The Data Journalist

Chapter 7 tutorial

Geocoding in ArcGIS Desktop (ArcMap)

Prepared by David McKie Contact:

Summary: In many cases, online geocoding services are all you will need to convert addresses and other location data into geographic data. When you have a larger number of points to geocode, however, and available lookup data, the case for doing the job yourself can be compelling. This tutorial shows you how to geocode addresses using the Qgis' built-in geocoding utility. If you are unsure of the basics of the Qgis user interface, see the quick tour of ArcGIS desktop tutorial.

For this exercise, we'll use a city of Ottawa discarded syringe file, but without the longitude and latitude coordinates. In many instances when obtaining datasets from open data websites or freedom-of-information requests, you will get addresses, that is a field with the number, address name and suffix (example: 2132 Bank St.).

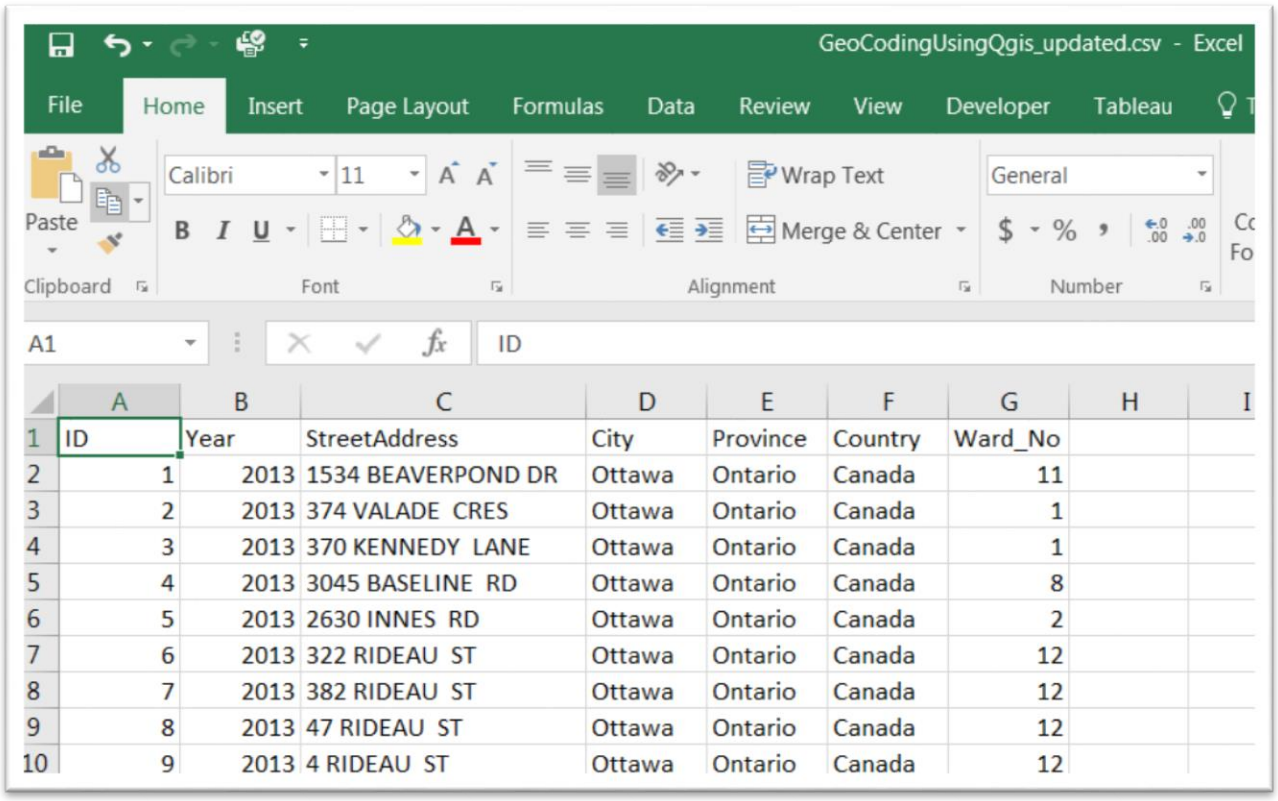
While Fusion Tables can use street address, combined with the city, town or county; province or state; and country, all combined in one column to place the locations on a map, Qgis needs longitude and latitude coordinates. The good news is that Qgis can take the address information we've just described, and use open-sourced geocoding services to locate the latitude and longitude coordinates.

Where Fusion Tables needs the street address, city, province and country combined in one column, Qgis requires that they be separated in four respective fields. If the fields are not separated in this manner, you'll have to use some of the techniques described in the "Working with specialized functions in Excel" tutorial for Chapter 4. If they are, then you can follow the steps outlined in this tutorial.

Skills you will learn:

How to create to geocode in Qgis.

To download the discarded syringe file we'll be using for geocoding, please click here.

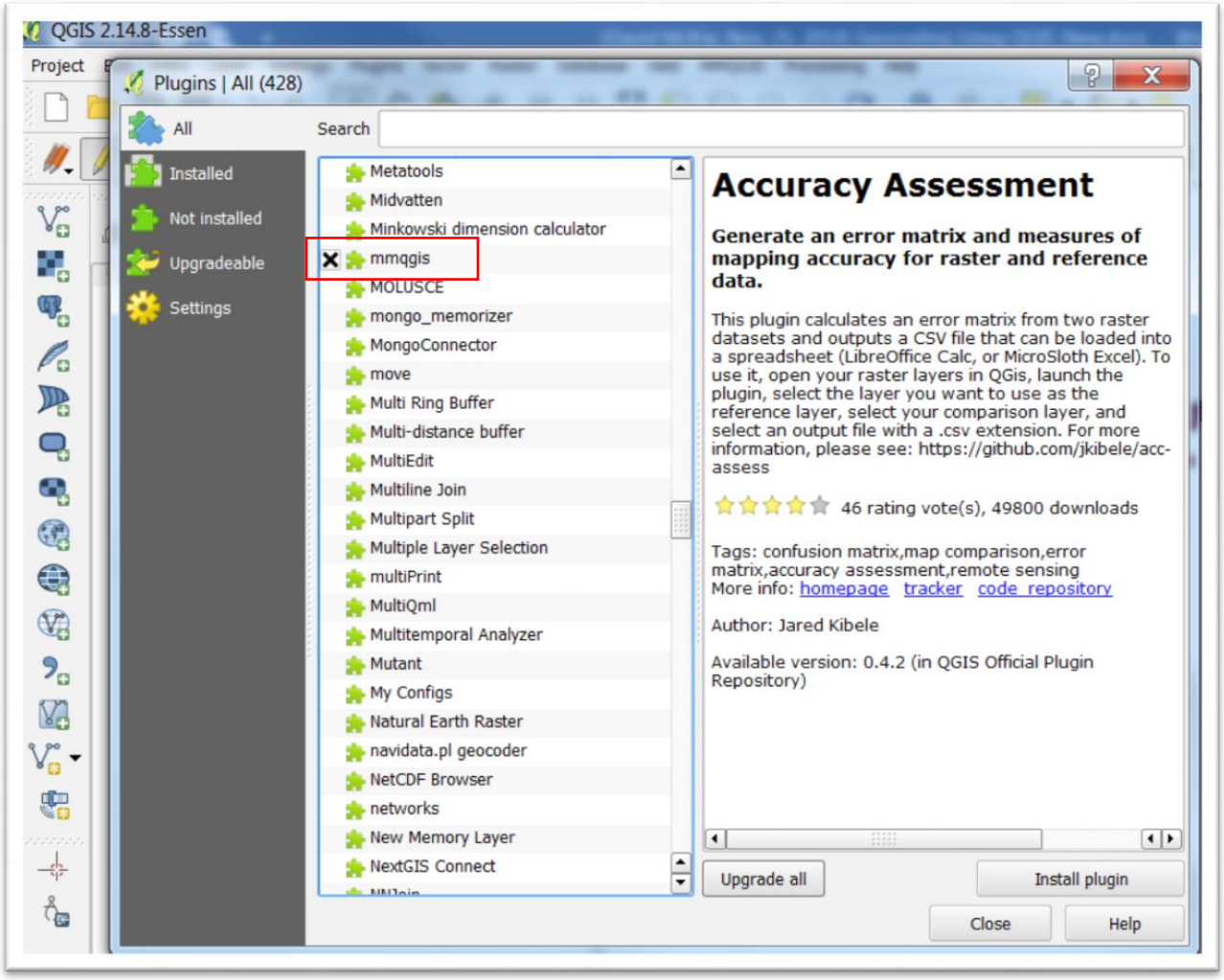


	A	B	C	D	E	F	G	H	I
1	ID	Year	StreetAddress	City	Province	Country	Ward_No		
2	1	2013	1534 BEAVERPOND DR	Ottawa	Ontario	Canada	11		
3	2	2013	374 VALADE CRES	Ottawa	Ontario	Canada	1		
4	3	2013	370 KENNEDY LANE	Ottawa	Ontario	Canada	1		
5	4	2013	3045 BASELINE RD	Ottawa	Ontario	Canada	8		
6	5	2013	2630 INNES RD	Ottawa	Ontario	Canada	2		
7	6	2013	322 RIDEAU ST	Ottawa	Ontario	Canada	12		
8	7	2013	382 RIDEAU ST	Ottawa	Ontario	Canada	12		
9	8	2013	47 RIDEAU ST	Ottawa	Ontario	Canada	12		
10	9	2013	4 RIDEAU ST	Ottawa	Ontario	Canada	12		

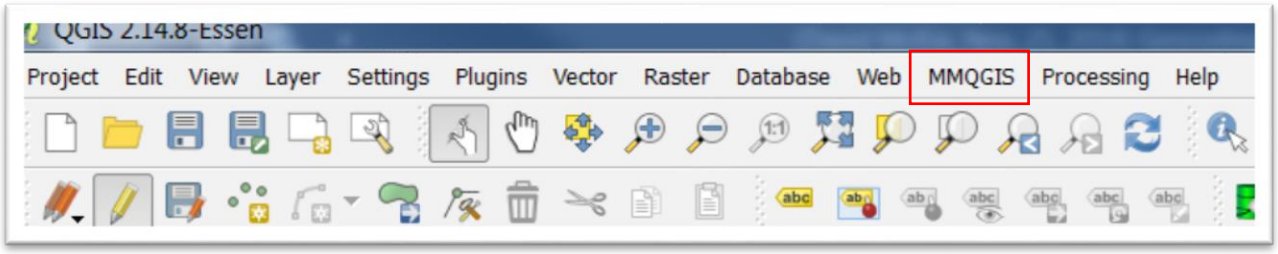
As discussed above, the address fields are separated fields for each piece of geographic information:

i. Address: 1534 Beaverpond Dr
ii. City: Ottawa
iii. Province: Ontario
iv. Country: Canada

To geocode, you'll have to install the "mmqgis" plugin. In QGIS, click on Plugins > Manage and Install Plug-ins. Scroll down and click on "mmqgis" and click on install.

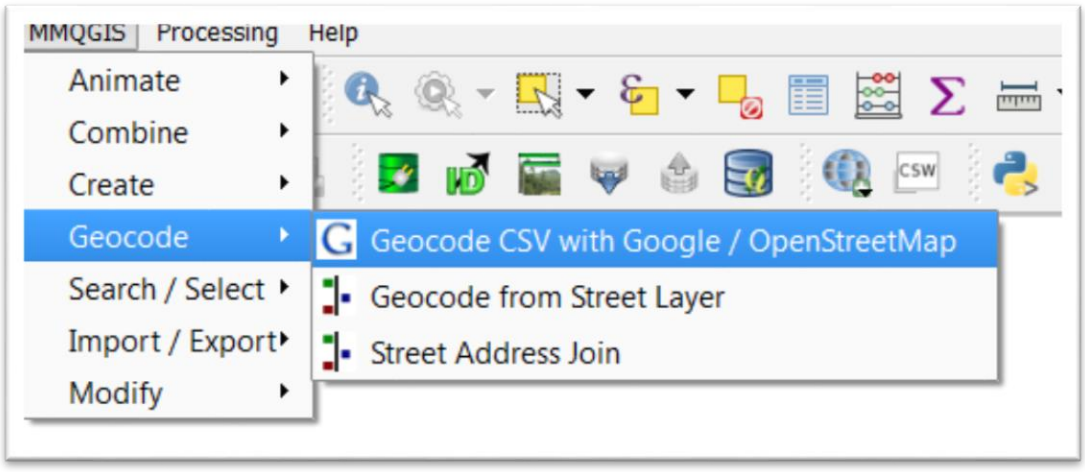


Once installed, you should see the “MMQGIS” in the menu bar.

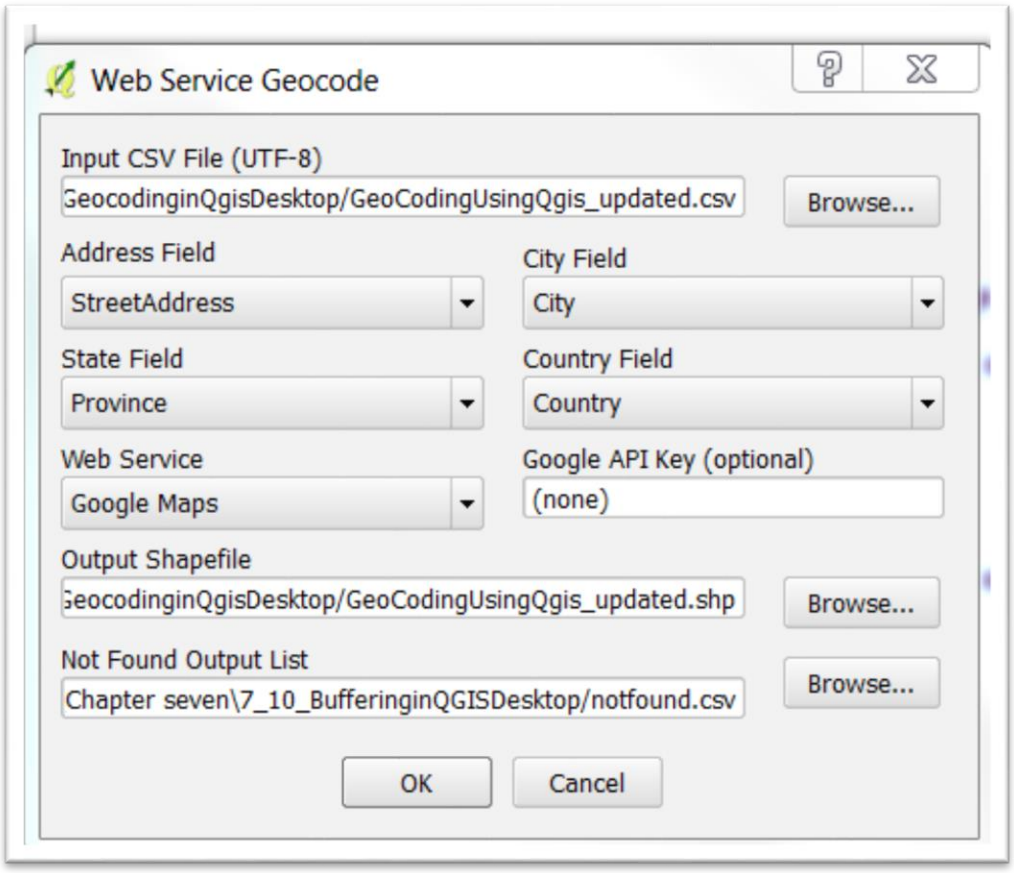


Import the discarded syringe file through the MMQGIS plugin.

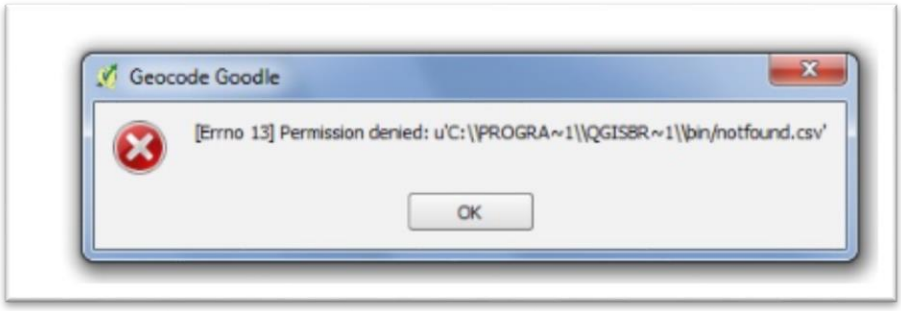
Click on MMQGIS (which will be located on the menu at the top) > Geocode > Geocode CSV with Google/OpenStreetMap.



Browsing, and then clicking on your file, should correctly populate Qgis' "Web Service Geocode" dialogue box.



Note: You'll notice the second category for the output file says "Not Found", which is where the non-matching lines in the csv get written to. In other words, all the files that are not geocoded end up in this file. So, simply browse to the same location that you've saved the original file, rename the file with something like "unfounded files", and then select the okay tab. Failing to do this will produce an error message which denies you permission.



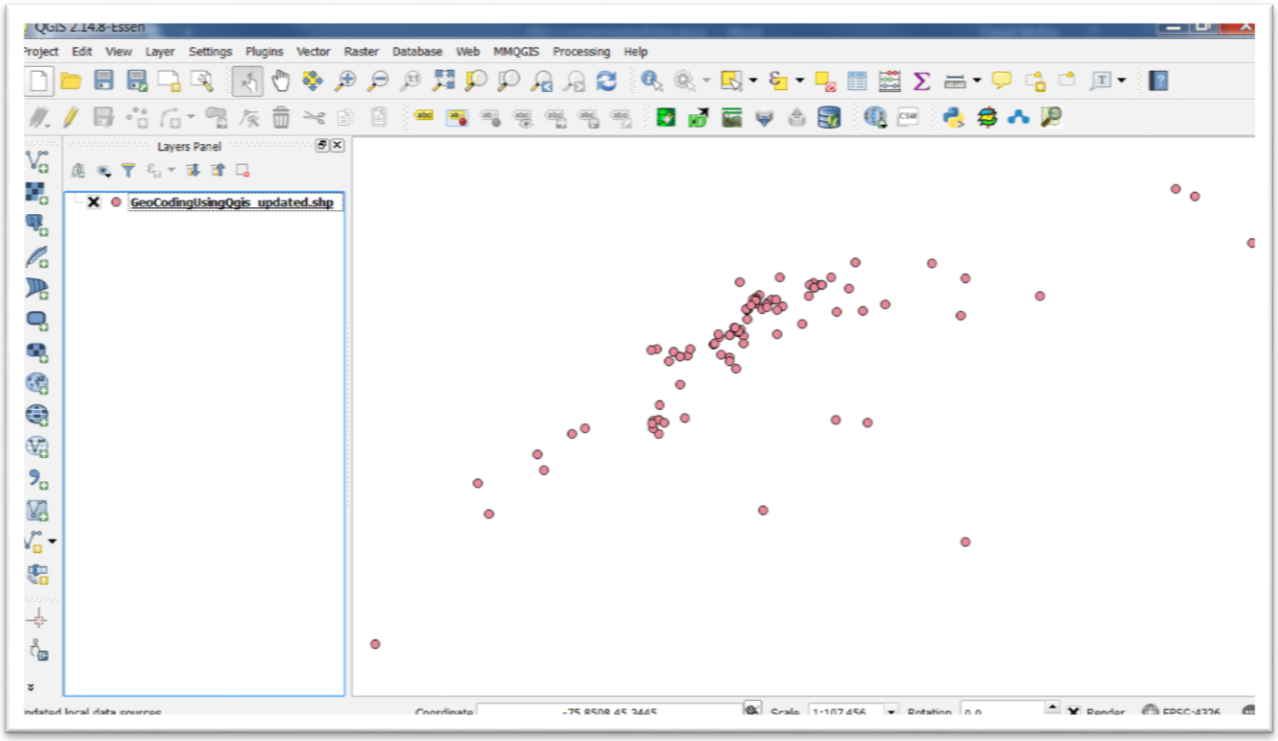
Now, let's continue.

Not only will the web service geocode the address with longitude and latitude coordinates, but Qgis will create create a shape file, which you can see on the extension. For the purposes of this exercise, just ignore the category below the "Output Shapefile" label, and select OK.

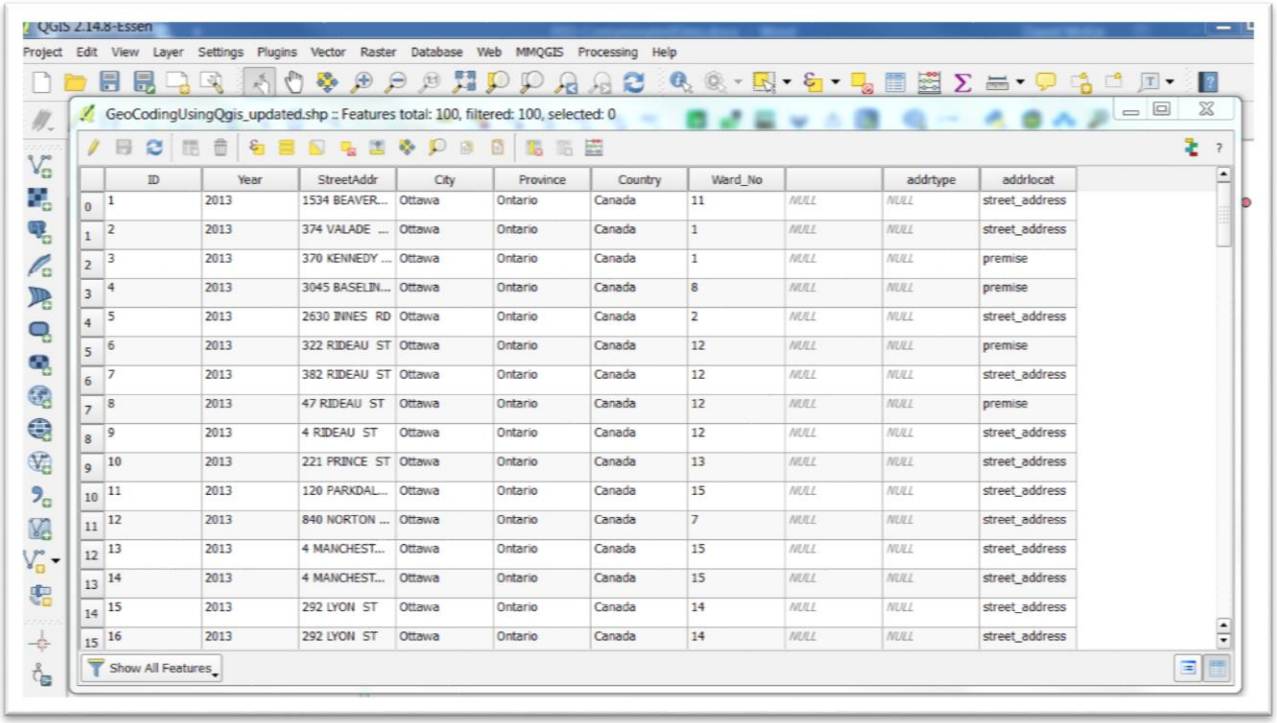
The actual geoprocessing will take a few minutes, after which time, the points will be plotted

Once completed, the geocoded points will appear on the map. (NOTE: QGIS can be unpredictable. So, if the process stalls, or seems to be taking too long, try it

again.)



Open the csv file's attribute to view the records that weren't geocoded and attempt to fix the addresses.

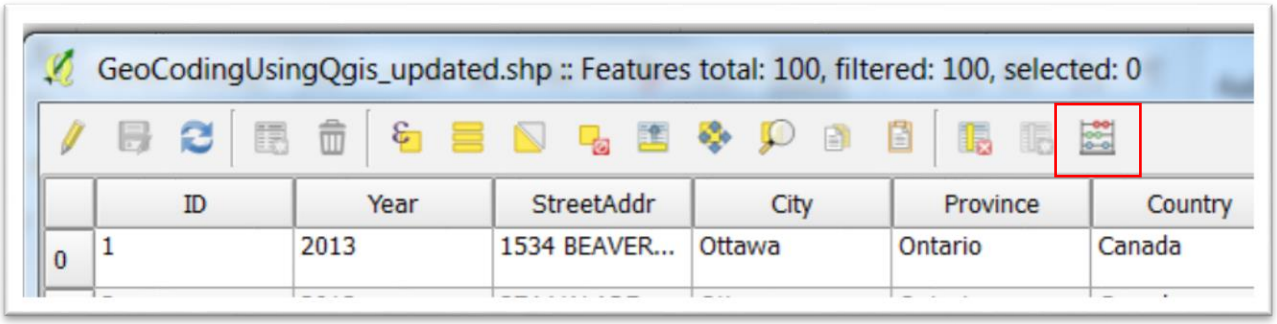


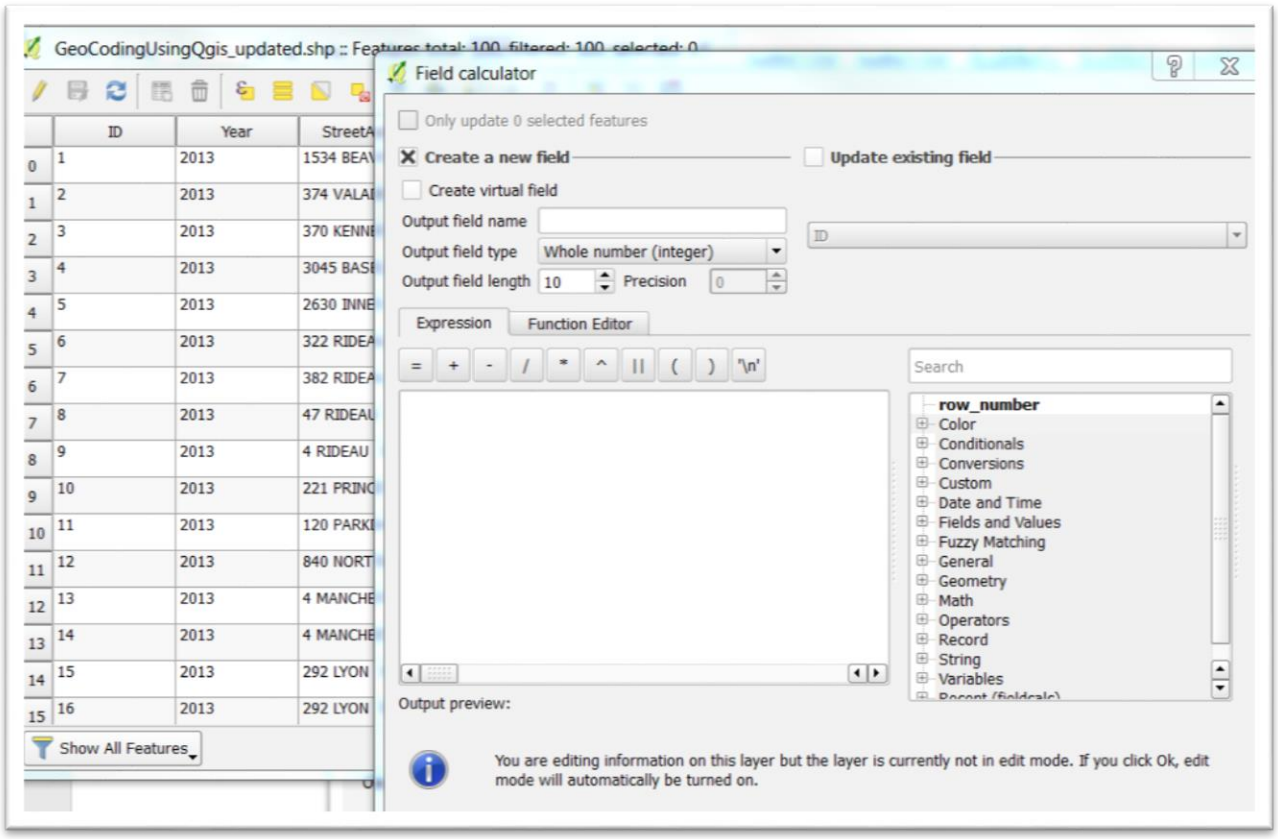
	ID	Year	StreetAddr	City	Province	Country	Ward_No		addrtype	addrlocat
0	1	2013	1534 BEAVER...	Ottawa	Ontario	Canada	11	NULL	NULL	street_address
1	2	2013	374 VALADE ...	Ottawa	Ontario	Canada	1	NULL	NULL	street_address
2	3	2013	370 KENNEDY ...	Ottawa	Ontario	Canada	1	NULL	NULL	premise
3	4	2013	3045 BASELIN...	Ottawa	Ontario	Canada	8	NULL	NULL	premise
4	5	2013	2630 INNES RD	Ottawa	Ontario	Canada	2	NULL	NULL	street_address
5	6	2013	322 RIDEAU ST	Ottawa	Ontario	Canada	12	NULL	NULL	premise
6	7	2013	382 RIDEAU ST	Ottawa	Ontario	Canada	12	NULL	NULL	street_address
7	8	2013	47 RIDEAU ST	Ottawa	Ontario	Canada	12	NULL	NULL	premise
8	9	2013	4 RIDEAU ST	Ottawa	Ontario	Canada	12	NULL	NULL	street_address
9	10	2013	221 PRINCE ST	Ottawa	Ontario	Canada	13	NULL	NULL	street_address
10	11	2013	120 PARKDAL...	Ottawa	Ontario	Canada	15	NULL	NULL	street_address
11	12	2013	840 NORTON ...	Ottawa	Ontario	Canada	7	NULL	NULL	street_address
12	13	2013	4 MANCHEST...	Ottawa	Ontario	Canada	15	NULL	NULL	street_address
13	14	2013	4 MANCHEST...	Ottawa	Ontario	Canada	15	NULL	NULL	street_address
14	15	2013	292 LYON ST	Ottawa	Ontario	Canada	14	NULL	NULL	street_address
15	16	2013	292 LYON ST	Ottawa	Ontario	Canada	14	NULL	NULL	street_address

You'll notice that the attribute table does not show the longitude and latitude coordinates, even though QGIS is using them to map the locations.

To obtain columns with the longitude and latitudes, we'll have to use Qgis's field calculator.

Stay in the attribute table, and select the icon to the far right of the menu.





Make sure the box to the left of "Create a new field" is checked.

Next to "Output field name" type "X" for X-axis.

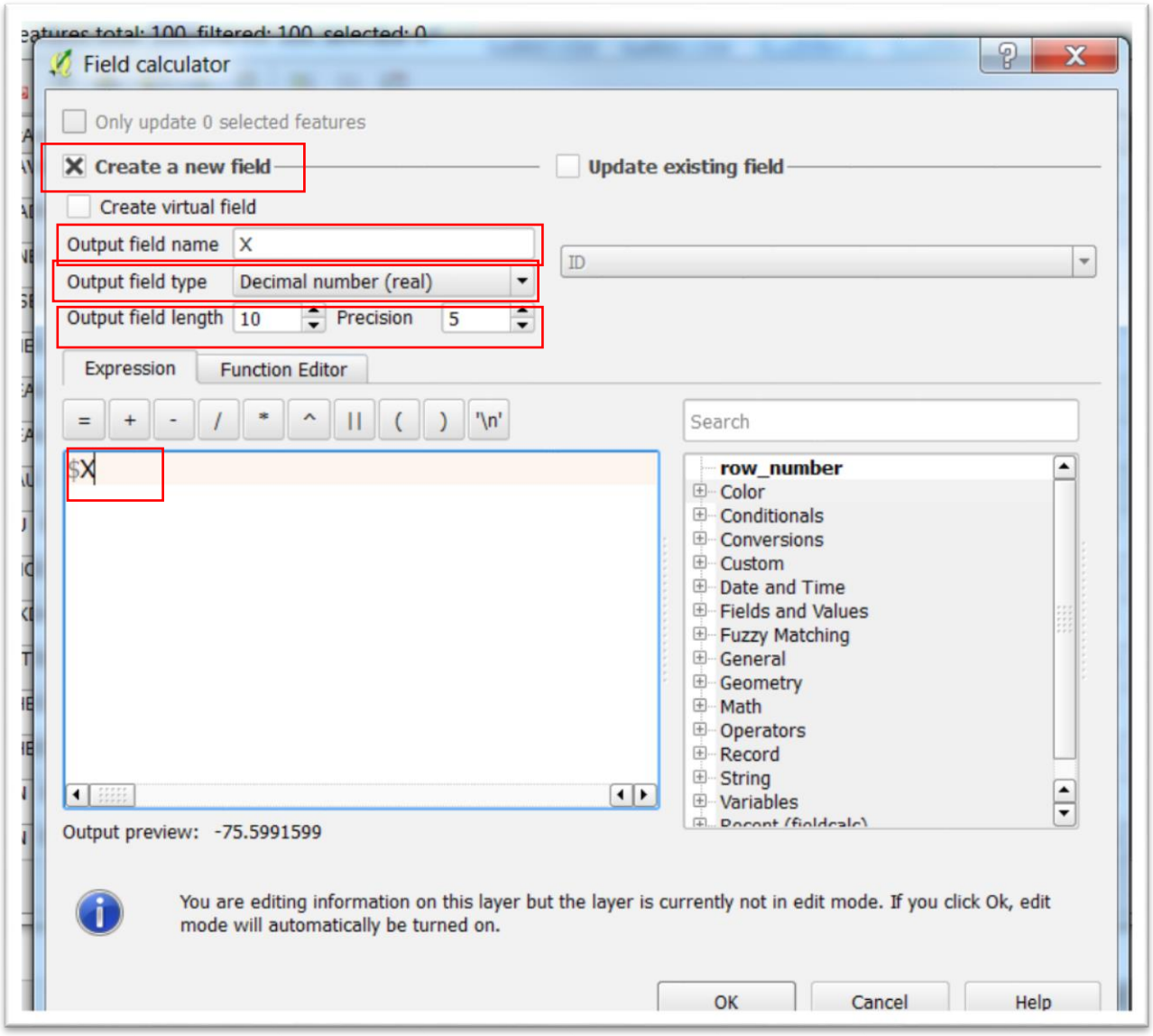
The “Output field type” is a “Decimal number (real)”

Output field length is 10 (Note: older versions of Qgis call this “Output field width”)

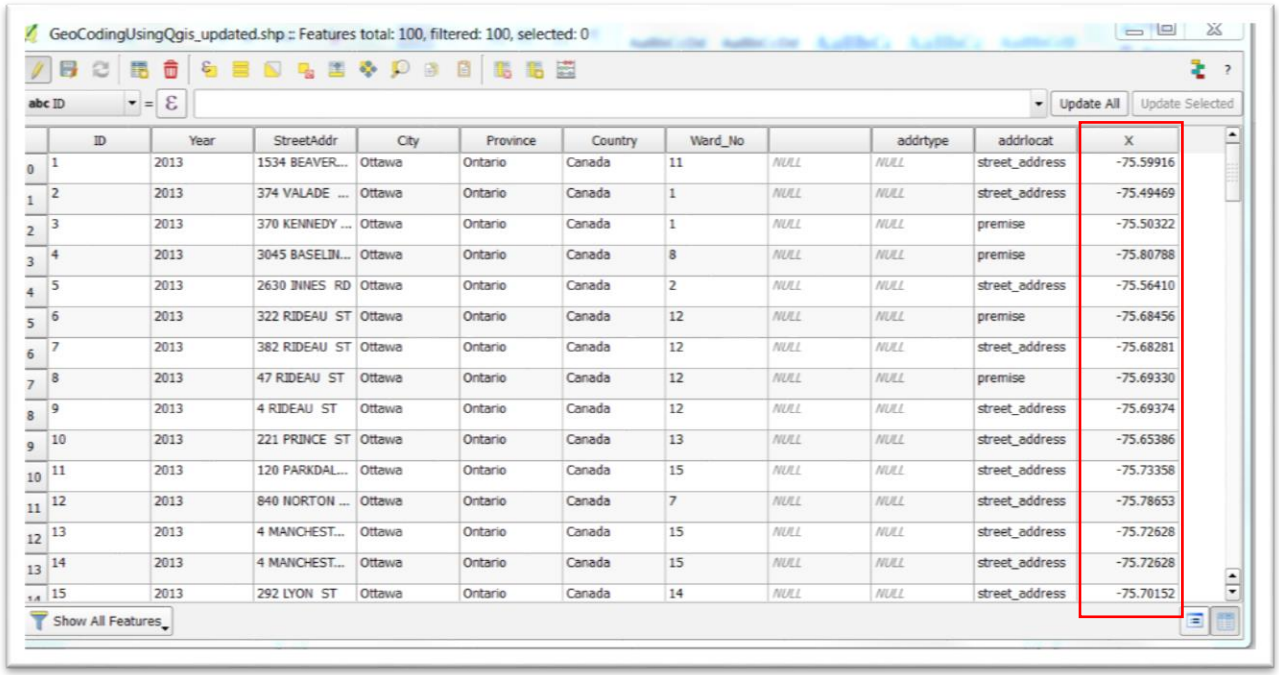
The “Precision” is 5 (for the five decimal points).

In the “Expression” box, type “$X”.

Your “Field calculator” dialogue box should look like this:



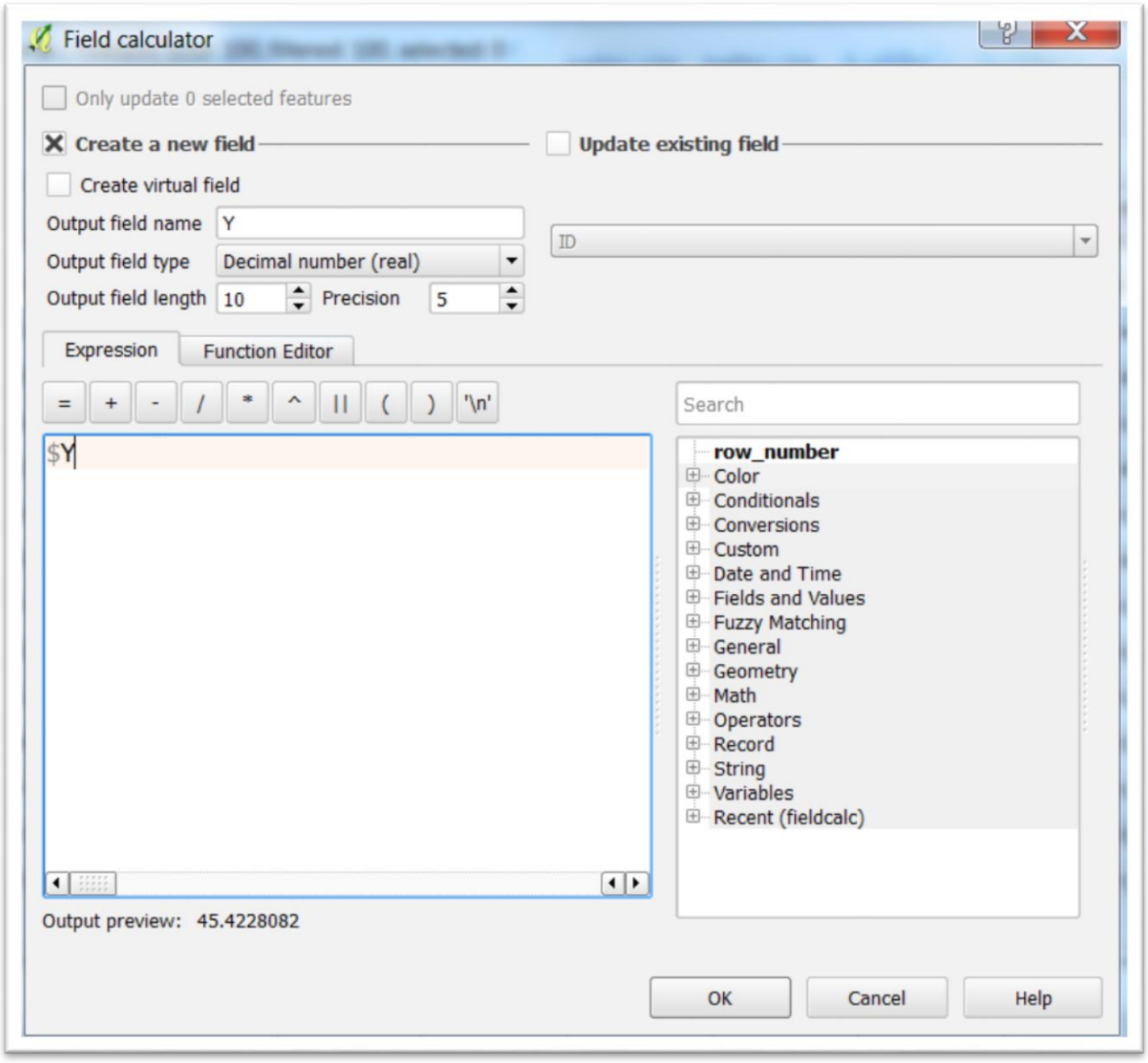
Select the “OK” tab.

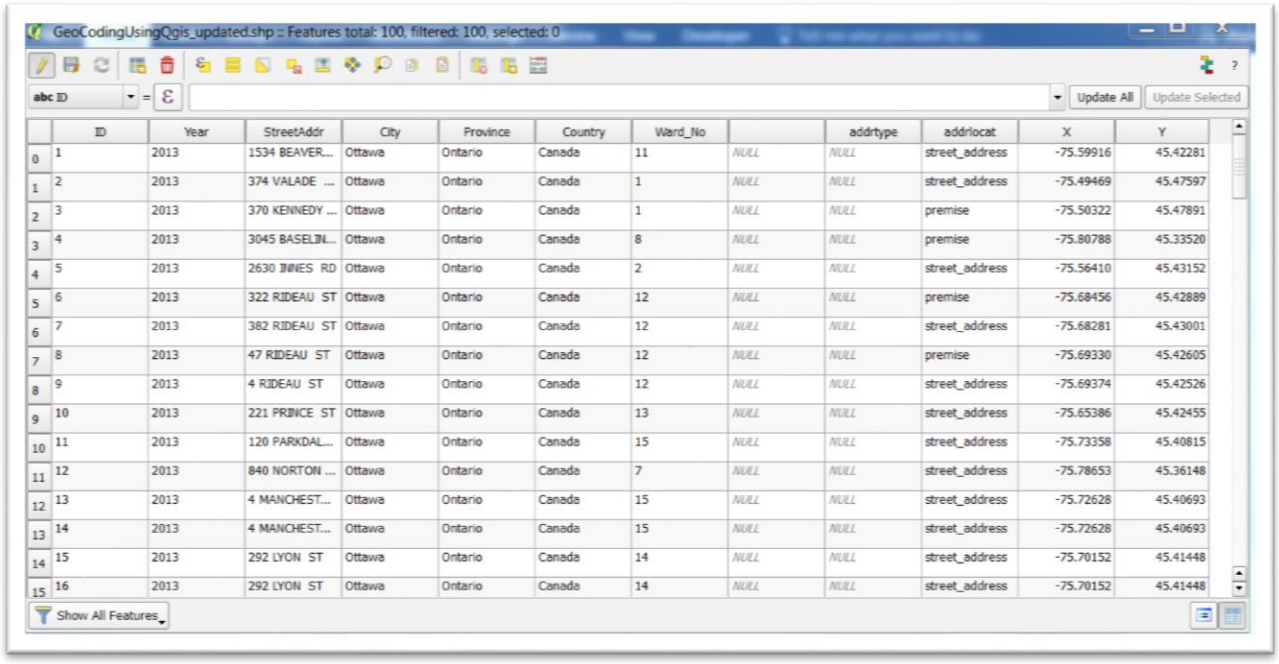


	ID	Year	StreetAddr	City	Province	Country	Ward_No		addrtype	addrlocat	X
0	1	2013	1534 BEAVER...	Ottawa	Ontario	Canada	11	NULL	NULL	street_address	-75.59916
1	2	2013	374 VALADE ...	Ottawa	Ontario	Canada	1	NULL	NULL	street_address	-75.49469
2	3	2013	370 KENNEDY ...	Ottawa	Ontario	Canada	1	NULL	NULL	premise	-75.50322
3	4	2013	3045 BASELIN...	Ottawa	Ontario	Canada	8	NULL	NULL	premise	-75.80788
4	5	2013	2630 INNES RD	Ottawa	Ontario	Canada	2	NULL	NULL	street_address	-75.56410
5	6	2013	322 RIDEAU ST	Ottawa	Ontario	Canada	12	NULL	NULL	premise	-75.68456
6	7	2013	382 RIDEAU ST	Ottawa	Ontario	Canada	12	NULL	NULL	street_address	-75.68281
7	8	2013	47 RIDEAU ST	Ottawa	Ontario	Canada	12	NULL	NULL	premise	-75.69330
8	9	2013	4 RIDEAU ST	Ottawa	Ontario	Canada	12	NULL	NULL	street_address	-75.69374
9	10	2013	221 PRINCE ST	Ottawa	Ontario	Canada	13	NULL	NULL	street_address	-75.65386
10	11	2013	120 PARKDAL...	Ottawa	Ontario	Canada	15	NULL	NULL	street_address	-75.73358
11	12	2013	840 NORTON ...	Ottawa	Ontario	Canada	7	NULL	NULL	street_address	-75.78653
12	13	2013	4 MANCHEST...	Ottawa	Ontario	Canada	15	NULL	NULL	street_address	-75.72628
13	14	2013	4 MANCHEST...	Ottawa	Ontario	Canada	15	NULL	NULL	street_address	-75.72628
14	15	2013	292 LYON ST	Ottawa	Ontario	Canada	14	NULL	NULL	street_address	-75.70152

We now have a column displaying the longitude or “X” coordinates.

Repeat the same process for the latitude, which will be the “Y” coordinate.





	ID	Year	StreetAddr	City	Province	Country	Ward_No		addrtype	addrlocat	X	Y
0	1	2013	1534 BEAVER...	Ottawa	Ontario	Canada	11	NULL	NULL	street_address	-75.59916	45.42281
1	2	2013	374 VALADE ...	Ottawa	Ontario	Canada	1	NULL	NULL	street_address	-75.49469	45.47597
2	3	2013	370 KENNEDY ...	Ottawa	Ontario	Canada	1	NULL	NULL	premise	-75.50322	45.47891
3	4	2013	3045 BASELIN...	Ottawa	Ontario	Canada	8	NULL	NULL	premise	-75.80788	45.33520
4	5	2013	2630 INNES RD	Ottawa	Ontario	Canada	2	NULL	NULL	street_address	-75.56410	45.43152
5	6	2013	322 RIDEAU ST	Ottawa	Ontario	Canada	12	NULL	NULL	premise	-75.68456	45.42889
6	7	2013	382 RIDEAU ST	Ottawa	Ontario	Canada	12	NULL	NULL	street_address	-75.68281	45.43001
7	8	2013	47 RIDEAU ST	Ottawa	Ontario	Canada	12	NULL	NULL	premise	-75.69330	45.42605
8	9	2013	4 RIDEAU ST	Ottawa	Ontario	Canada	12	NULL	NULL	street_address	-75.69374	45.42526
9	10	2013	221 PRINCE ST	Ottawa	Ontario	Canada	13	NULL	NULL	street_address	-75.65386	45.42455
10	11	2013	120 PARKDAL...	Ottawa	Ontario	Canada	15	NULL	NULL	street_address	-75.73358	45.40815
11	12	2013	840 NORTON ...	Ottawa	Ontario	Canada	7	NULL	NULL	street_address	-75.78653	45.36148
12	13	2013	4 MANCHEST...	Ottawa	Ontario	Canada	15	NULL	NULL	street_address	-75.72628	45.40693
13	14	2013	4 MANCHEST...	Ottawa	Ontario	Canada	15	NULL	NULL	street_address	-75.72628	45.40693
14	15	2013	292 LYON ST	Ottawa	Ontario	Canada	14	NULL	NULL	street_address	-75.70152	45.41448
15	16	2013	292 LYON ST	Ottawa	Ontario	Canada	14	NULL	NULL	street_address	-75.70152	45.41448

The new columns will allow you to map these locations using ArcGIS Online, Fusion Tables, or Tableau, once you ‘ve exported the layer as a csv file.

The coordinates will also allow you to perform the kinds of spatial joins in Qgis that we learned in the “7_13_SpatialJoinsQGISDesktop” tutorial.