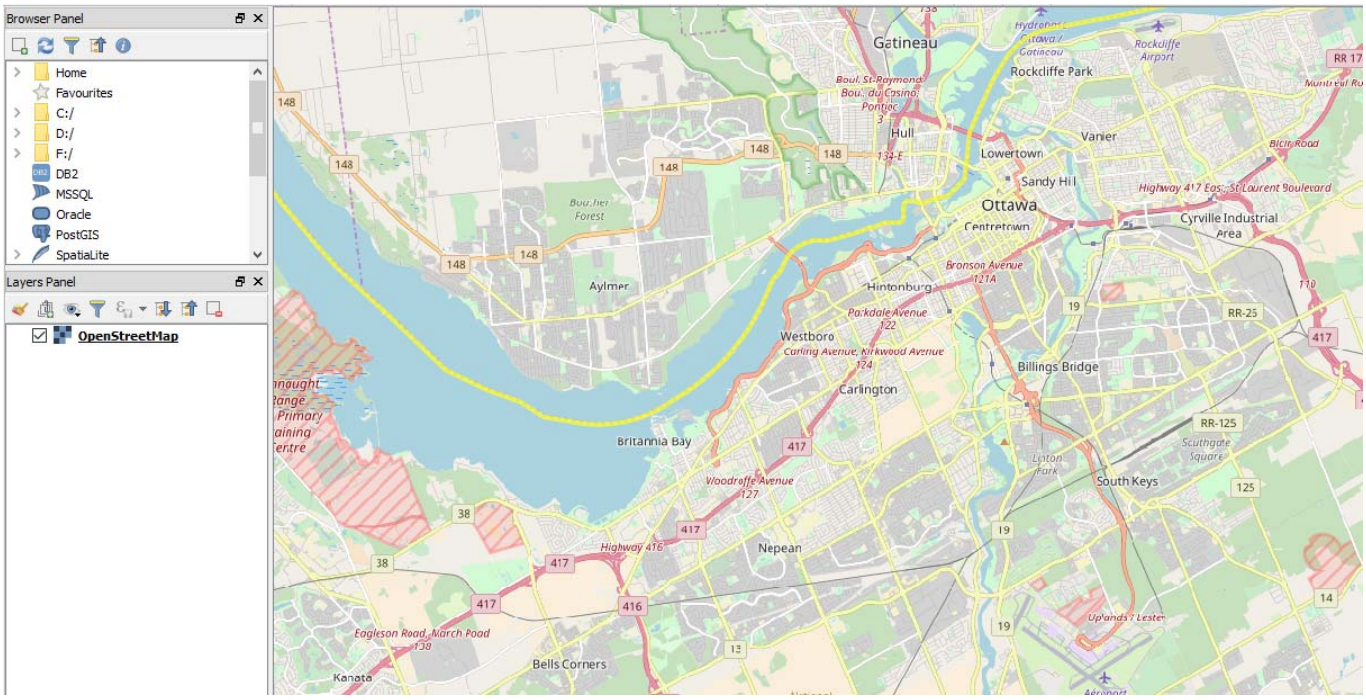
6. Using the **Quick Finder** plugin and **Search Bar**, search for your area of interest. This tutorial will focus on Ottawa, Ontario.



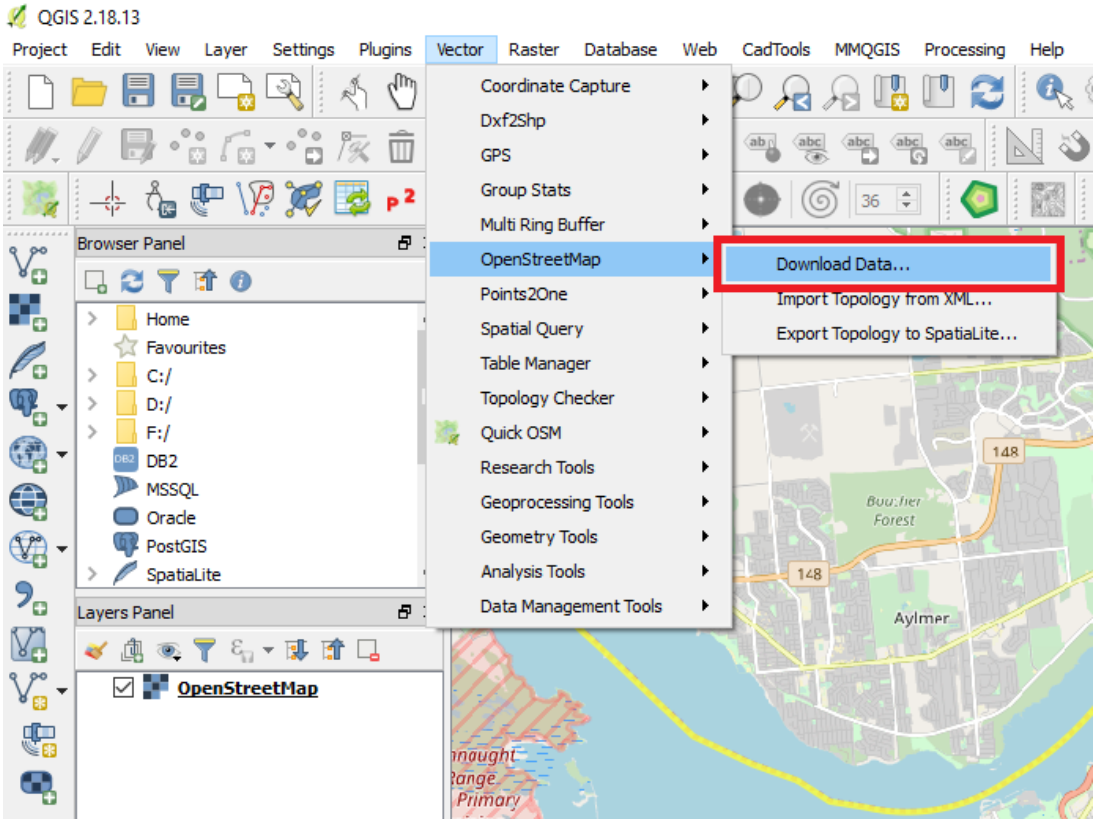


7. To zoom into a smaller area of interest, click the **Zoom In** icon and click and drag over the basemap. If you have a slower computer, it may be best to stick to a smaller area of interest as represented in the area inside the red triangle in the screen grab below, and the next one below it.

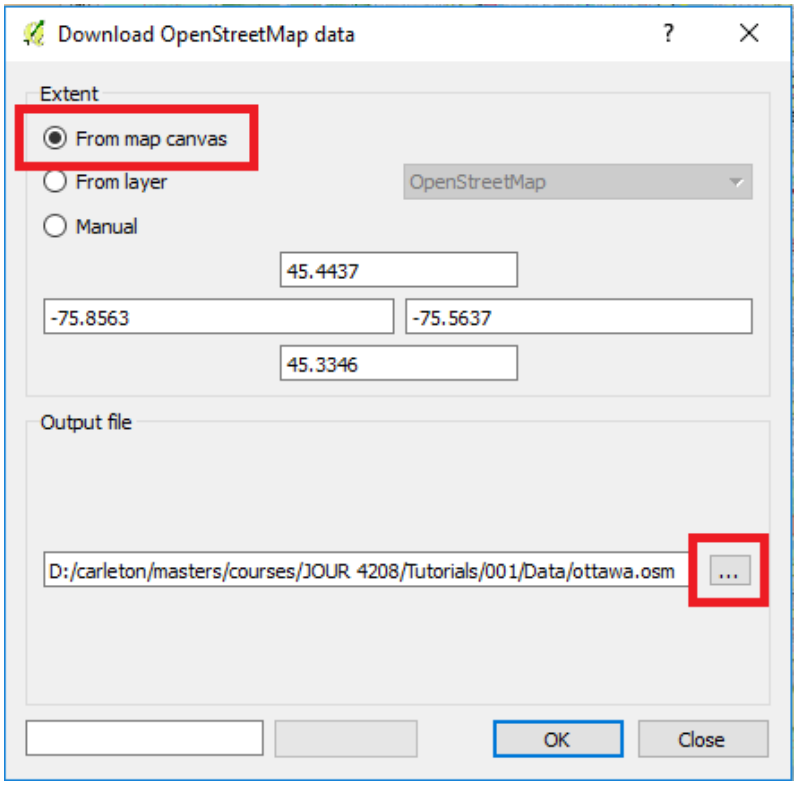




8. We can now download OSM data in the current map canvas extent. Go to **Vector > OpenStreetMap > Download Data…**

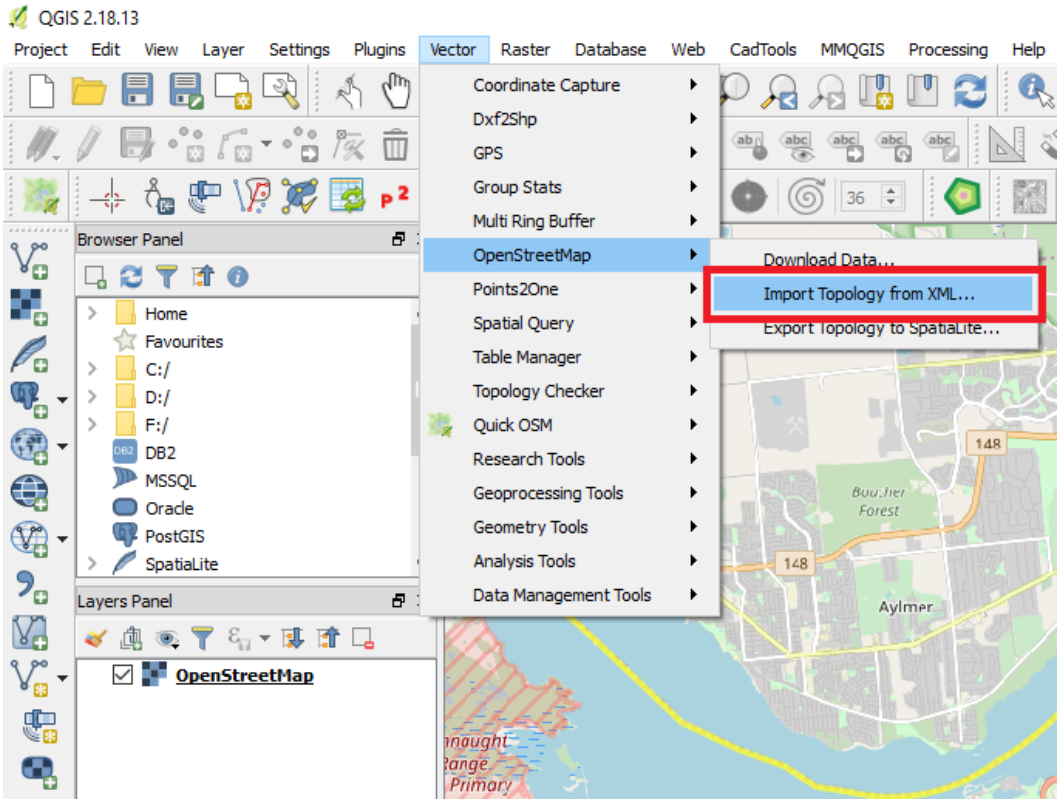


9. In the **Download OpenStreetMap data** dialogue box, select "**From map canvas"** as the "**Extent"**. Also specify the output file location.

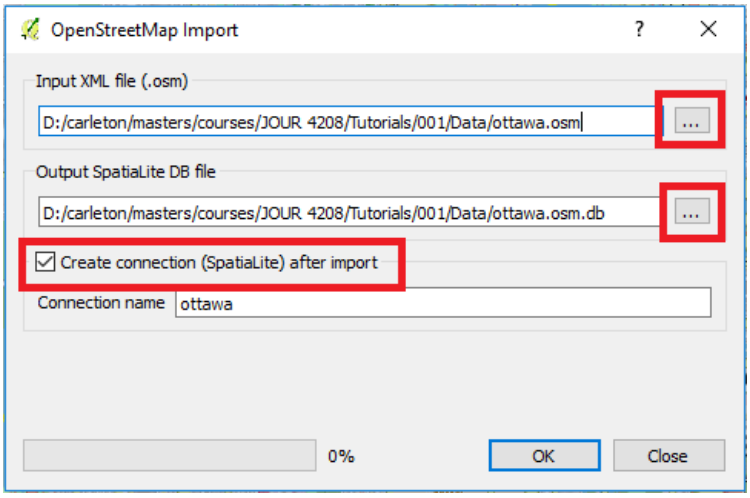


10. The file just downloaded is in an **".osm"** file extension, which is a text file in OSM XML format. This file format must be converted to a format known by QGIS.

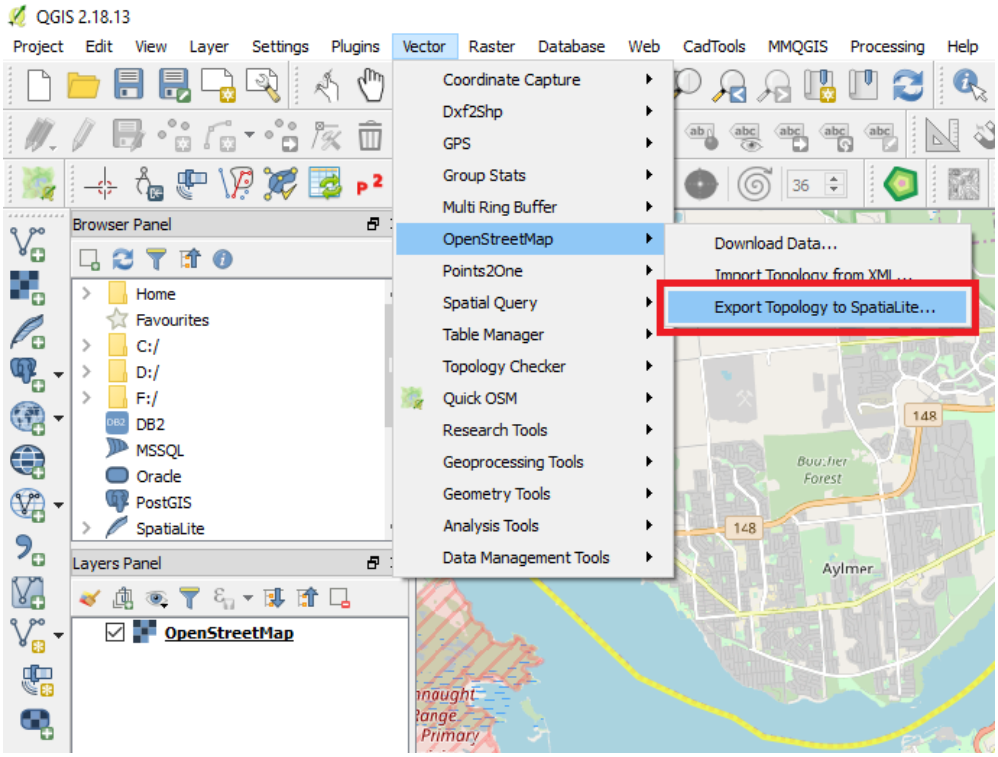
    Navigate to **Vector > OpenStreetMap > Import Topology from XML…**



11. Choose the downloaded **"ottawa.osm"** file as the **"Input XML file (.osm)"** and save the output file as **"ottawa.osm.db".** Make sure that **"Create connection (SpatiaLite) after import"** is checked. Depending on your version of QGIS, the B**Create connection (SpatiaLite) after import"** check box may not be there. This is OK. Just verify that your "**Input XML file (.osm)"** file ends with **".osm"** extension, and the **"Output SpatiaLite DB file"** ends with **".osm.db"** extension. Click **OK**.



12. The next step involves creating geometry layers from our SpatialLite DB file. Doing so will let us view and analyze the OSM data as points, lines or polygons in our QGIS project. To do this, navigate to **Vector > OpenStreetMap > "Export Topology to SpatialLite…"**

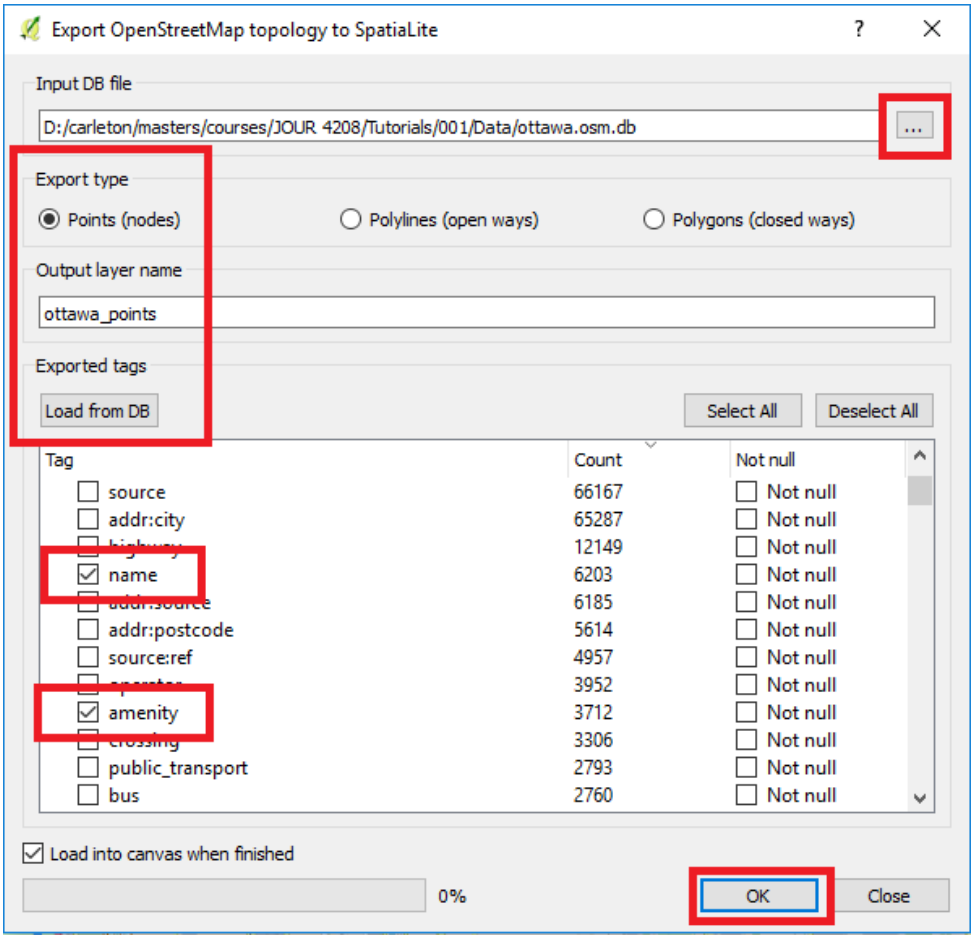


13. The **ottawa.osm.db** file contains all the OSM data from the map canvas (points, lines and polygons). For the purposes of this tutorial we will extract hospitals, schools and restaurants from the **ottawa.osm.db** file. We will select "**Points (nodes)"** as the **Export type**. If you wanted to extract road networks from the OSM dataset of our map canvas, you would select **Polylines (open ways)**. Name the output layer as **"ottawa_points"**. GIS data has two main types, location and attribute (thematic) information. We are NOT ONLY interested in WHERE the hospitals, schools and restaurants are located, but the NAMES of these points of interest.

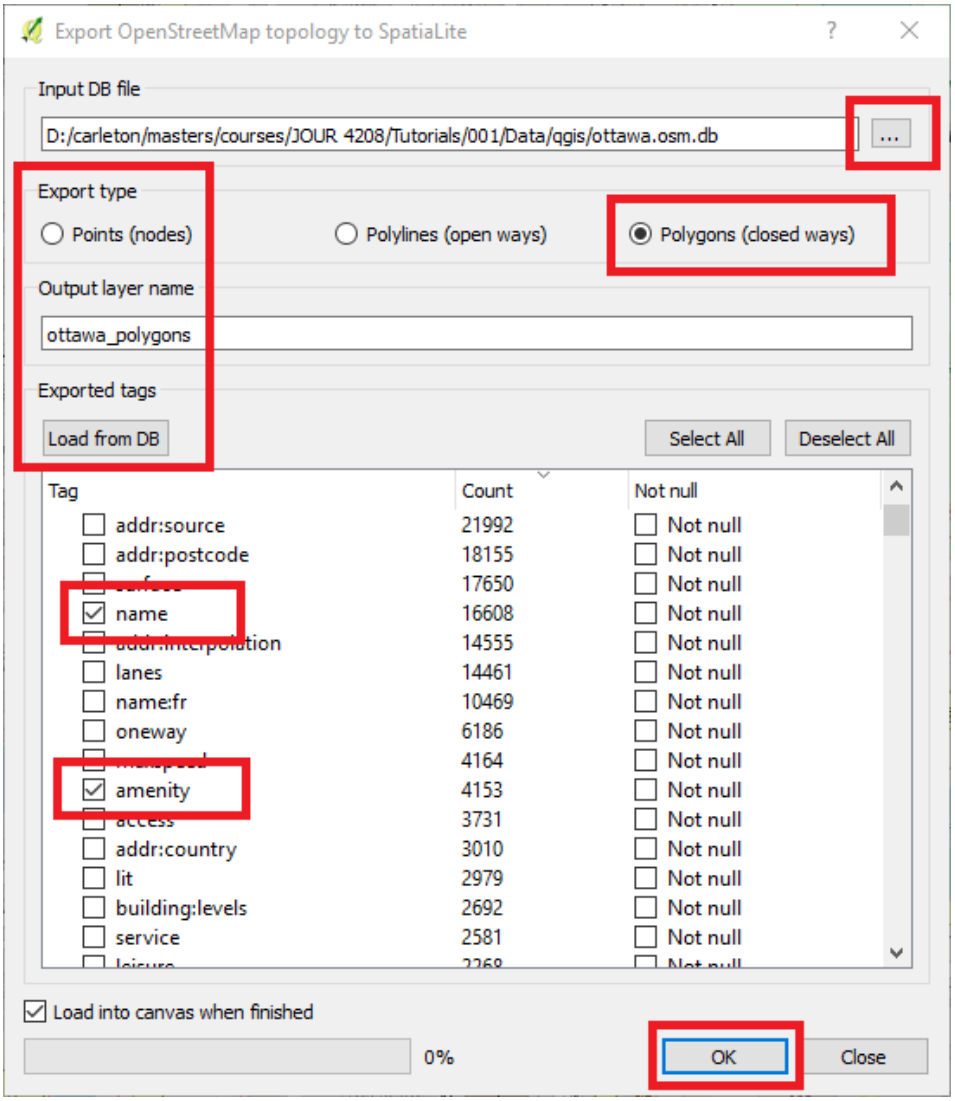
Under the **Exported tags**, select **Load from DB**, then we will select **"amenity"** and "**name"**. Expand the dialogue box to see more of the categories. The **Tag** column can be sorted alphabetically by clicking the column header ("Tag"). Checking the **Not Null** check boxes, will select the point features that are not blank (i.e. features that have metadata information available). We will leave **Not Null** unchecked.

Select **OK**. This will select all the points with **"amenity**" and "**name"** tags from the **"ottawa.osm.db"** file. Depending on the speed of your laptop and internet connection, this downloading process may take some time. So, be patient!

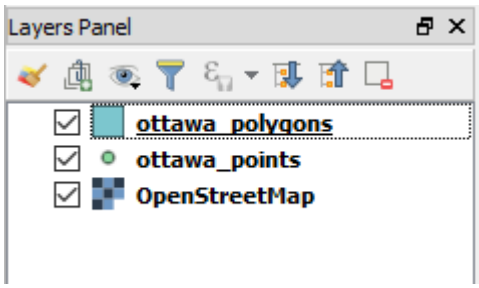
The **Count** column is the total number of points with that specific tag. For example, there are 6,203 points in my current map view with the includes the name tag. This count number will vary depending on your map extent. If you are zoomed in to a smaller area of interest, the count numbers will be smaller. If you are zoomed out (covering a larger area of interest), the count numbers will be larger.



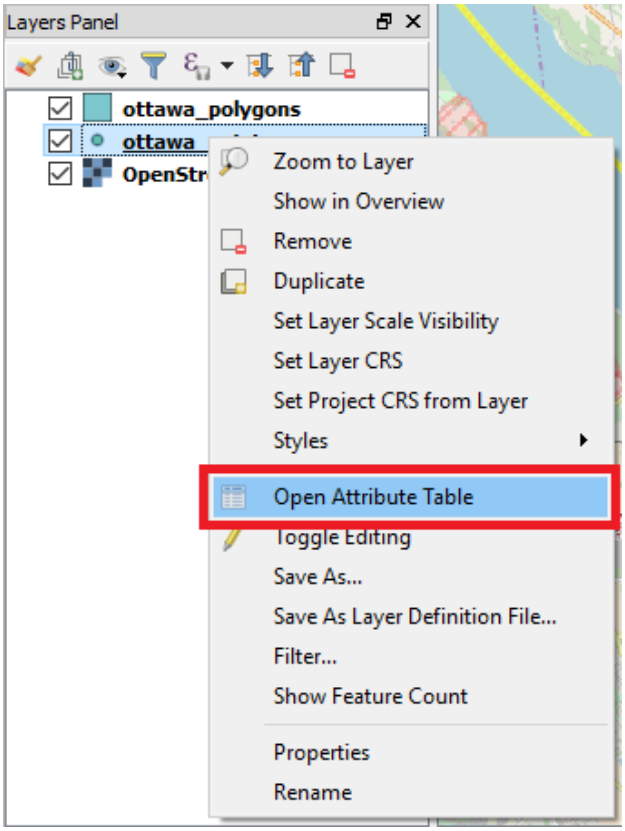
14. We will also export **“amenity”** and **“name”** polygon geometry from the OSM dataset. For the next export, instead of selecting the **Export type** as “**Points (nodes)”**, select “**Polygons (closed ways)”**.



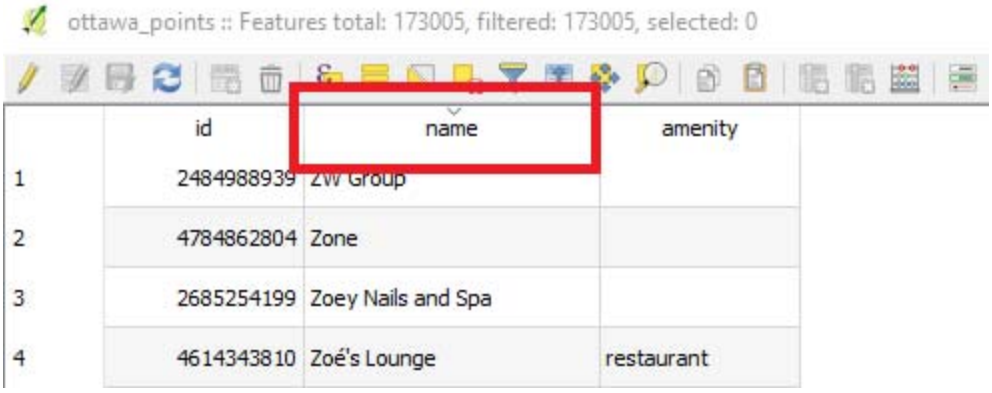
15. You will now see a **ottawa_points** and **ottawa_polygons** layer that has been added to QGIS.



Since we are only interested in hospitals, schools and restaurants, we will have to write a search query to filter our desired points of interest. To do this right click on the **ottawa_points** layer and select **Open Attribute Table**.

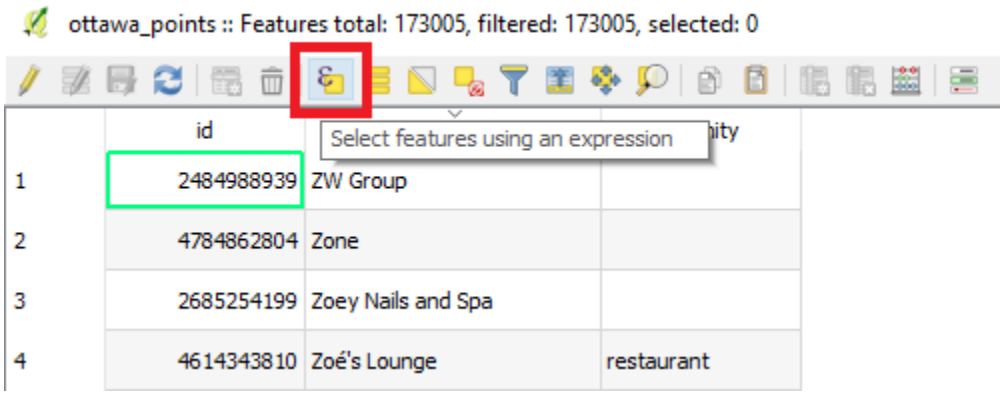


16. You will see that some features have "**amenity"** types as their names. To view the "**names"** of each of the points extracted, sort the **names** field in descending order (click the names field until the arrow is pointing down). The previous steps (creating an .osm.db file, export topology, etc.) allowed us to now see certain metadata information on each of the points from our area of interest.

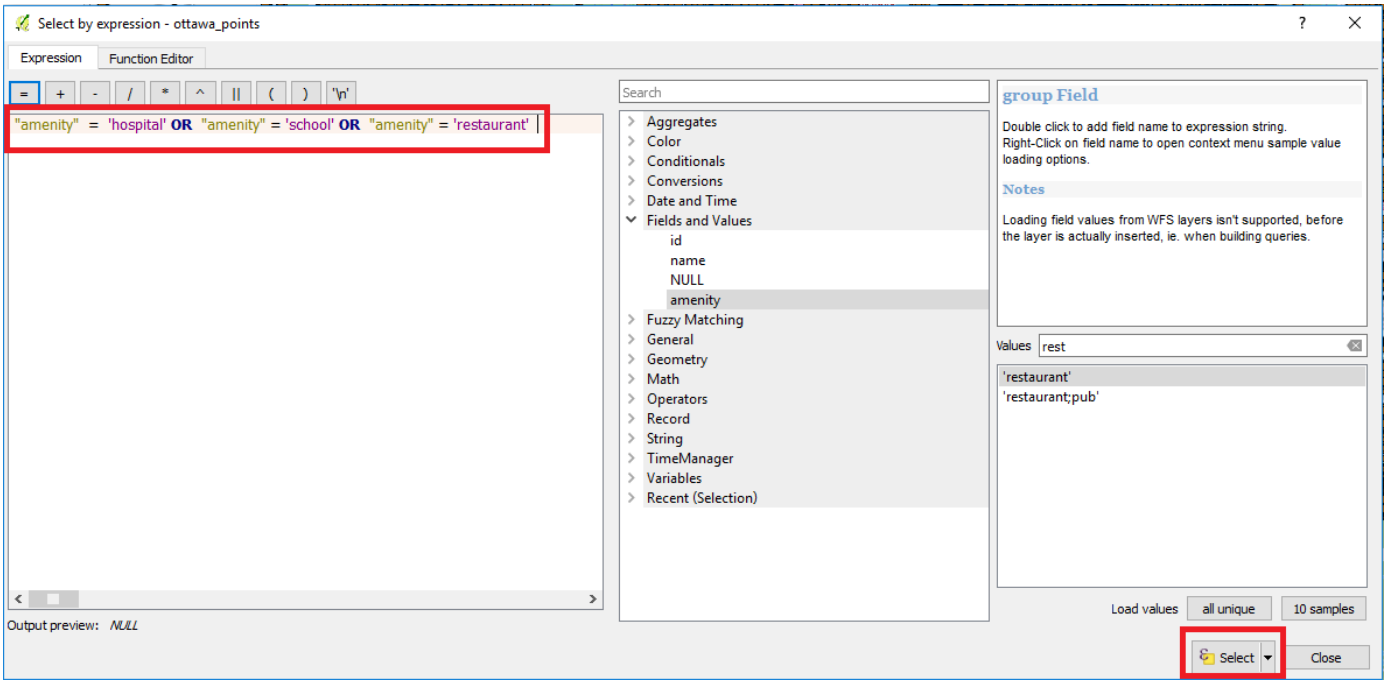


	id	name	amenity
1	2484988939	ZW Group	
2	4784862804	Zone	
3	2685254199	Zoey Nails and Spa	
4	4614343810	Zoé's Lounge	restaurant

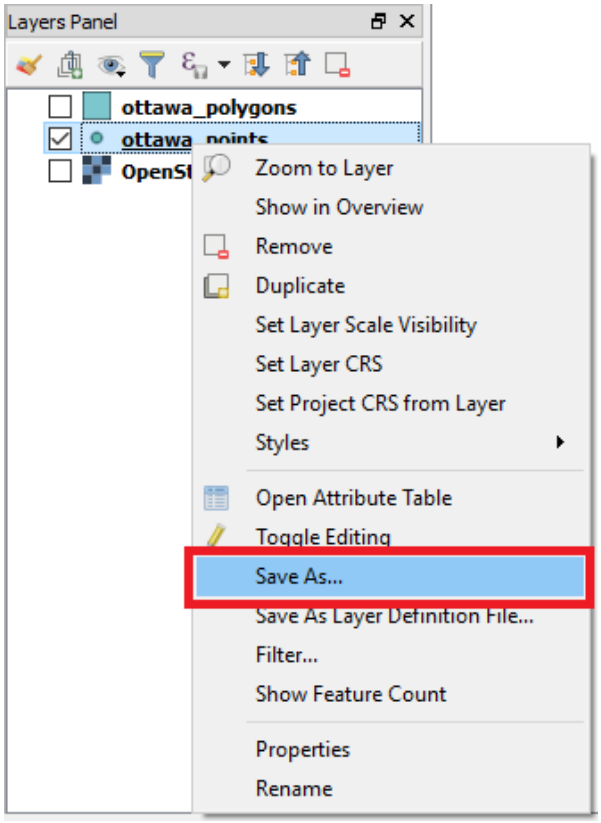
17. To filter our points of interest, we will create a simple SQL expression. Click the "**Select features using an expression"** icon.



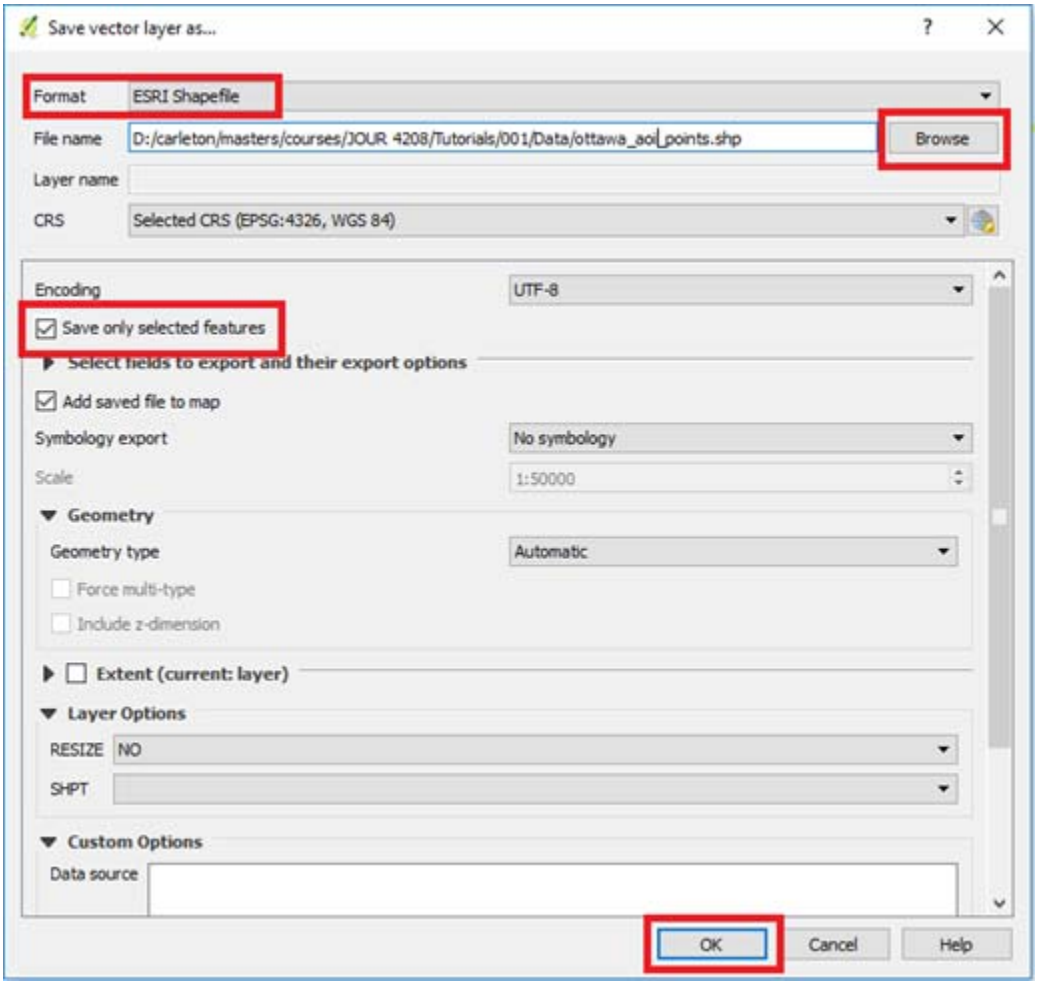
18. Clicking the **Select features using an expression** box, produces the **Select by expression** dialogue box in this step. Next enter the query expression, **"amenity" = 'hospital' OR "amenity" = 'school' OR "amenity" = 'restaurant'**. It should be noted that the second and third expressions don't need to be in quotation marks but it is good practice to use them. Click **Select**.



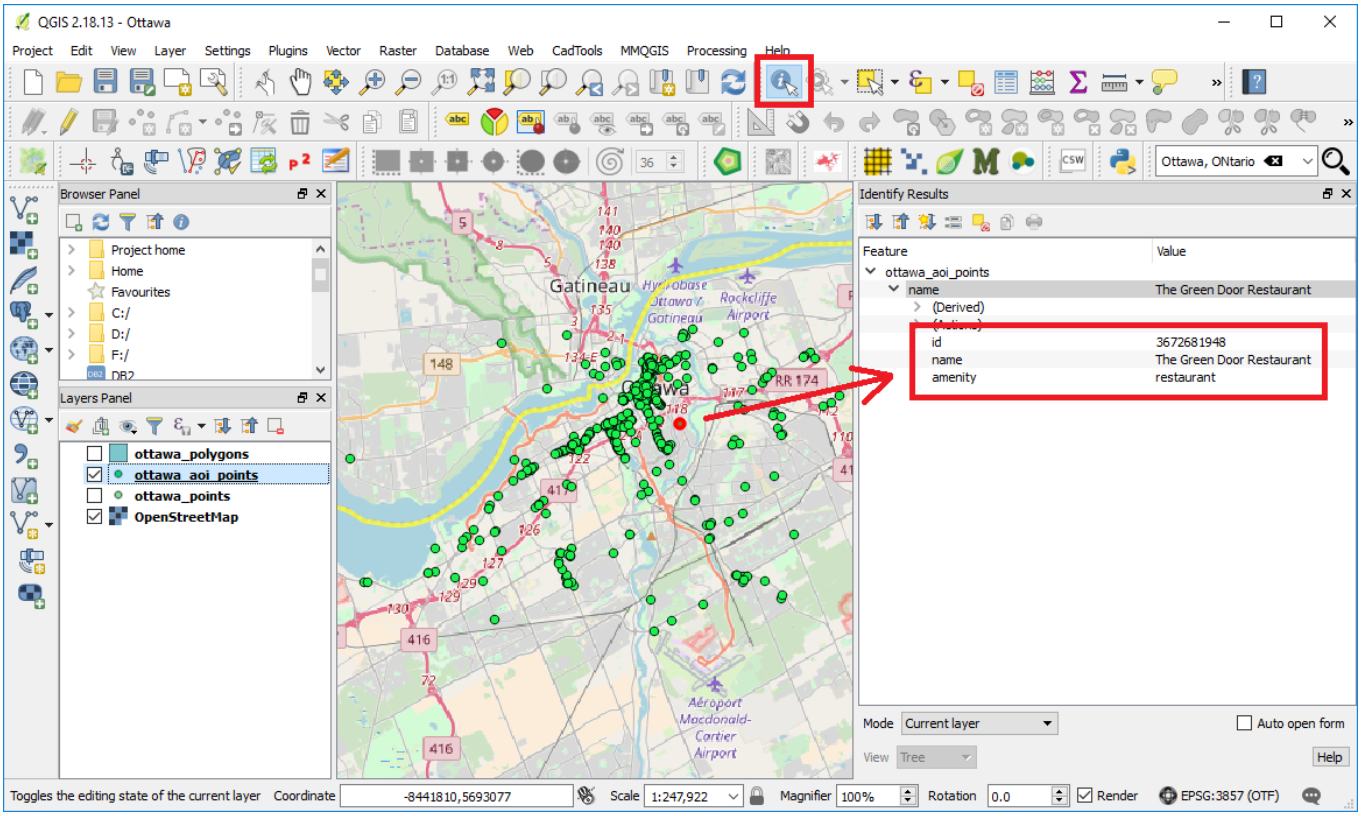
19. Back in the QGIS canvas you will see some selected yellow points. This is a result of our search query. To save that selection, right click the "**ottawa_points"** label and select **Save As**…



20. In the **Save vector layer as…** dialogue box, select the **Format** type as **ESRI Shapefile**, select **Browse**, and save the the new layer as **"ottawa_aoi_points"**. *****AND THIS IS VERY IMPORTANT: Also check off **Save only selected features…**** Click **OK**.

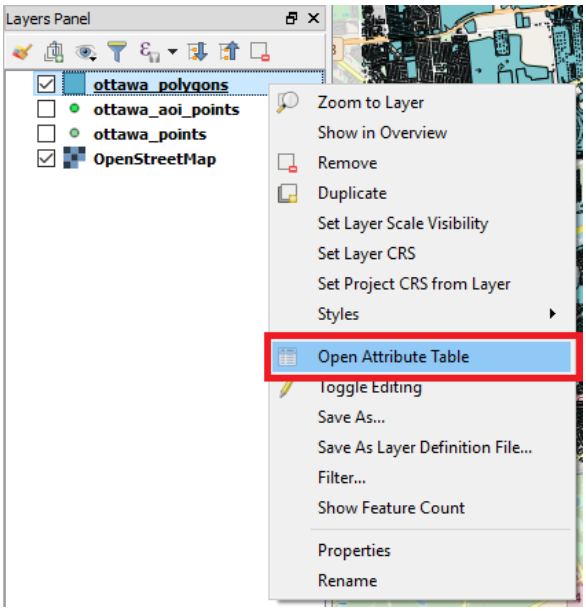


21. You will now see the resulting points from our query. To view more information on the points of interest, uncheck the **ottawa_points** layer, then select the **Identify Features** tool at the top panel, and then click on a point. The "**Identify Results"** panel to the right (or to the left, depending your version of Qgis) of the canvas will open with attribute information on that point.

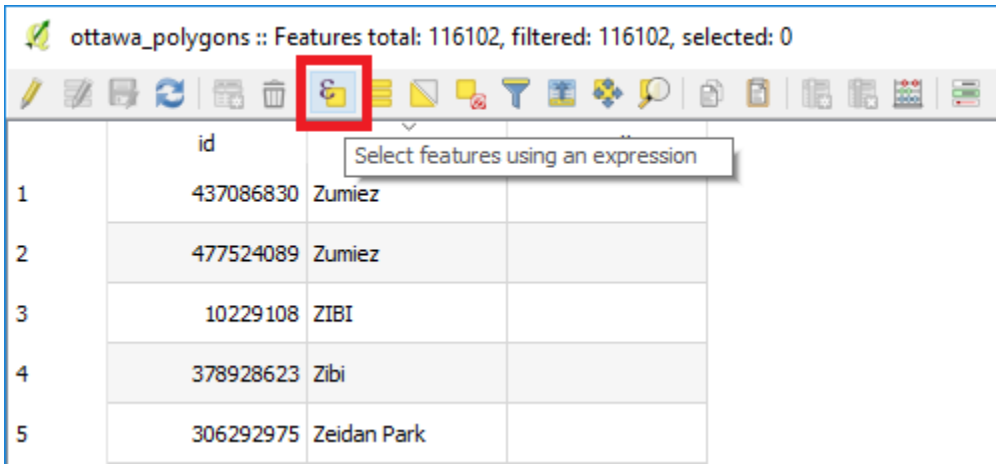


22. The following steps will re-iterate steps 16 to 20, for the **ottawa_polygons** to display our polygons of interest. Feel free to follow the next steps, or just re-iterate steps 16-20, but for the **ottawa_polygons** layer.

    Check the box beside the **ottawa_polygons** layer to view all of polygons we've selected in step 14.

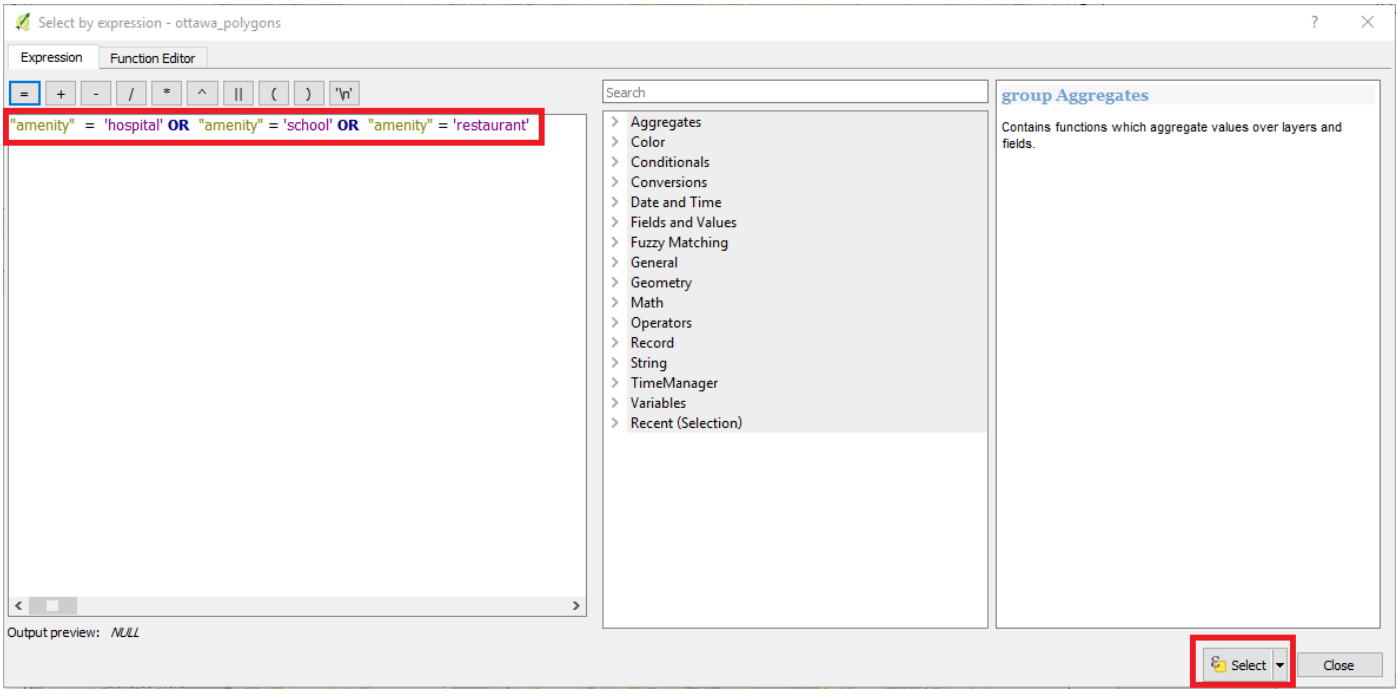


23. Sort the **name** field in descending order (arrow above **name** pointing down). We can now see that polygon "**names"** and "**amenity"** types were selected from step 14. Click **Select features using an expression** box.

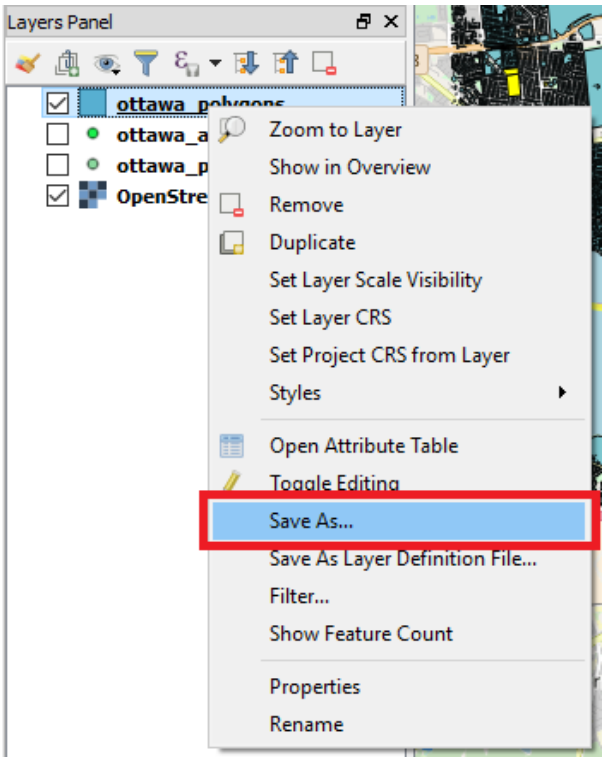


	id	
1	437086830	Zumiez
2	477524089	Zumiez
3	10229108	ZIBI
4	378928623	Zibi
5	306292975	Zeidan Park

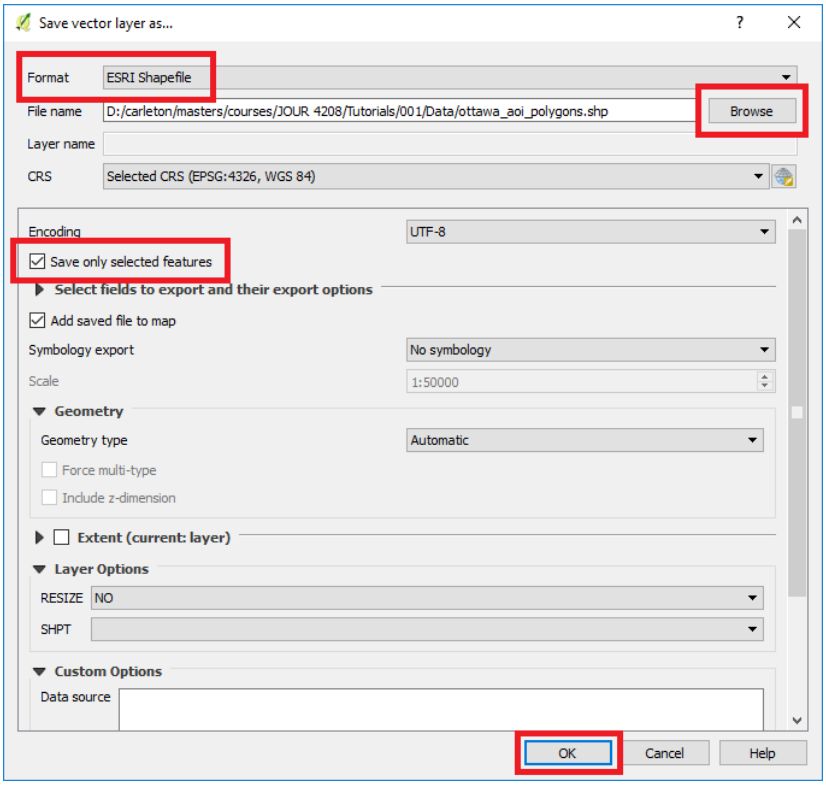
24. Next enter the same query expression but for the **ottawa_polygons** layer, **"amenity" = 'hospital' OR "amenity" = 'school' OR "amenity" = 'restaurant'**. Click **Select**.



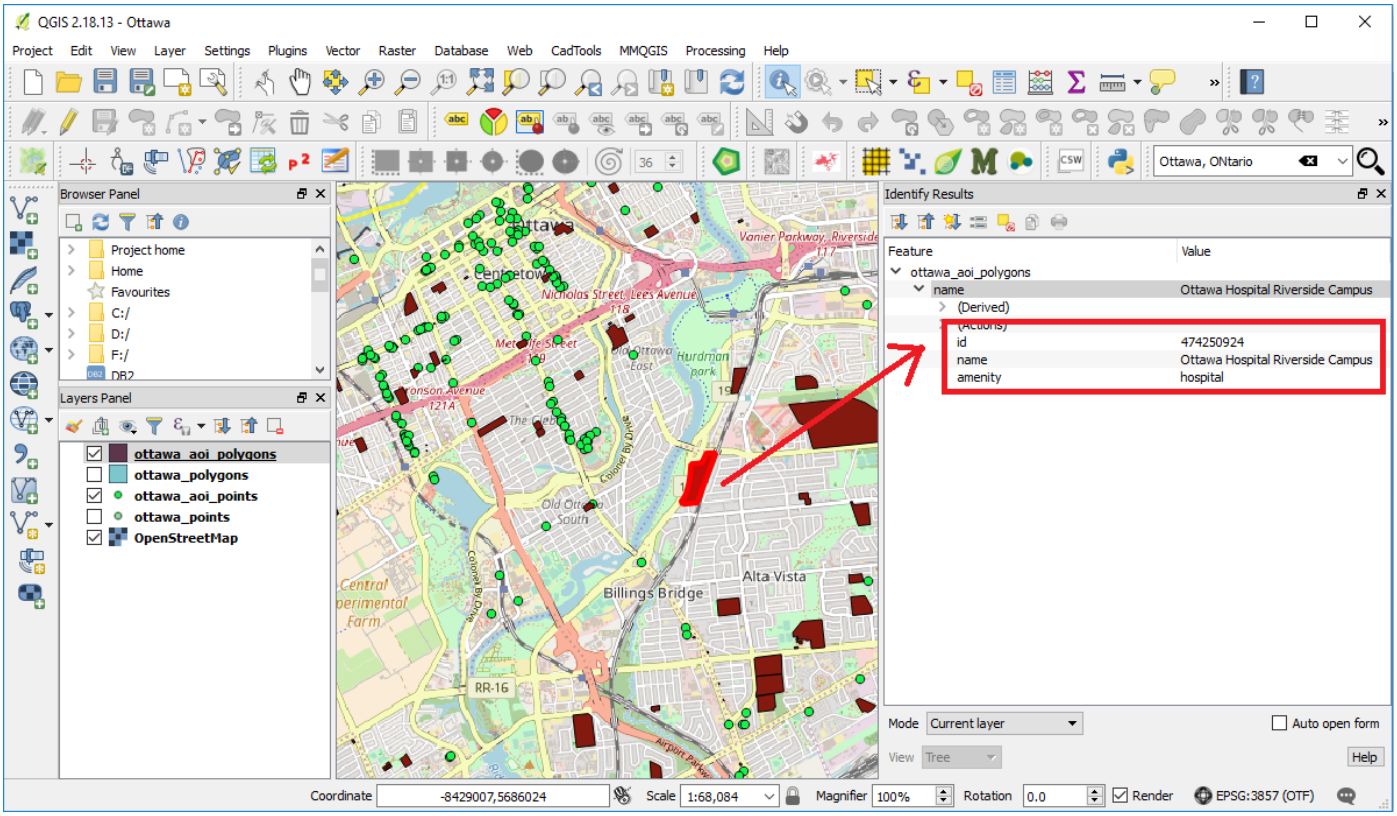
25. Back on the QGIS canvas you will see some selected yellow polygon geometries. This is a result of our search query. To save that selection, right-click **ottawa_polygons** and select **Save As**…



26. In the **Save vector layer as…** dialogue box, select the **Format** type as **ESRI Shapefile**, select **Browse**, and save the as **ottawa_aoi_polygons**. Also check off **Save only selected features…** Click **OK**.



27. You will now see the resulting polygons from our query. To view more information on the polygons of interest, uncheck the **ottawa_polygons** layer, then select the **Identify Features** tool at the top panel and click on a polygon. The **Identify Results** panel will open with attribute information on that polygon.


QGIS 2.18.13 - Ottawa
Project Edit View Layer Settings Plugins Vector Raster Database Web CadTools MMQGIS Processing Help
Ottawa, ONtario
Browser Panel
Project home
Home
Favourites
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id
474250924
name
Ottawa Hospital Riverside Campus
amenity
hospital
Mode
Current layer
Auto open form
View
Tree
Help
Coordinate
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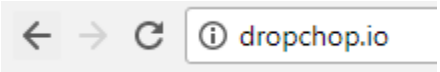
Scale
1:68,084
Magnifier
100%
Rotation
0.0
Render
EPSG:3857 (OTF)

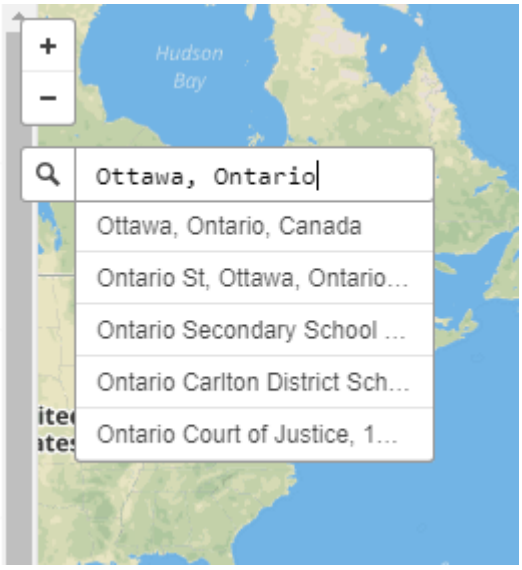
Dropchop.io

The next section of this tutorial will outline the steps required to search and extract (download) OSM data using a tool called Dropchop within your internet browser. The main advantage to using this method is that there fewer steps required. Although, there is processing done outside of QGIS.

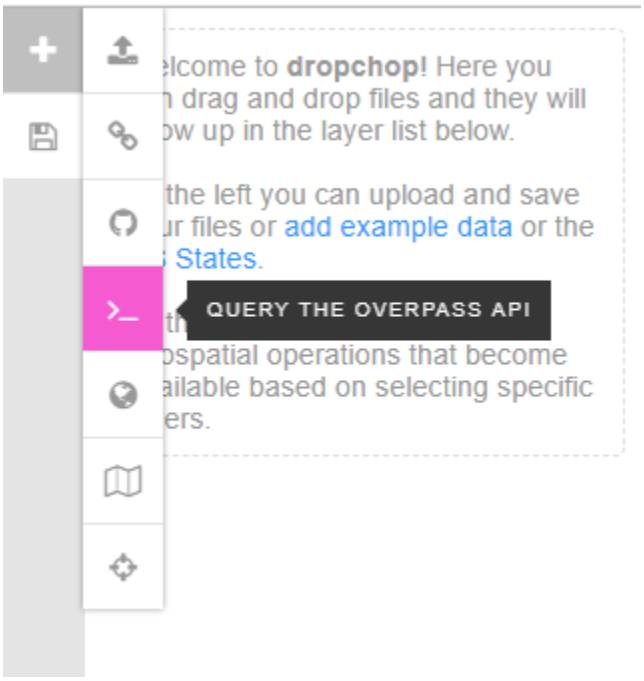
1. Open the internet browser of your choice and type http://dropchop.io in the address bar.



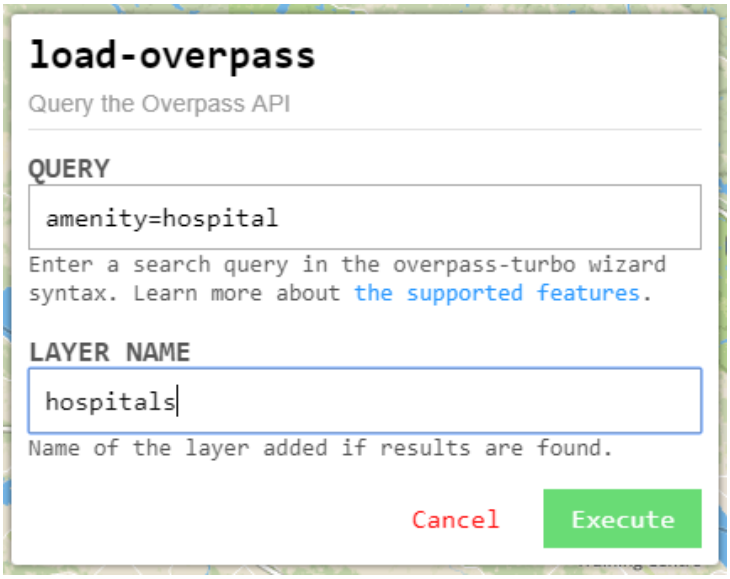
2. Once you're on the page search for **Ottawa, Ontario** in the search bar.

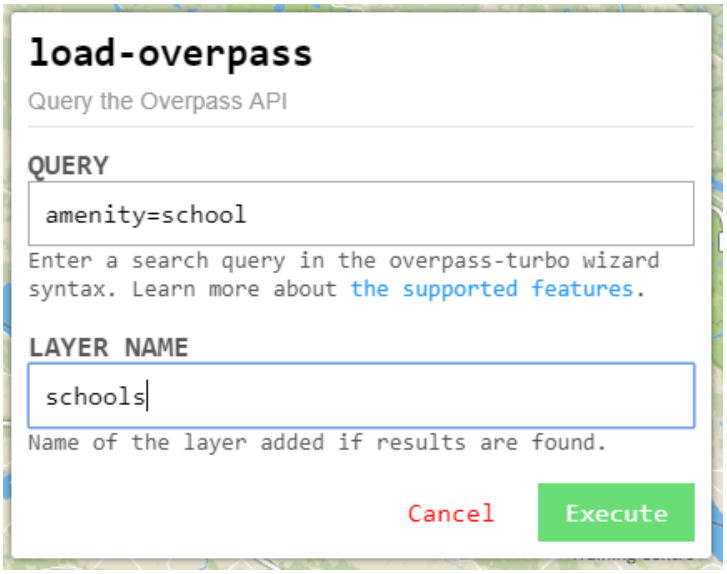


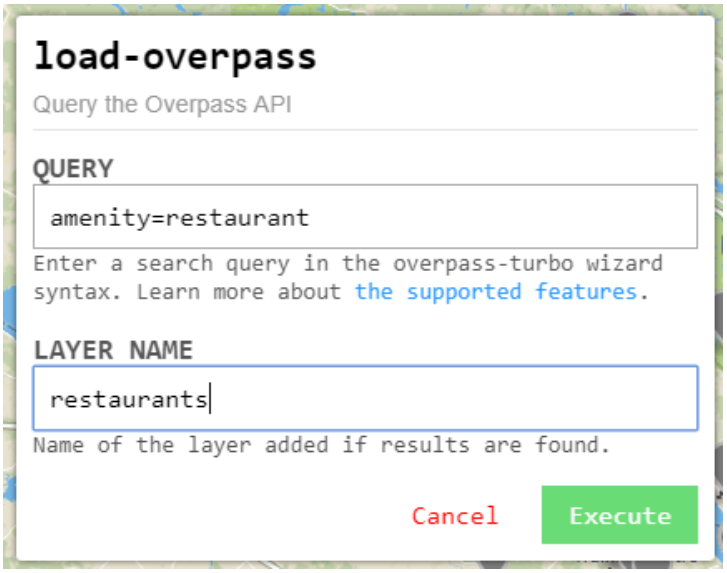
3. Hover over the green **+** icon and select **Query the Overpass API**.



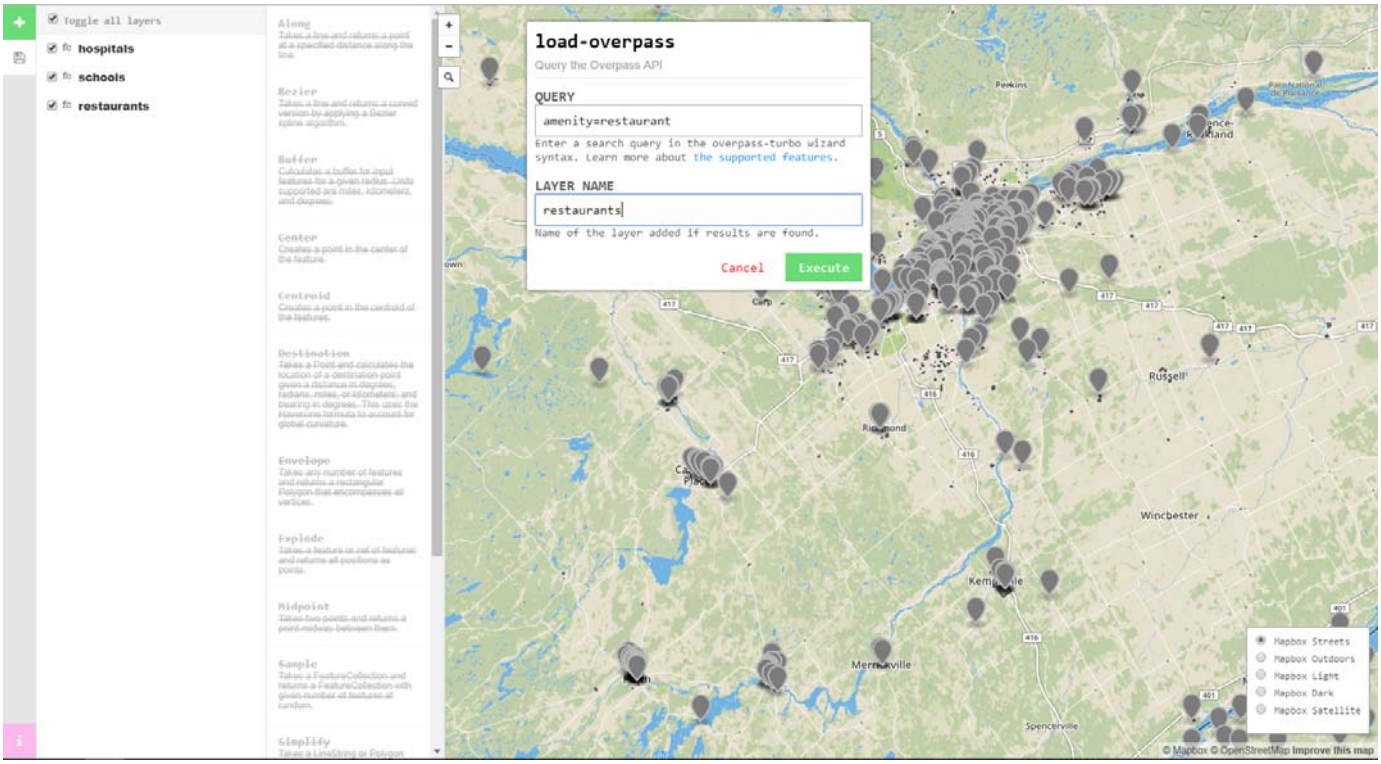
4. From here, a query search interface will appear. This is similar to the SQL querying that is done in the Attribute Table, but with the OpenStreetMap API. In the **Query** box type, **amenity=hospital**. In the **Layer Name**, name the layer **hospitals**. Press Execute. Conduct this step for **amenity=school** and **amenity=restaurant**.



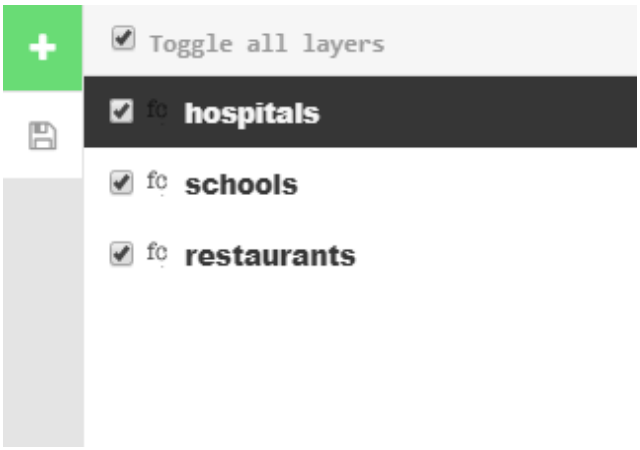




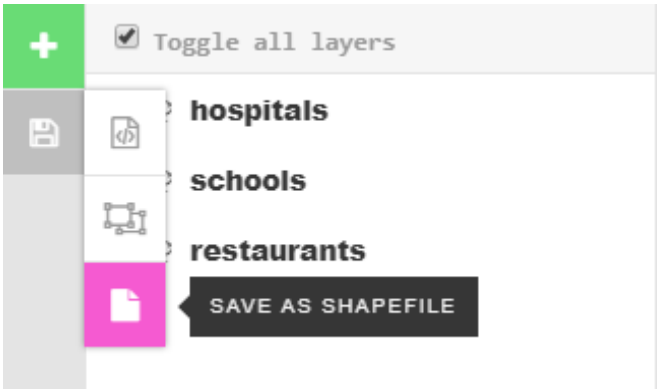
5. You'll now see all the points and polygons in the bounding box region with the tags **amenity=hospital**, **amenity=school** and **amenity=restaurant**.



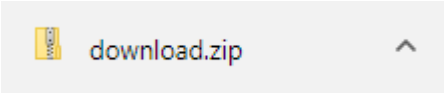
6. In the Layer Panel to the left hospitals feature class will be added. Click the hospitals layer so that it turns black.



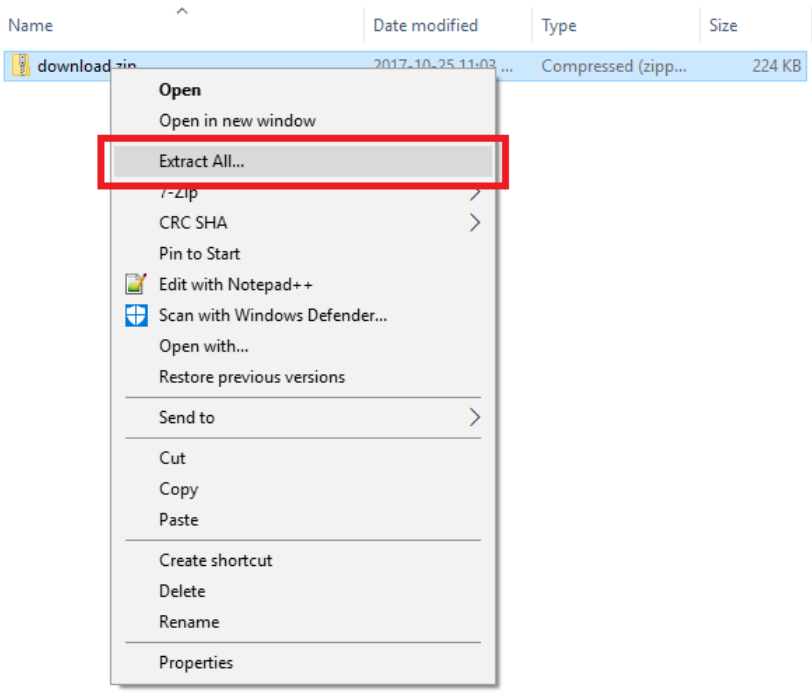
7. To the left, hover over the **Save Icon** and select **Save as Shapefile**.



8. The hospitals layer should have downloaded as a .zip file.



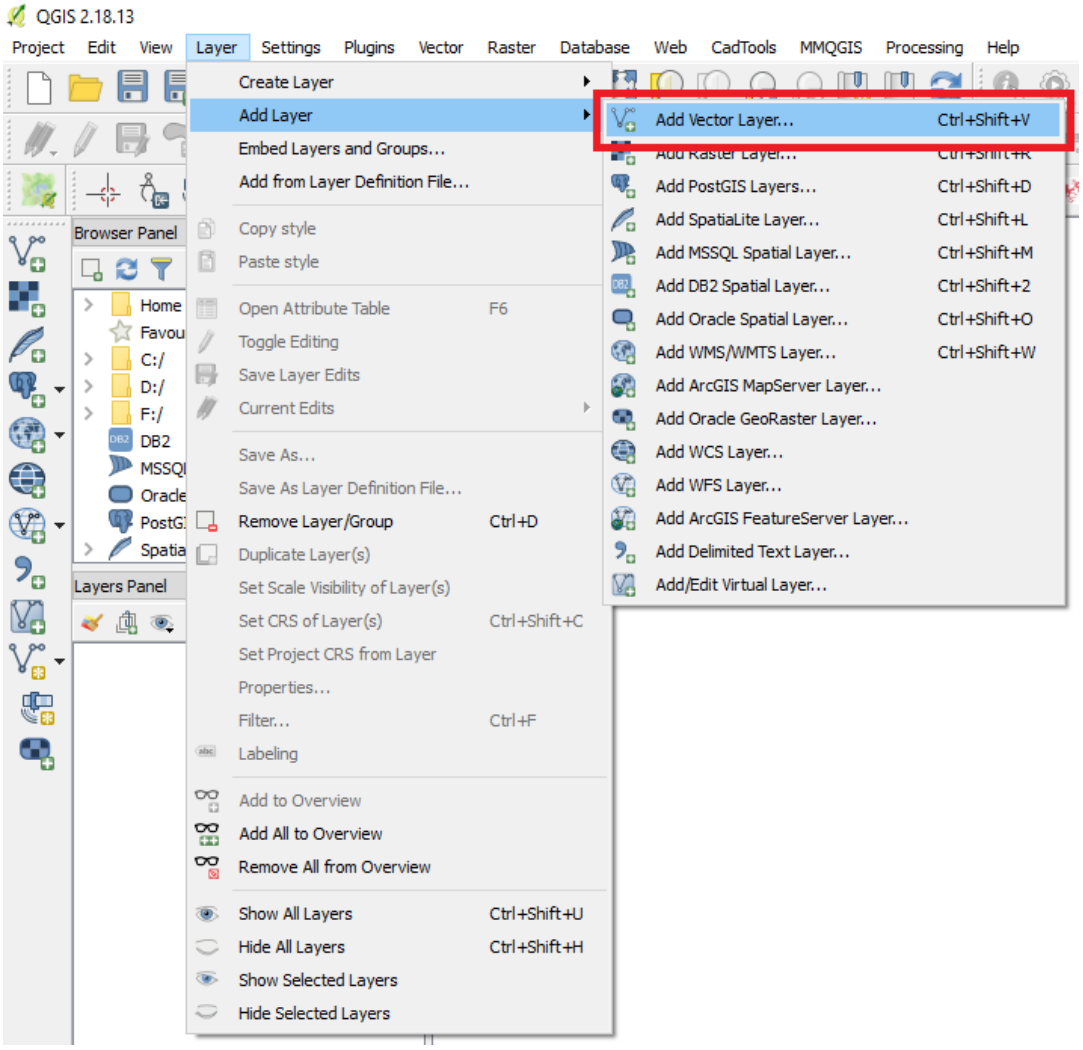
9. Navigate to the default downloads folder for your internet browser and copy the **download.zip** file to the directory of your choice and **Extract All…** files.



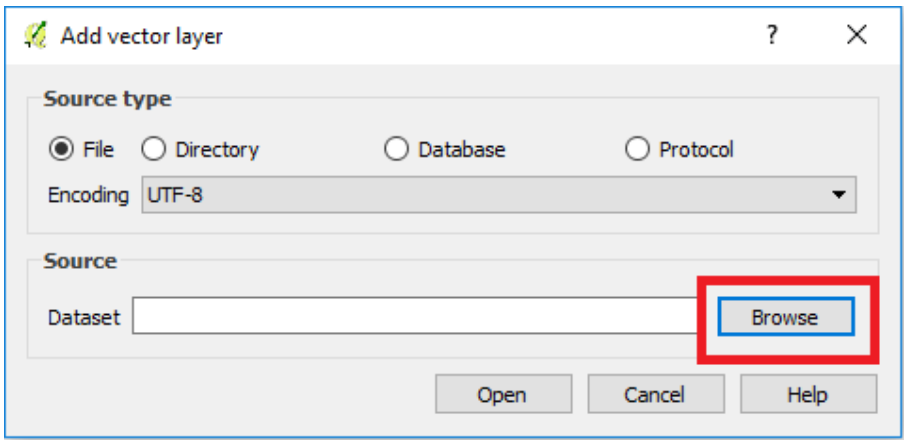
10. Navigate to the **download > dropchop_hospitals** folder. In there you will see two specific ".shp" files, **dropchop_hospitals_point.shp** and **dropchop_hospitals_poly.shp**.

Name	Date modified	Type	Size
dropchop_hospitals_point.dbf	2017-10-25 11:09 ...	OpenOffice.org 1....	12 KB
dropchop_hospitals_point.prj	2017-10-25 11:09 ...	PRJ File	1 KB
dropchop_hospitals_point.shp	2017-10-25 11:09 ...	FMEFormatFile.F...	1 KB
dropchop_hospitals_point.shx	2017-10-25 11:09 ...	SHX File	1 KB
dropchop_hospitals_poly.dbf	2017-10-25 11:09 ...	OpenOffice.org 1....	195 KB
dropchop_hospitals_poly.prj	2017-10-25 11:09 ...	PRJ File	1 KB
dropchop_hospitals_poly.shp	2017-10-25 11:09 ...	FMEFormatFile.F...	16 KB
dropchop_hospitals_poly.shx	2017-10-25 11:09 ...	SHX File	1 KB

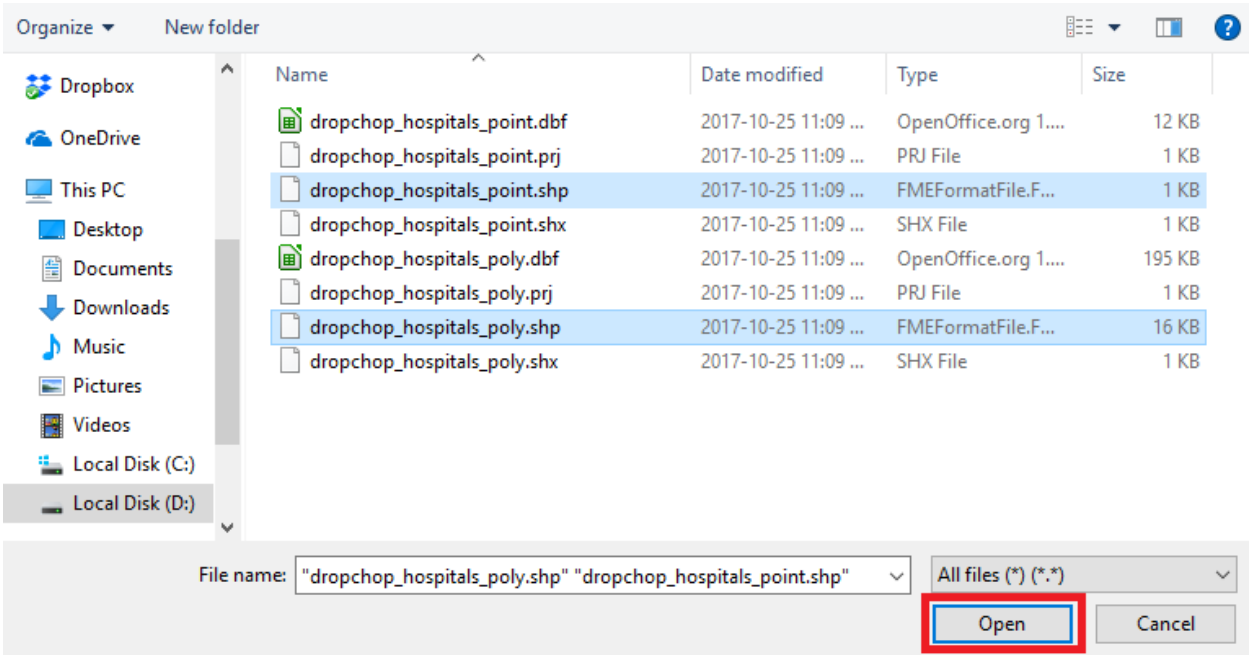
11. Open up QGIS and select **Layer > Add Layer > Add Vector Layer…**



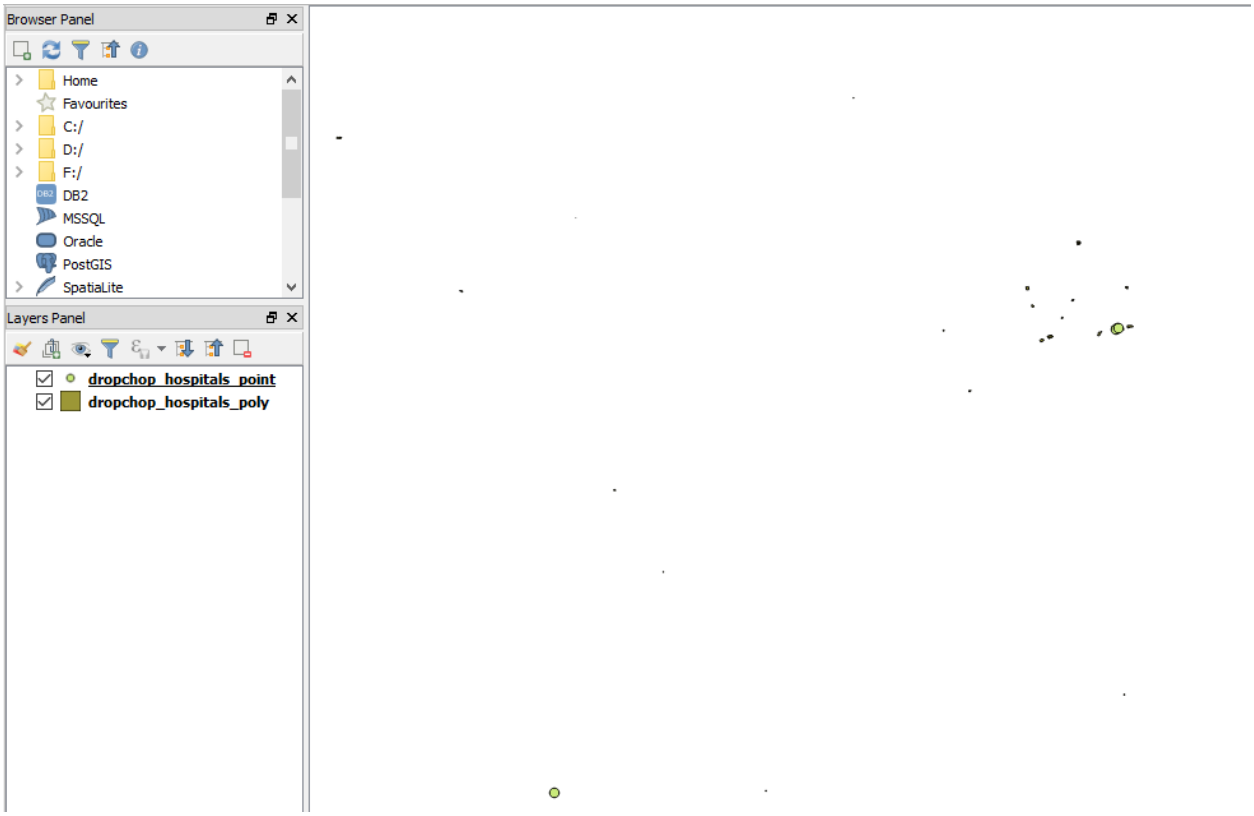
12. Browse to your working directory (where you copied and extracted the **download.zip** file).



13. Select the **dropchop_hospitals_point.shp** and **dropchop_hospitals_poly.shp** files. Hold down **Ctrl** and click the .shp files. Click **Open** and **Open** again.



14. We will now see the hospital points and polygons extracted from the OpenStreetMap database using the browser Dropchop tool displayed in our QGIS window.



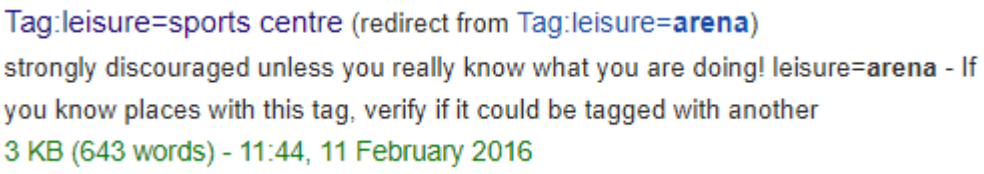
Steps 6 to 13 can be reiterated using the restaurant and school layers instead of the hospital layer.

If you would like to search for other points of interest (not hospitals, schools or restaurant). Search for the point of interest in the OpenStreetMap Wiki.

http://wiki.openstreetmap.org/wiki/Main_Page

For example: recreation/sports centres

- Search for arena, ignore the “Did you mean” notification…



- Browse the search results for the most similar entry
- Instead of **amenity=**, the tag for sports centres is **leisure=**

http://wiki.openstreetmap.org/wiki/Tag:leisure%3Dsports_centre