

Census tutorial using the city of Ottawa's wards

Every five years, Statistics Canada uses the Census Program to collect vital data about Canadians that paints a portrait of who we are. Traditionally, the program has been comprised of the Census of Agriculture, the Census of Population and the Mandatory Long-Form Census. The last census was conducted in May 2011.

Unfortunately, the former Conservative government did away with the mandatory long-form census, citing privacy concerns.

In 2011, the [National Household Survey](#) replaced the long-form census, which collected everything from immigration patterns to religious affiliation to income, providing data that was the lifeblood for municipalities, community services, businesses and academic research, to name just a few end-users.

Though it collected information similar to the long-form census, the survey was voluntary. The low response rate produced poor-quality data that could not be compared to the numbers from the 2006 Census Program.

Still, at least for journalists, the household survey answers many questions about about our communities:

Which neighborhoods have the highest numbers of high-income earners?

Do certain immigrants gravitate towards particular neighborhoods?

Do federal civil servants live close to the downtown core?

Answers to these questions can lead to interesting stories that don't necessarily produce spectacular headlines, but are worth telling nonetheless. It is for this reason that we will learn how to map the 2011 Household Survey data that has been tailored for city of Ottawa's 23 wards. The city has also combined it with the actual census data that collects basic information such as age and sex.

It's worth noting that Liberal government [re-instated](#) the long-form census as one of its first orders of business. But for the time being, we're stuck with the 2011 data.

So let's get started.

1. You'll find the survey data (called "2011_NHS_Ward_Data) by navigating to the bottom of the city of [Ottawa's open data website](#) that contains the files.
2. Before downloading the file, it's always good practice to read the background information before going too much further.
3. Click on the "Go to resource" tab to the right of the "2011_NHS_Ward_Data".
4. You can see a sample of the table underneath the "Download" tab.
5. Download the table.
6. Move the "2011nhswarddata.csv" file to the folder you're using for this tutorial, open it and study the contents.
7. Save the csv file in Excel format, which will allow us to add worksheets.
8. Working in your Excel file, paste the website's URL into the first available cell in the first row.

9. Copy the table, and paste it into a new worksheet called "workingcopy"
10. Delete the first row.
11. To make it easier to scroll down the table, freeze the word names to hold them in place.
12. Scroll to row 2265 (if you've followed step 10 and deleted the first row).
13. Select that section. (**NOTE:** I've reduced the font size to fit the entire table in the screen shot. So just increase the size of the page if you're struggling to decipher the contents.)

Word Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22			
Word	Others	Oklahoma	Illinois	Arkansas	Kansas	Nebraska	Missouri	Colorado	Minnesota	Wisconsin	Michigan	Indiana	Rhode Island	Vermont	New Hampshire	Connecticut	Delaware	Virginia	North Carolina	South Carolina	Georgia	Kansas	South		
Total income in 2010 of population aged 16 years and over	79395	3330	3205	25300	26225	18660	20220	2448	4960	32975	36225	2778	35900	30790	30790	30790	30790	30790	30790	30790	30790	30790	30790	30790	
Without income	32575	1800	1525	1825	1175	635	350	1740	1630	1370	2470	1620	1845	1435	660	305	1345	1035	1735	1770	830	880	1640	835	
With income	66820	3795	2960	34770	25050	17920	19270	24470	43255	19205	36250	26095	33340	29335	30030	30090	30760	27995	34475	32280	19560	19290	20955	32685	
Under \$5,000	64870	3380	2790	3635	2845	1895	1635	2040	3060	2160	4190	2970	2895	2490	2760	2270	3025	2785	3460	2790	1305	1395	2680	3305	
\$5,000 to \$9,999	43375	2460	1760	2205	1480	1085	1260	2180	2530	1935	2630	1945	2620	1925	1850	1635	2380	1815	2480	2095	350	1080	1435	1905	
\$10,000 to \$14,999	52395	2285	2035	2020	1475	1235	1545	3080	3020	2700	3240	2225	3705	2640	3180	2245	3220	2385	2090	1950	1215	1885	1465	2250	
\$15,000 to \$19,999	48120	2005	1720	1785	1220	840	300	3665	2365	2935	1930	3405	2740	2970	2295	2700	1920	2185	1665	1075	1640	1265	1640	1960	
\$20,000 to \$24,999	7875	3395	2490	2360	1935	1700	1760	4770	4830	2465	4325	3070	4610	3640	3475	4300	2690	4725	2660	1620	1670	2240	2440	3000	
\$25,000 to \$29,999	65000	1435	2420	2390	2035	1535	1640	3930	4445	3250	3530	3370	2820	3000	2675	3590	3000	2675	3590	2620	1630	1795	2395	2395	
\$30,000 to \$34,999	64040	3660	2735	3145	2050	1860	1790	3380	3305	3320	3265	3395	2890	2730	2530	2445	2890	2305	2305	2305	2305	1875	2025	2540	3395
\$35,000 to \$39,999	60430	4905	2895	3480	1960	1850	1790	2780	2675	2755	3320	2605	2775	2420	2390	2285	2390	2705	2525	3625	1475	1470	2430	2395	
\$40,000 to \$44,999	66430	4905	2895	3480	1960	1850	1790	2780	2675	2755	3320	2605	2775	2420	2390	2285	2390	2705	2525	3625	1475	1470	2430	2395	
\$45,000 to \$49,999	66430	4905	2895	3480	1960	1850	1790	2780	2675	2755	3320	2605	2775	2420	2390	2285	2390	2705	2525	3625	1475	1470	2430	2395	
\$50,000 and over	68395	3700	3890	3300	3505	2450	2305	2225	3260	2540	2625	1890	2195	2650	2270	4640	2890	4095	2350	3225	2405	1840	375	2225	1930
\$100,000 to \$124,999	34825	1390	1885	1395	1000	1275	855	1030	1265	1395	1395	1395	1395	1395	1395	1395	1395	1395	1395	1395	1395	1395	1395	1395	
\$125,000 and over	34825	1390	1885	1395	1000	1275	855	1030	1265	1395	1395	1395	1395	1395	1395	1395	1395	1395	1395	1395	1395	1395	1395	1395	
Median income \$	39530	45285	43375	45020	47432	44481	41425	32184	36689	35006	32098	35663	29504	34003	35394	44323	33179	43968	32481	48762	44876	43790	59023	42364	
Average income \$	43026	50954	54173	50269	56001	54856	57226	43221	45520	44314	43700	44176	43057	43002	45063	61088	41564	53962	45221	52393	56022	56181	57482	50274	

14. Copy the section and paste it into a new worksheet called "Income".
15. Insert a blank row above the table.

- Copy the row containing the column heads in the workingcopy table.

1	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

- Paste the contents into the empty row in your “Income” table whose first row should contain the ward numbers.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
2	Total income in 2010 of population aged 15 years and over	79395	3370	3505	2530	2625	3660	2020	3445	4360	3375	3035	2775	2500	3670	3170	3175	3705	2300	3525	3495	3375	2935	3035	3470
3	Without income	32575	1600	1625	1075	575	950	1740	1640	1270	2470	1620	1845	1455	450	395	1845	105	1705	1770	870	870	1600	1600	1600
4	With income	46820	1770	1880	1455	2045	1710	1670	2175	3090	1665	1415	1930	1045	2170	2175	1930	2655	1195	1755	1725	2505	1335	1435	1870
5	Under \$5,000	64670	3300	2390	2675	2045	1655	1635	2140	3060	3140	410	2070	2015	2430	2350	2270	3325	2715	3480	2770	1325	1035	2650	3305
6	\$5,000 to \$9,999	43375	2460	1760	2205	1480	105	1260	2000	2530	1335	2630	1345	2620	1325	1050	1015	2430	2055	350	1100	1425	1305	1305	1305
7	\$10,000 to \$14,999	52935	2285	2035	2020	1475	1275	1845	3090	3020	2700	3240	2295	3705	2540	3100	2245	3220	2395	2900	1050	1055	165	165	2250
8	\$15,000 to \$19,999	48020	2095	1720	1715	1220	840	300	2695	2945	2715	2925	1930	2415	2740	2870	2255	2325	1630	2195	1645	1075	1040	1285	1840
9	\$20,000 to \$24,999	79575	3305	2410	2360	1035	1700	1720	4790	4630	3405	4215	3070	4505	3640	3475	2745	4300	2630	4725	2640	1620	1670	2240	2030
10	\$25,000 to \$29,999	65000	2435	2420	2190	2035	1535	1830	3300	4445	3250	3530	3370	2820	3000	2675	3530	3405	2630	1630	1785	2355	2355	2355	2395
11	\$30,000 to \$34,999	64840	2640	2725	3345	2050	1860	1790	3300	3395	3320	3265	2660	3195	2930	2730	2520	3485	2200	3005	2305	1675	2035	2540	3205
12	\$35,000 to \$39,999	60430	4005	2955	2440	1960	1650	1780	2700	2675	2755	2420	2605	2715	2420	2390	2265	2390	2105	2525	3625	1475	1470	1840	2395
13	\$40,000 to \$44,999	86325	3545	4060	3275	2440	2280	2605	2470	4575	3490	3950	4320	3355	3085	3580	3970	2545	3435	3640	5220	2665	2745	4470	4440
14	\$45,000 to \$49,999	53900	3735	2355	2480	2300	1475	2030	2195	3290	2270	2600	1645	2640	2090	2520	2675	2530	2630	1015	1335	3575	3050	3050	3050
15	\$50,000 and over	64935	3700	3080	3300	3505	2450	2385	2225	3260	2540	2625	1880	2135	2650	2270	4680	2030	4095	2050	3225	2405	2375	3030	3420
16	\$50,000 to \$54,999	34425	1390	1605	1315	1000	1275	1055	1035	1760	1265	1235	1395	1095	1190	1040	1660	1660	1420	1645	1240	375	2225	1930	1930
17	\$55,000 and over	34470	1715	1525	1290	1795	1190	1620	1190	1610	1275	1220	1390	1045	1195	2640	1290	1430	1275	1105	1400	1605	1605	1605	1605
18	Median income \$	33530	45285	4551	45032	47412	44481	46425	32754	36085	35006	32038	35563	25504	34003	35334	44323	33176	41898	32431	40762	44576	43730	51033	42364
19	Average income \$	43026	50954	54173	50263	56001	54056	57236	43221	45220	44334	43706	44176	41057	43002	45013	40181	43564	53362	45221	52833	56022	56151	57482	50274

- Copy this table and paste it into a new worksheet, called “IncomeForMapping”

- Since we can only visualize one value at a time on a map, we’ll have to choose a category. During our in-class exercise, we selected “Median income”. So let’s go with that one.

- Delete all the rows under the ward numbers, except for “Median income”

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
1	Ward Number																								
2	Median income	33530	45285	4551	45032	47412	44481	46425	32754	36085	35006	32038	35563	25504	34003	35334	44323	33176	41898	32431	40762	44576	43730	51033	42364

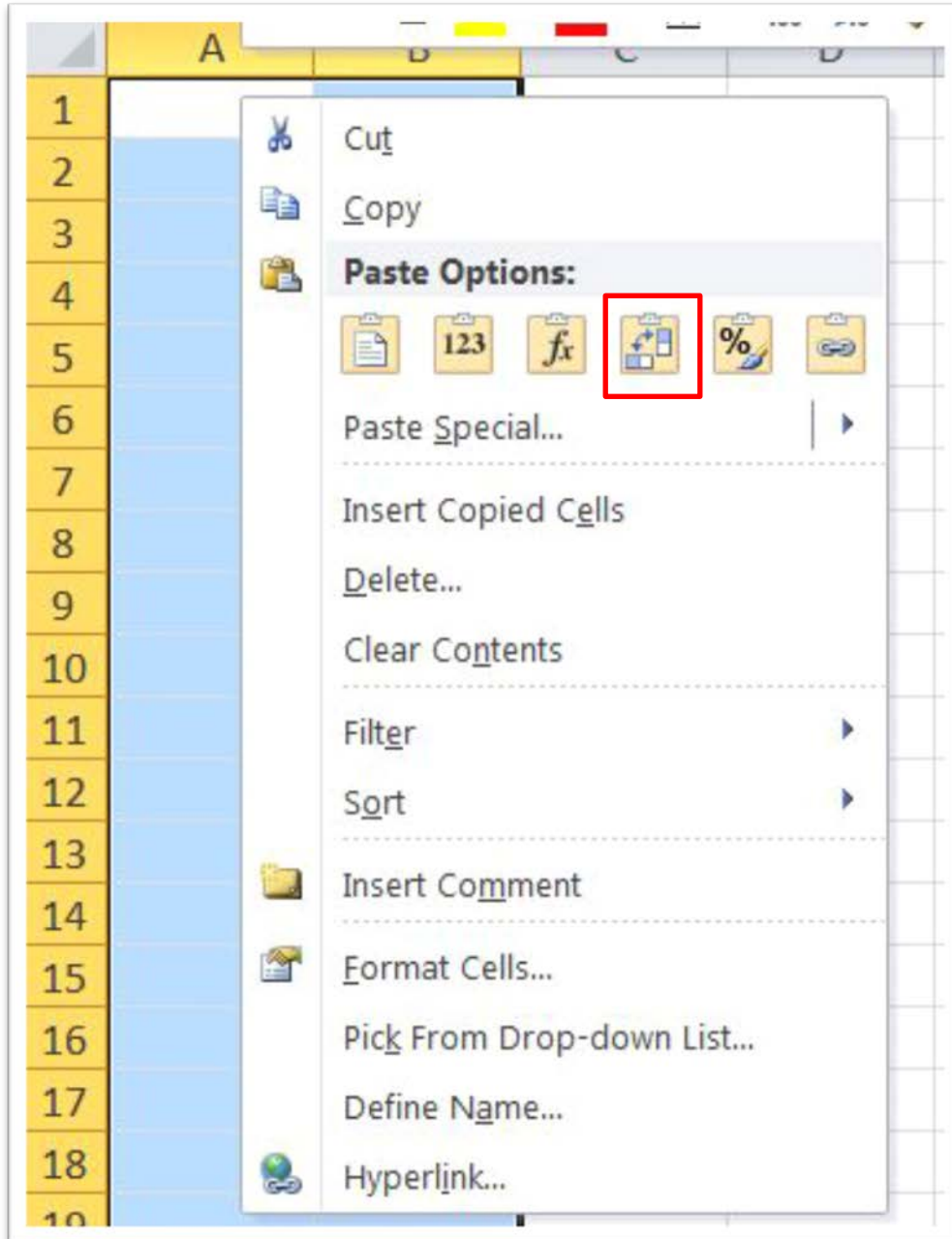
-

- Now we must “[transpose](#)” the table so that the ward numbers are displayed in a column. The reason will be evident in a little while.

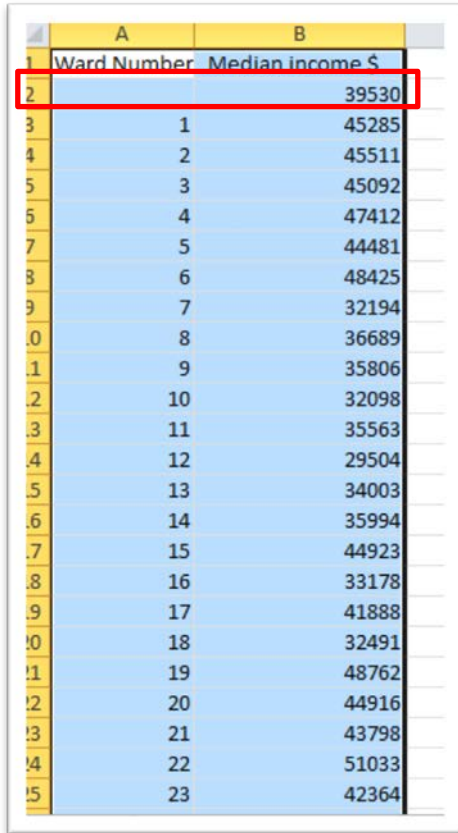
- To do this, select and copy the table.

- Go to a new worksheet, right click in cell A1 to obtain your pasting options. Instead of pasting the contents in a regular fashion, we will use the “transposing” option highlighted in the

screen shot below.



25. Select the transpose icon to change the shape of your table.



	A	B
1	Ward Number	Median income \$
2		39530
3	1	45285
4	2	45511
5	3	45092
6	4	47412
7	5	44481
8	6	48425
9	7	32194
0	8	36689
1	9	35806
2	10	32098
3	11	35563
4	12	29504
5	13	34003
6	14	35994
7	15	44923
8	16	33178
9	17	41888
0	18	32491
1	19	48762
2	20	44916
3	21	43798
4	22	51033
5	23	42364

26. Delete row two, which is the income figure for Ottawa as a whole. If you don't delete the row, A2 will show up as a "Null" value in Qgis, which could cause problems as we saw in the

[contaminated sites tutorial.](#)

	A	B
1	Ward Number	Median income
2	1	45285
3	2	45511
4	3	45092
5	4	47412
6	5	44481
7	6	48425
8	7	32194
9	8	36689
10	9	35806
11	10	32098
12	11	35563
13	12	29504
14	13	34003
15	14	35994
16	15	44923
17	16	33178
18	17	41888
19	18	32491
20	19	48762
21	20	44916
22	21	43798
23	22	51033
24	23	42364

27. As was the case with MySQL, mapping programs like Qgis do not like titles with spaces. So let's use underscores to clean up the

	A	B
1	Ward_Number	Median_income

column labels.

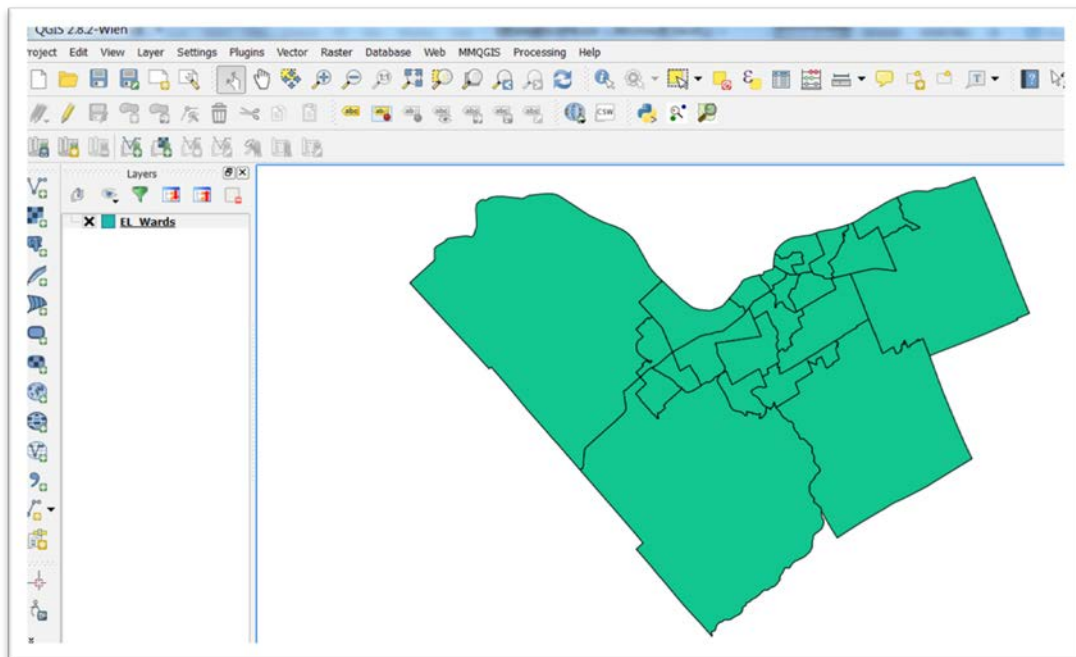
28. You'll also notice that we eliminated the space that was in front on the "M" in Median. Copy this table, open a new file, paste it in, name the file "OttawaIncome", and save it in a csv format.

29. Leave this file for now.

30. Download the city of Ottawa's 2014 Ward file by clicking [here](#). (NOTE: The reason it failed to work in class is because the file was defective, one of the hazards of working with tables on

open data sites. The city of Ottawa kindly provided the clean version that we'll use for this tutorial.)

31. Move the zip file to this tutorial's folder create a subfolder called "Wards_2014" and unzip the contents into that subfolder.
32. Open a new version of Qgis.
33. Import the ward shape file, using the technique we learned in the [contaminated sites tutorial](#). (**NOTE:** Because we'll be using the ward numbers to join the csv file with the income data to the ward file, we don't have to worry about projections as we did in the tutorial with contaminated sites.)
34. Your screen should look like this, though the colour may be different.



35. Right-click on the ward layer to open the attribute table.

DESCRIPTIC	NAME	NAME_FR	WARD_NUM	WARD_EN	WARD_FR	COUNCILLOR	WARD_NAME_	WARD_NAME1	WARD_NUMBE	SHAPE_Leng	SHAPE_Area	
0	KANATA SOU...	Ward 23	Quartier 23	23	KANATA SOUTH	KANATA-SUD	Allan Hubley	Kenata South	Kenata-Sud	23	19871.785830...	16418739.588...
1	BAY - Mark Ta...	Ward 7	Quartier 7	7	BAY	BAJE	Mark Taylor	Bay	Baie	7	39722.032347...	64174613.788...
2	OSGOODE - G...	Ward 20	Quartier 20	20	OSGOODE	OSGOODE	George Darouze	Osgoode	Osgoode	20	105838.74232...	463561580.89...
3	BEACON HILL-...	Ward 11	Quartier 11	11	BEACON HILL-...	BEACON HILL-...	Tim Tierney	Beacon Hill-Cy...	Beacon Hill-Cy...	11	26012.651084...	19598778.374...
4	COLLEGE - Ric...	Ward 8	Quartier 8	8	COLLEGE	COLLÈGE	Rick Chiarelli	College	Collège	8	40055.357183...	46077373.446...
5	GLOUCESTER-...	Ward 22	Quartier 22	22	GLOUCESTER-...	GLOUCESTER-...	Michael Qaqish	Gloucester-So...	Gloucester-Ne...	22	45545.496088...	37013497.119...
6	KANATA NOR...	Ward 4	Quartier 4	4	KANATA NORTH	KANATA-NORD	Marianne Wilk...	Kanata North	Kanata-Nord	4	25997.770037...	24235080.595...
7	KNOXDALE-M...	Ward 9	Quartier 9	9	KNOXDALE-M...	KNOXDALE-M...	Keith Egli	Knoxdale-Meri...	Knoxdale-Meri...	9	36533.316874...	47513023.658...
8	RIVER - Riley ...	Ward 16	Quartier 16	16	RIVER	RIVIÈRE	Riley Brocking...	River	Rivière	16	32244.191498...	26892629.939...
9	CAPITAL - Da...	Ward 17	Quartier 17	17	CAPITAL	CAPITALE	David Chernu...	Capital	Capitale	17	19243.225638...	10961789.086...
10	KITCHISSIPPI...	Ward 15	Quartier 15	15	KITCHISSIPPI	KITCHISSIPPI	Jeff Leiper	Kitchissippi	Kitchissippi	15	16441.444685...	15130226.048...
11	GLOUCESTER-...	Ward 10	Quartier 10	10	GLOUCESTER-...	GLOUCESTER-...	Diane Deans	Gloucester-So...	Gloucester-Se...	10	45788.222260...	76159003.045...
12	ALTA VISTA - ...	Ward 18	Quartier 18	18	ALTA VISTA	ALTA VISTA	Jean Cloutier	Alta Vista	Alta Vista	18	19302.220840...	20433121.100...
13	SOMERSET - ...	Ward 14	Quartier 14	14	SOMERSET	SOMERSET	Catherine Mc...	Somerset	Somerset	14	11458.284323...	6380164.7086...
14	STITTSVILLE ...	Ward 6	Quartier 6	6	STITTSVILLE	STITTSVILLE	Shad Qadri	Stittsville	Stittsville	6	22036.367720...	23212974.828...
15	RIDEAU-VANIE...	Ward 12	Quartier 12	12	RIDEAU-VANIER	RIDEAU-VANIER	Mathieu Fleury	Rideau-Vanier	Rideau-Vanier	12	15172.590423...	7951860.2593...
16	RIDEAU-ROCK...	Ward 13	Quartier 13	13	RIDEAU-ROCK...	RIDEAU-ROCK...	Tobi Nussbaum	Rideau-Rockcl...	Rideau-Rockcl...	13	25921.094283...	19838707.163...
17	INNES - Jody ...	Ward 2	Quartier 2	2	INNES	INNES	Jody Mitic	Innes	Innes	2	33018.165318...	40385597.674...
18	ORLÉANS - Bo...	Ward 1	Quartier 1	1	ORLÉANS	ORLÉANS	Bob Monette	Orléans	Orléans	1	29237.165112...	25385948.958...
19	CUMBERLAND...	Ward 19	Quartier 19	19	CUMBERLAND	CUMBERLAND	Stephen Blais	Cumberland	Cumberland	19	98794.871092...	379836566.83...
20	RIDEAU-GOUL...	Ward 21	Quartier 21	21	RIDEAU-GOUL...	RIDEAU-GOUL...	Scott Moffatt	Rideau-Goulb...	Rideau-Goulb...	21	131359.05825...	736559935.94...
21	WEST CARLE...	Ward 5	Quartier 5	5	WEST CARLE...	WEST CARLE...	Eli El-Chantry	West Carleton...	West Carleton...	5	122388.21698...	765569539.78...
22	BARRHAVEN - ...	Ward 3	Quartier 3	3	BARRHAVEN	BARRHAVEN	Jan Harder	Barrhaven	Barrhaven	3	29730.224063...	26227247.182...

36. We'll use the column with the ward number to perform our join.

37. Take a close look at the numbers in the "WARD_NUM" row. They are left-justified, which means Qgis is reading them as text. This is a problem because the ward numbers in the csv file are formatted as actual numbers. In order to perform a join, the numbers **MUST** be in the **SAME** format. This means we have to find a way of converting the ward numbers in the csv file into text.

38. A way to do this is to create what's called a [csvt file](#).

39. Open a "Notepad" or a text editor, Notepad++ or TextWrangler.

40. Now let's specify the datatypes we want in each column. For the "Ward_Number" column, we will specify that we want to convert it to a "string" function. In other words, convert it to a text. Median_income can be left as is, which means an "integer".

41. So our csvt file, looks like this:

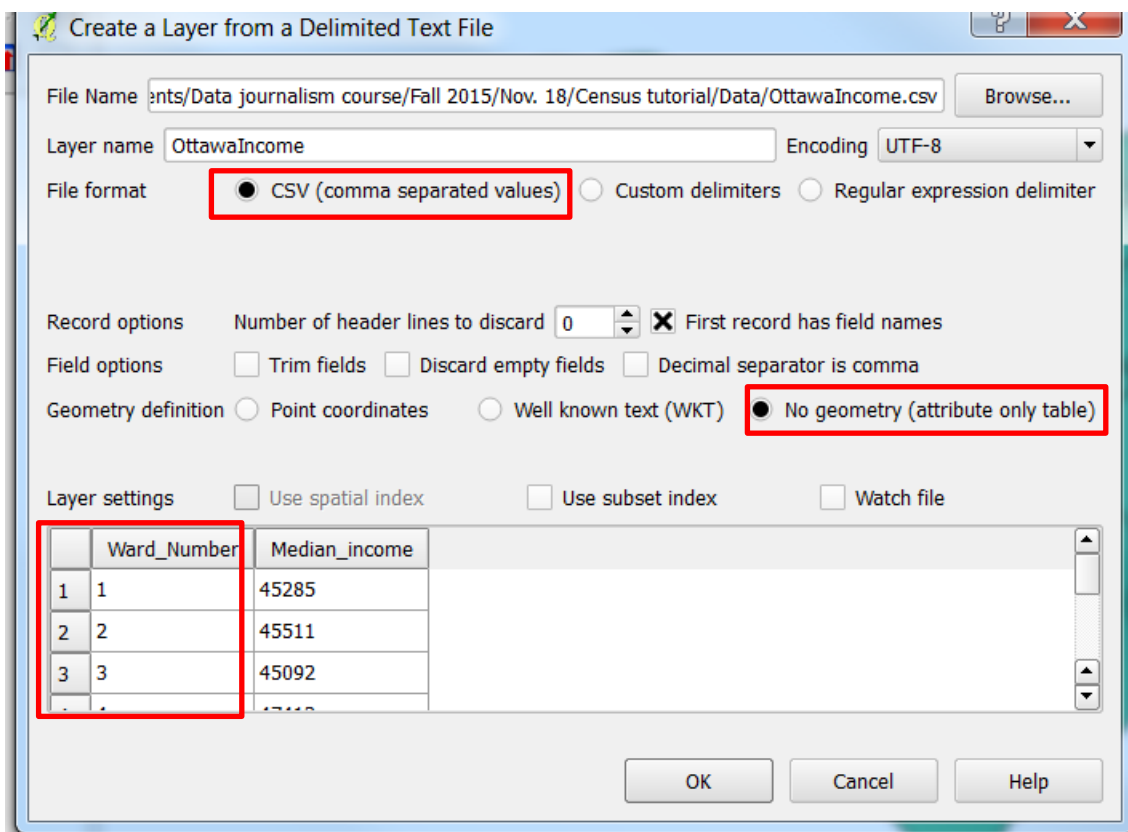
```
1 "String","Integer"
```

42. Now we **MUST** give it the same name as the csv file, "OttawaIncome" and a "csvt" extension.

43. Save it in the **SAME** folder as the csv file. (NOTE: the regular Notepad may add an extra "txt" extension after the "csvt" extension. If it does, just delete the "txt" extension.)

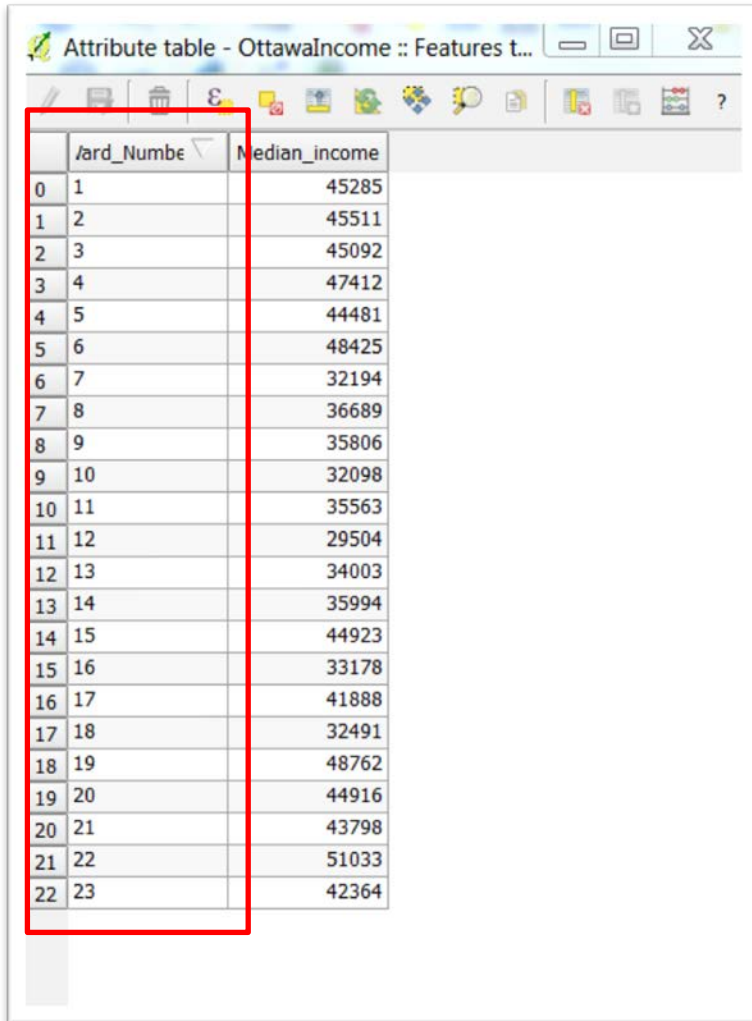
44. Using the Steps we learned in the [contaminated sites tutorial](#), import the csv file.

45. Your "Create a Layer from a Delimited Text File" dialog box should look like this:



46. Select OK.

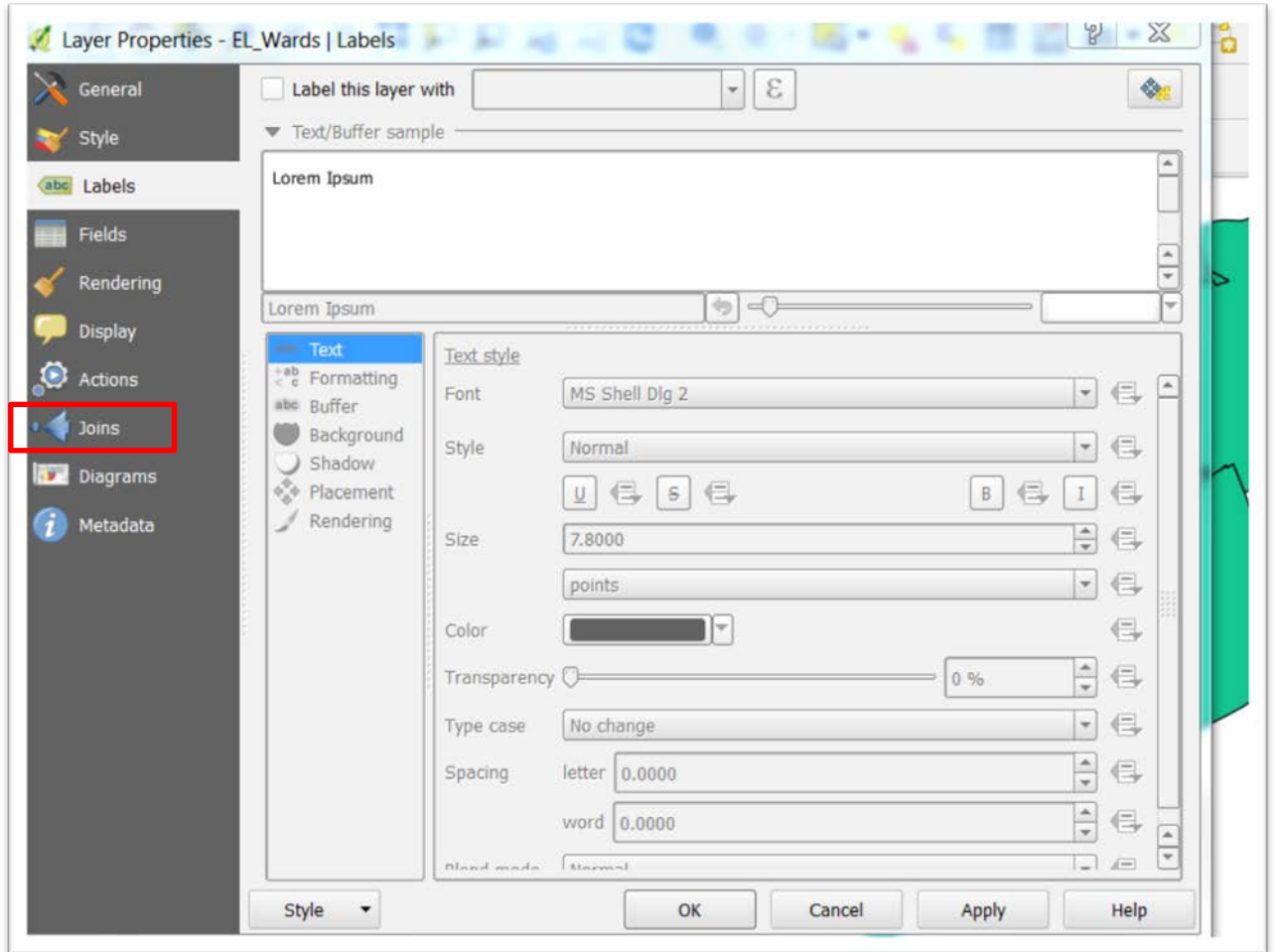
47. Open the attribute table to see the numbers are left-justified.



	Iard_Numbe	Median_income
0	1	45285
1	2	45511
2	3	45092
3	4	47412
4	5	44481
5	6	48425
6	7	32194
7	8	36689
8	9	35806
9	10	32098
10	11	35563
11	12	29504
12	13	34003
13	14	35994
14	15	44923
15	16	33178
16	17	41888
17	18	32491
18	19	48762
19	20	44916
20	21	43798
21	22	51033
22	23	42364

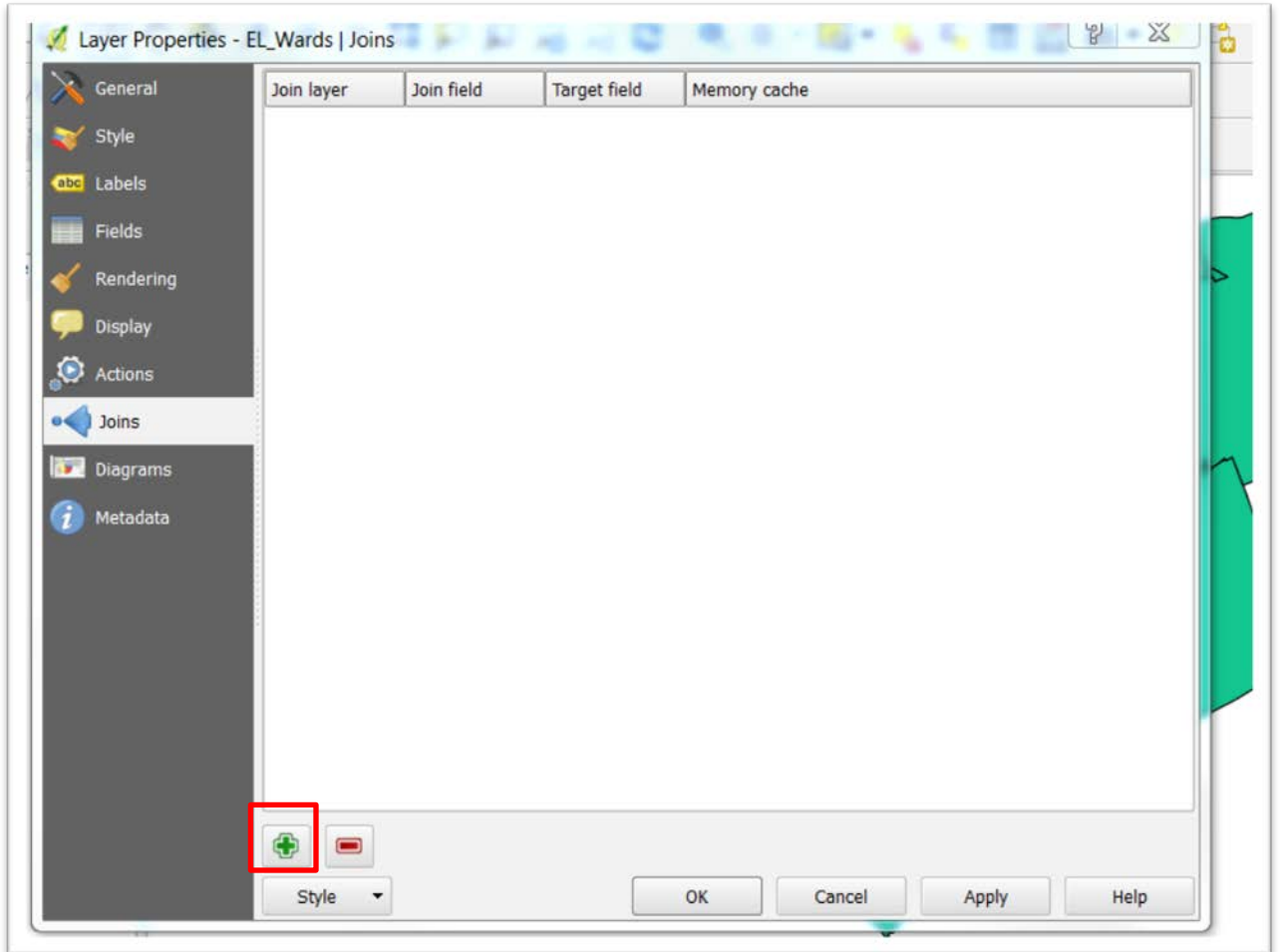
48. Close the table.

49. Right-click on the “El_Wards” layer, go to “Properties”.

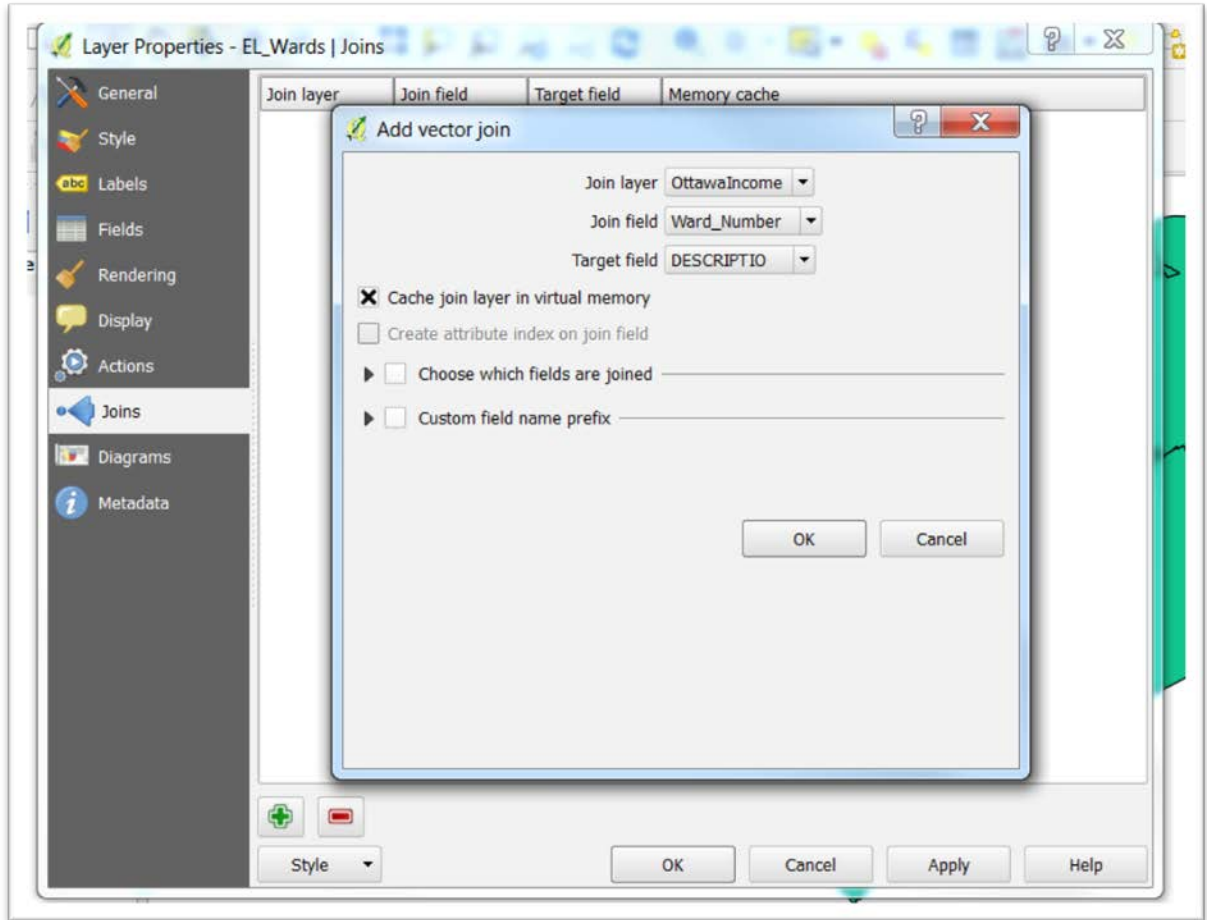


50. Select “Joins”.

51.

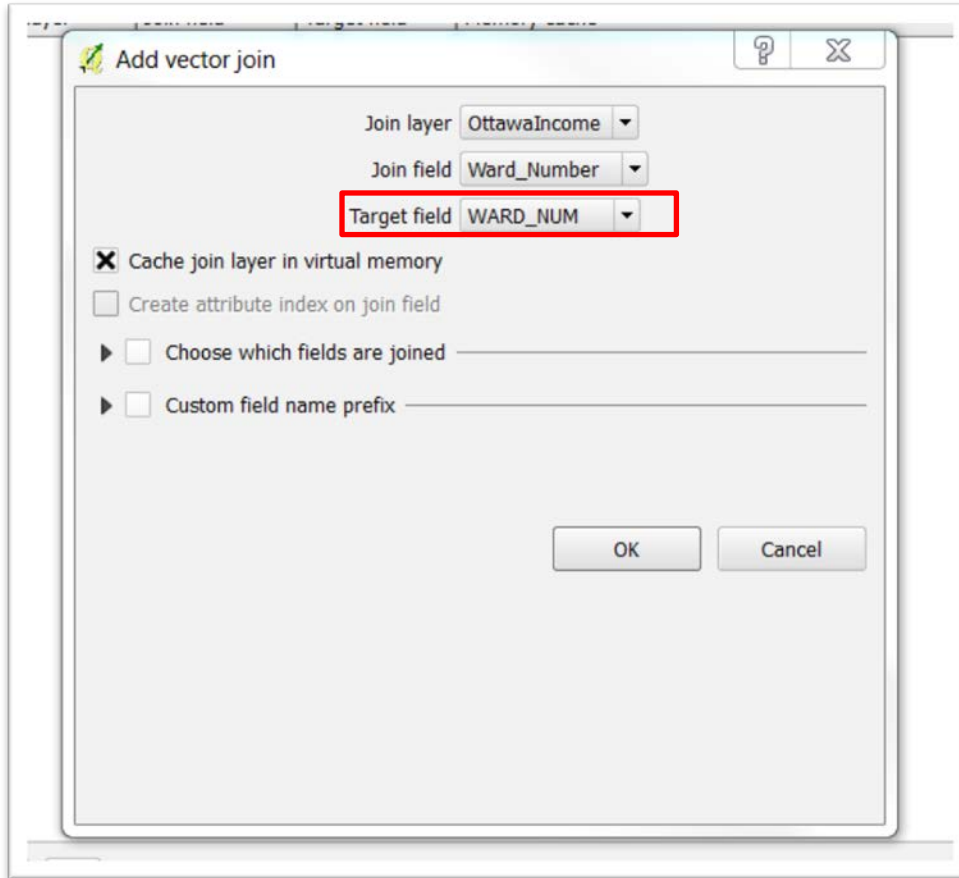


52. Click the green cross.



53. Our “Join layer” is “OttawaIncome”. The “Join field” is the Ward_Number. The “Target field”, or the field to which we will join the “Ward_Number” is the “WARD_NUM. Select the “Target

field's" drop-down menu to obtain the "WARD_NUM".



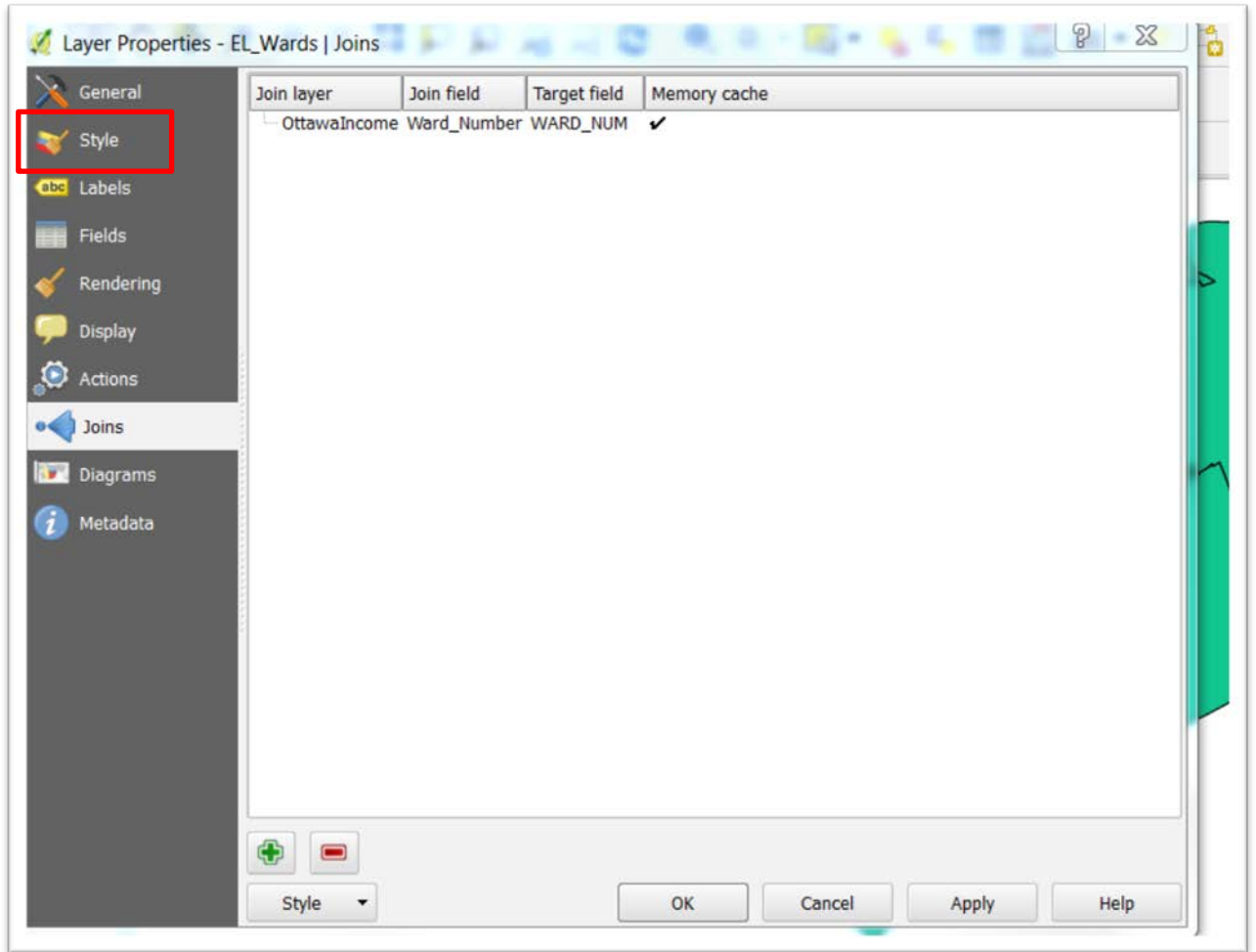
54. Select OK, Apply, then OK again.

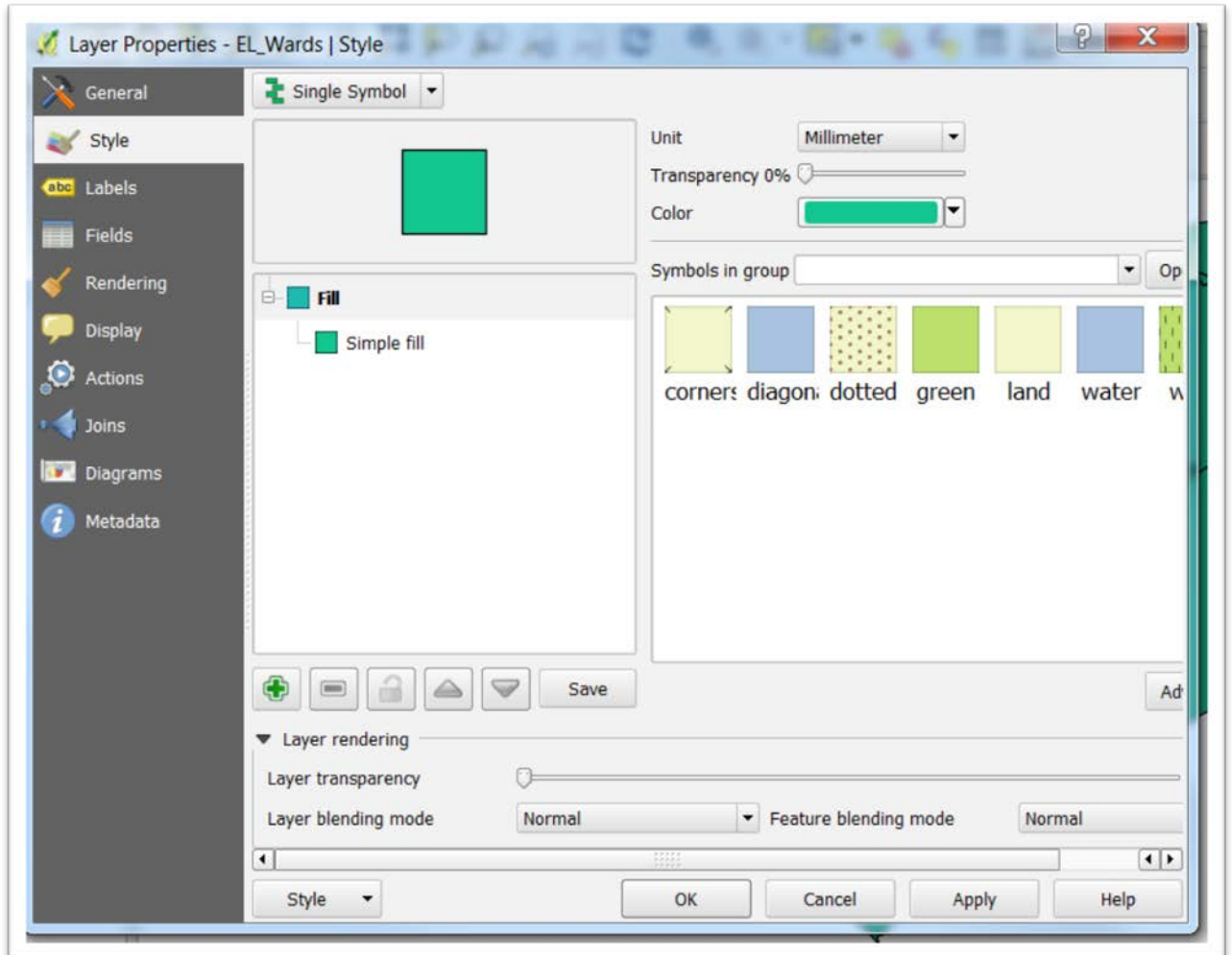
- Open the attribute table, and scroll to the far right to see median income numbers.

Attribute table - EL_Wards - Features total: 23, filtered: 23, selected: 0

NAME	NAME_FR	WARD_NUM	WARD_EN	WARD_FR	COUNCILLOR	WARD_NAME_	WARD_NAME1	WARD_NUMBE	SHAPE_Leng	HAPE_Are	OttawaIncome_Median_income
123	Quartier 23	23	KANATA SOUTH	KANATA-SUD	Allan Hubley	Kanata South	Kanata-Sud	23	19871.785830...	16418...	42364
17	Quartier 7	7	BAY	BAIE	Mark Taylor	Bay	Baie	7	39722.032347...	64174...	32194
120	Quartier 20	20	OSGOODE	OSGOODE	George Darouze	Osgoode	Osgoode	20	105838.74232...	46356...	44916
111	Quartier 11	11	BEACON HILL...	BEACON HILL...	Tim Tierney	Beacon Hill-Cy...	Beacon Hill-Cy...	11	26012.651084...	19598...	35563
18	Quartier 8	8	COLLEGE	COLLÈGE	Rick Chiarelli	College	Collège	8	40055.357183...	46077...	36689
122	Quartier 22	22	GLOUCESTER...	GLOUCESTER...	Michael Qaqish	Gloucester-So...	Gloucester-Ne...	22	45545.496088...	37013...	51033
14	Quartier 4	4	KANATA NORTH	KANATA-NORD	Marianne Wilk...	Kanata North	Kanata-Nord	4	25997.770037...	24235...	47412
19	Quartier 9	9	KNOXDALE-M...	KNOXDALE-M...	Keith Egli	Knoxdale-Mer...	Knoxdale-Mer...	9	36533.316874...	47513...	35806
116	Quartier 16	16	RIVER	RIVIÈRE	Riley Brocking...	River	Rivière	16	32244.191498...	26892...	33178
117	Quartier 17	17	CAPITAL	CAPITALE	David Chernu...	Capital	Capitale	17	19243.225638...	10961...	41888
115	Quartier 15	15	KITCHISSIPPI	KITCHISSIPPI	Jeff Leiper	Kitchissippi	Kitchissippi	15	16441.444685...	15130...	44923
110	Quartier 10	10	GLOUCESTER...	GLOUCESTER...	Diane Deans	Gloucester-So...	Gloucester-So...	10	45788.222260...	76159...	32098
118	Quartier 18	18	ALTA VISTA	ALTA VISTA	Jean Clouber	Alta Vista	Alta Vista	18	19302.220840...	20433...	32491
114	Quartier 14	14	SOMERSET	SOMERSET	Catherine Mc...	Somerset	Somerset	14	11458.284323...	63801...	35994
16	Quartier 6	6	STITTSVILLE	STITTSVILLE	Shad Qadri	Stittsville	Stittsville	6	22036.367720...	23212...	48425
112	Quartier 12	12	RIDEAU-VANIER	RIDEAU-VANIER	Mathieu Fleury	Rideau-Vanier	Rideau-Vanier	12	15172.590423...	79518...	29504
113	Quartier 13	13	RIDEAU-ROCK...	RIDEAU-ROCK...	Tobi Nussbaum	Rideau-Rockcl...	Rideau-Rockcl...	13	25921.094283...	19838...	34003
12	Quartier 2	2	INNES	INNES	Jody Mitic	Innes	Innes	2	33018.165318...	40385...	45511
11	Quartier 1	1	ORLÉANS	ORLÉANS	Bob Monette	Orléans	Orléans	1	29237.165112...	25385...	45285
119	Quartier 19	19	CUMBERLAND	CUMBERLAND	Stephen Blais	Cumberland	Cumberland	19	98794.871092...	37983...	48762
121	Quartier 21	21	RIDEAU-GOUL...	RIDEAU-GOUL...	Scott Moffatt	Rideau-Goulb...	Rideau-Goulb...	21	131359.05825...	73655...	43798
15	Quartier 5	5	WEST CARLE...	WEST CARLE...	Eli El-Chantiry	West Carleton...	West Carleton...	5	122388.21698...	76556...	44481
13	Quartier 3	3	BARRHAVEN	BARRHAVEN	Jan Harder	Barrhaven	Barrhaven	3	29730.224063...	26227...	45092

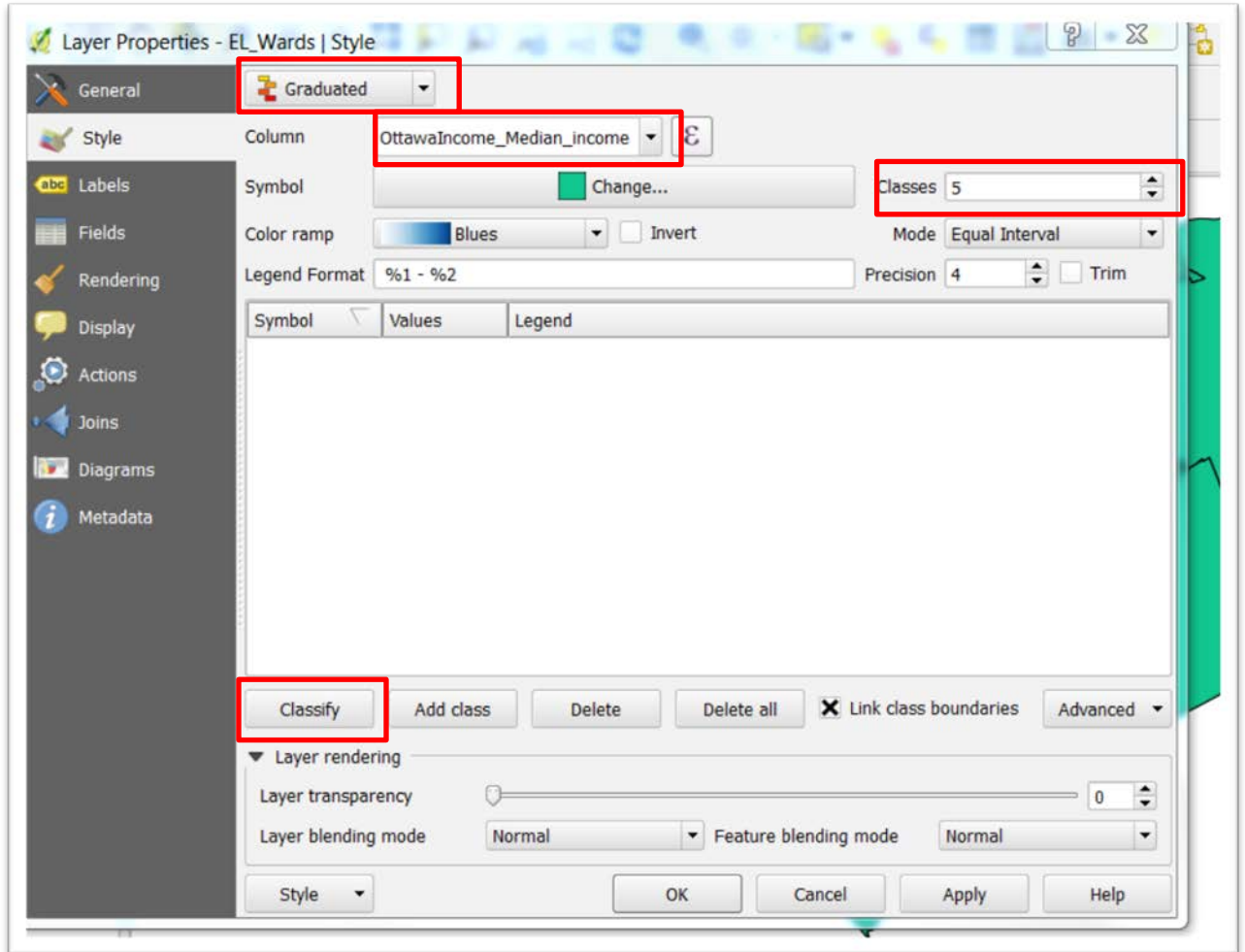
- Close the attribute table, right click on the “EL_Wards” layer, and return to properties, and select the “Style” option.





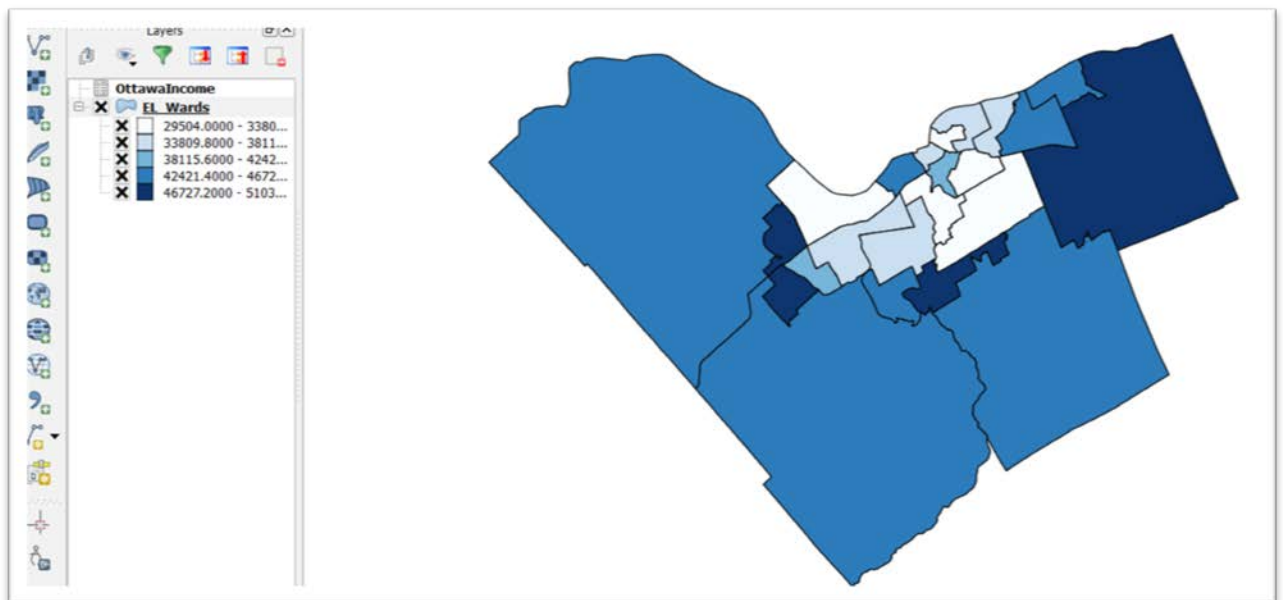
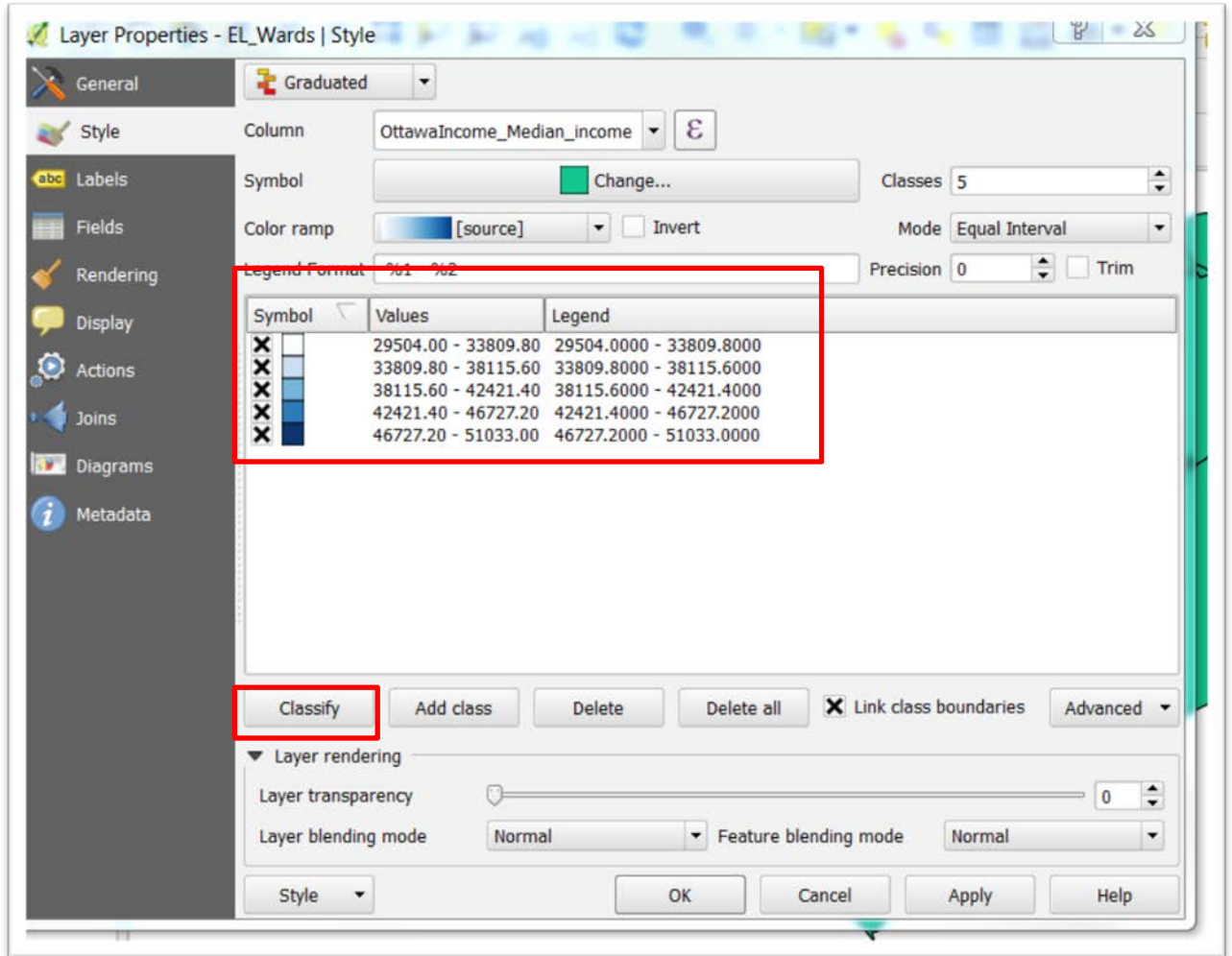
57. As we did in the contaminated sites tutorial, select “Graduated”, and specify the value we wish to visualize, which in

this case is the median income.

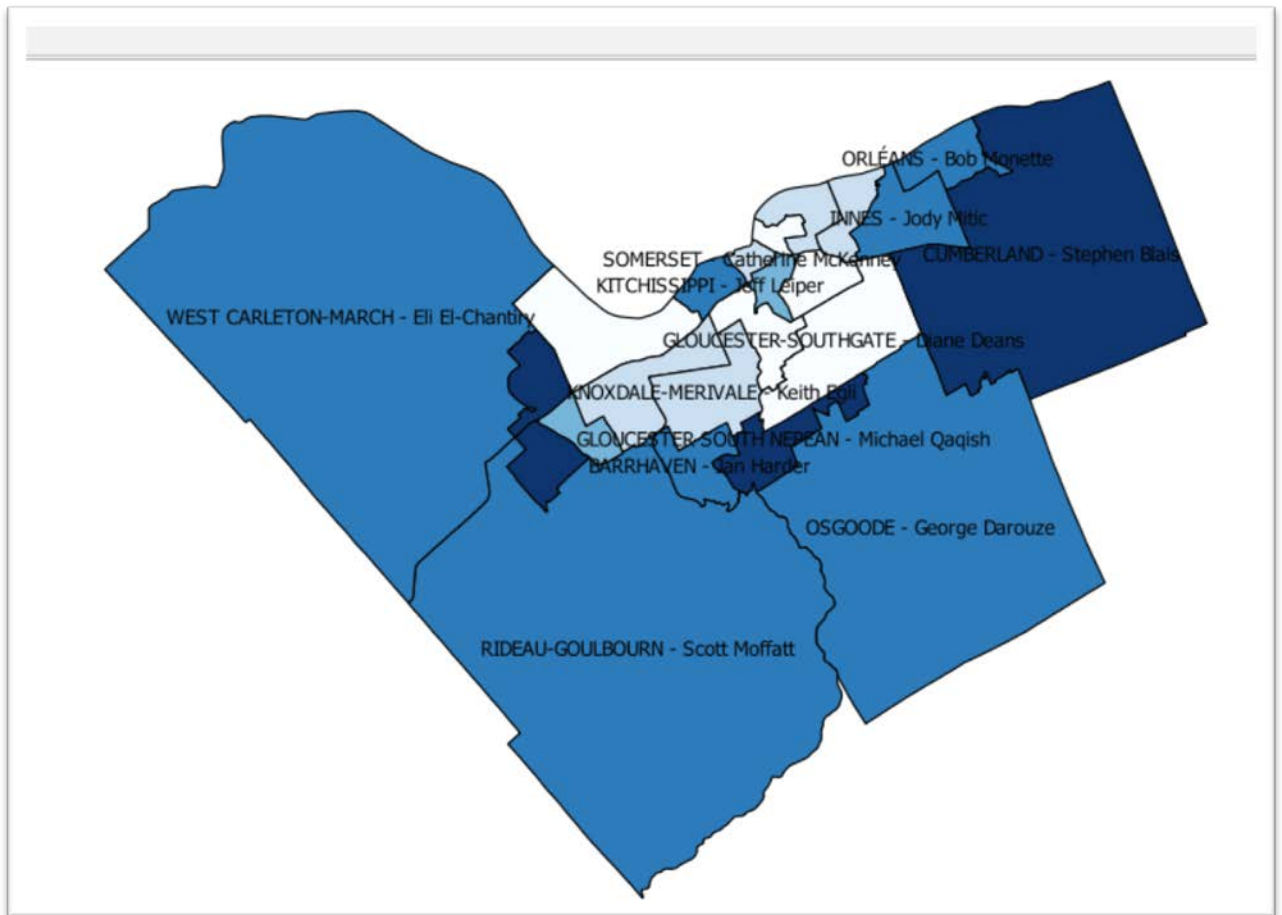


58. Qgis defaults to five categories, which can be changed using the “Advanced” feature. Let’s stick with five. You can also change the “Colour ramp”.

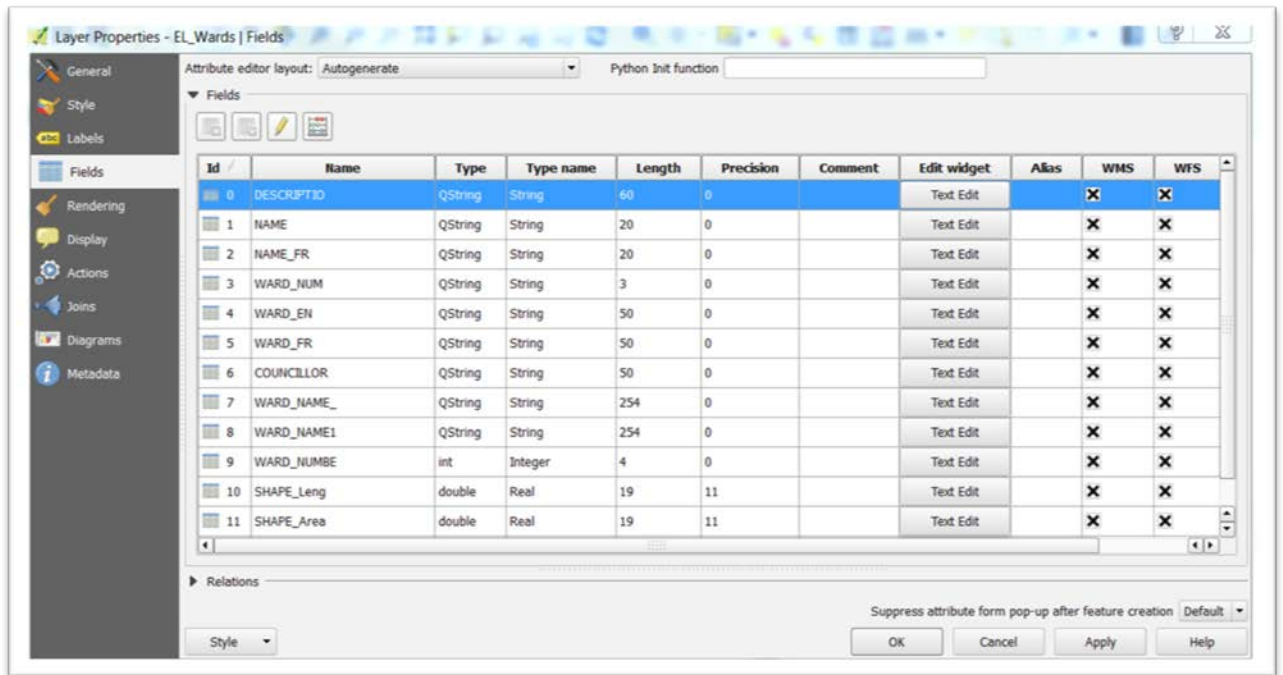
59. Select the "Classify" tab to make the categories appear.



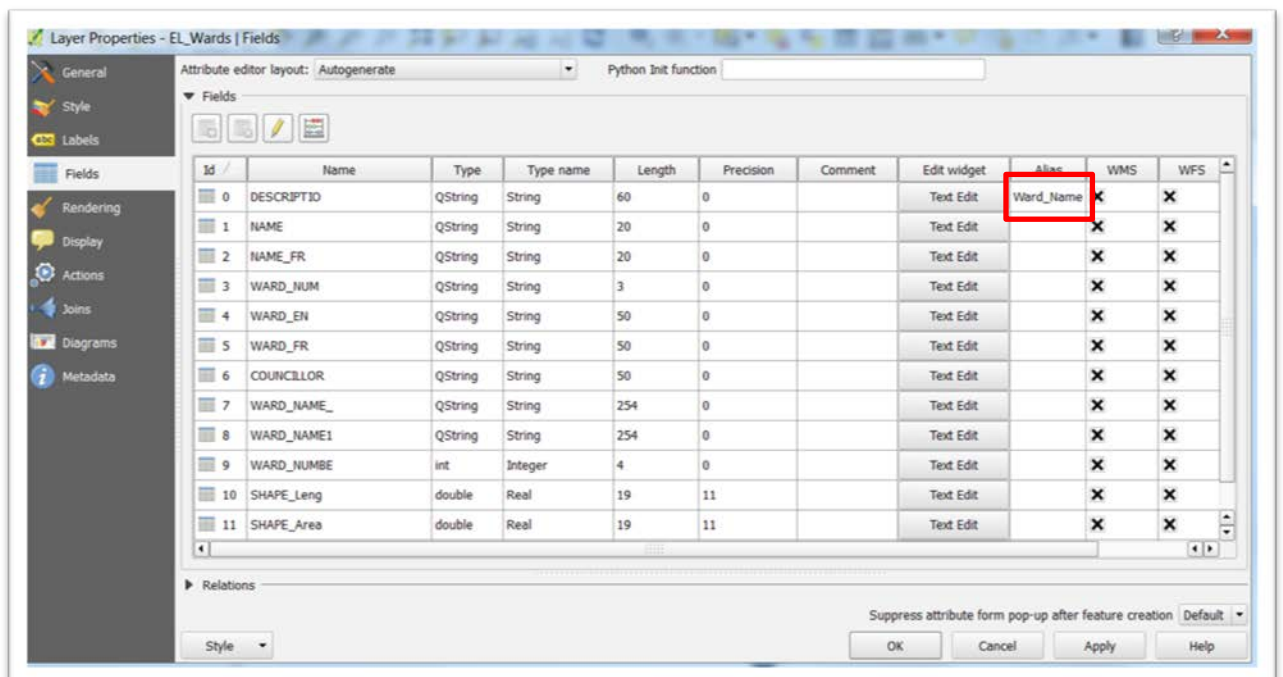
60. Not bad. You make the numbers in the “Legend” easier to read by deleting the numbers after the decimal point.
61. To make it easier to identify the wards, let’s activate the labels.
62. Return to the properties section, select “Labels”, specify that you want to “Label this layer with” the “DESCRPTIO” column, which we can improve by assigning it an alias, something we learned in MySQL. You can also specify the font size, and colour. Let’s stick with the default settings.



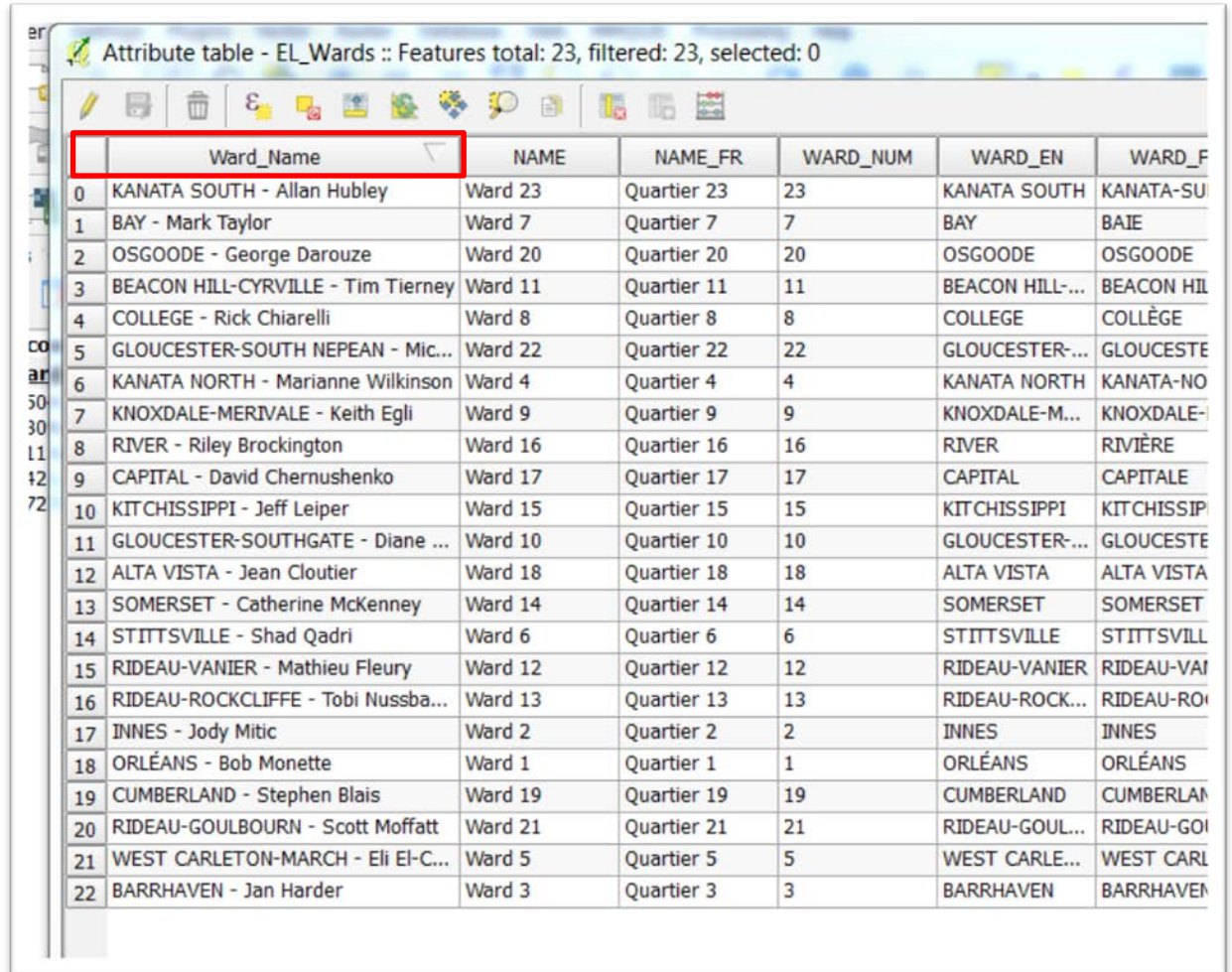
63. Now let's give that strangely named column better name. Return to properties, select "Fields".



64. In the Alias column, type "Ward_Name", select "Apply" and "OK".



65. Open the attribute table to see the new title.



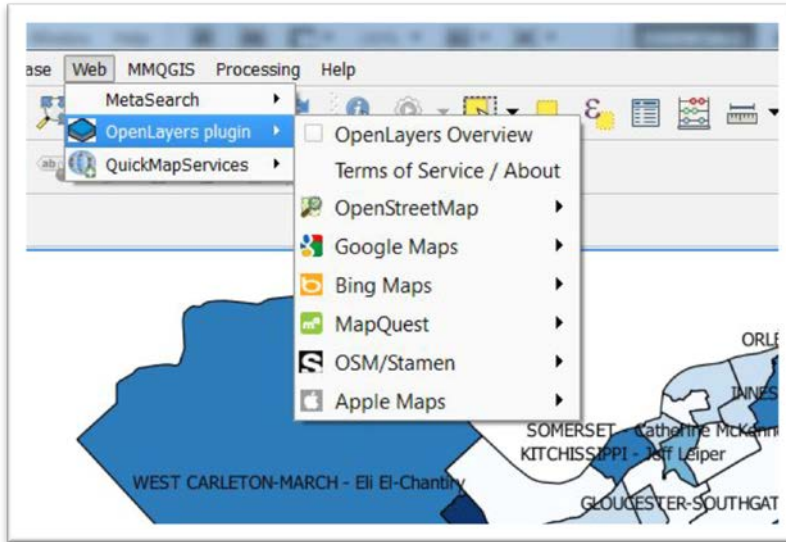
Attribute table - EL_Wards :: Features total: 23, filtered: 23, selected: 0

	Ward_Name	NAME	NAME_FR	WARD_NUM	WARD_EN	WARD_F
0	KANATA SOUTH - Allan Hubley	Ward 23	Quartier 23	23	KANATA SOUTH	KANATA-SU
1	BAY - Mark Taylor	Ward 7	Quartier 7	7	BAY	BAIE
2	OSGOODE - George Darouze	Ward 20	Quartier 20	20	OSGOODE	OSGOODE
3	BEACON HILL-CYRVILLE - Tim Tierney	Ward 11	Quartier 11	11	BEACON HILL-...	BEACON HIL
4	COLLEGE - Rick Chiarelli	Ward 8	Quartier 8	8	COLLEGE	COLLÈGE
5	GLOUCESTER-SOUTH NEPEAN - Mic...	Ward 22	Quartier 22	22	GLOUCESTER-...	GLOUCESTE
6	KANATA NORTH - Marianne Wilkinson	Ward 4	Quartier 4	4	KANATA NORTH	KANATA-NO
7	KNOXDALE-MERIVALE - Keith Egli	Ward 9	Quartier 9	9	KNOXDALE-M...	KNOXDALE-
8	RIVER - Riley Brockington	Ward 16	Quartier 16	16	RIVER	RIVIÈRE
9	CAPITAL - David Chernushenko	Ward 17	Quartier 17	17	CAPITAL	CAPITALE
10	KITCHISSIPPI - Jeff Leiper	Ward 15	Quartier 15	15	KITCHISSIPPI	KITCHISSIP
11	GLOUCESTER-SOUTHGATE - Diane ...	Ward 10	Quartier 10	10	GLOUCESTER-...	GLOUCESTE
12	ALTA VISTA - Jean Cloutier	Ward 18	Quartier 18	18	ALTA VISTA	ALTA VISTA
13	SOMERSET - Catherine McKenney	Ward 14	Quartier 14	14	SOMERSET	SOMERSET
14	STITTSVILLE - Shad Qadri	Ward 6	Quartier 6	6	STITTSVILLE	STITTSVILL
15	RIDEAU-VANIER - Mathieu Fleury	Ward 12	Quartier 12	12	RIDEAU-VANIER	RIDEAU-VAI
16	RIDEAU-ROCKCLIFFE - Tobi Nussba...	Ward 13	Quartier 13	13	RIDEAU-ROCK...	RIDEAU-RO
17	INNES - Jody Mitic	Ward 2	Quartier 2	2	INNES	INNES
18	ORLÉANS - Bob Monette	Ward 1	Quartier 1	1	ORLÉANS	ORLÉANS
19	CUMBERLAND - Stephen Blais	Ward 19	Quartier 19	19	CUMBERLAND	CUMBERLAN
20	RIDEAU-GOULBOURN - Scott Moffatt	Ward 21	Quartier 21	21	RIDEAU-GOUL...	RIDEAU-GOI
21	WEST CARLETON-MARCH - Eli El-C...	Ward 5	Quartier 5	5	WEST CARLE...	WEST CARL
22	BARRHAVEN - Jan Harder	Ward 3	Quartier 3	3	BARRHAVEN	BARRHAVEN

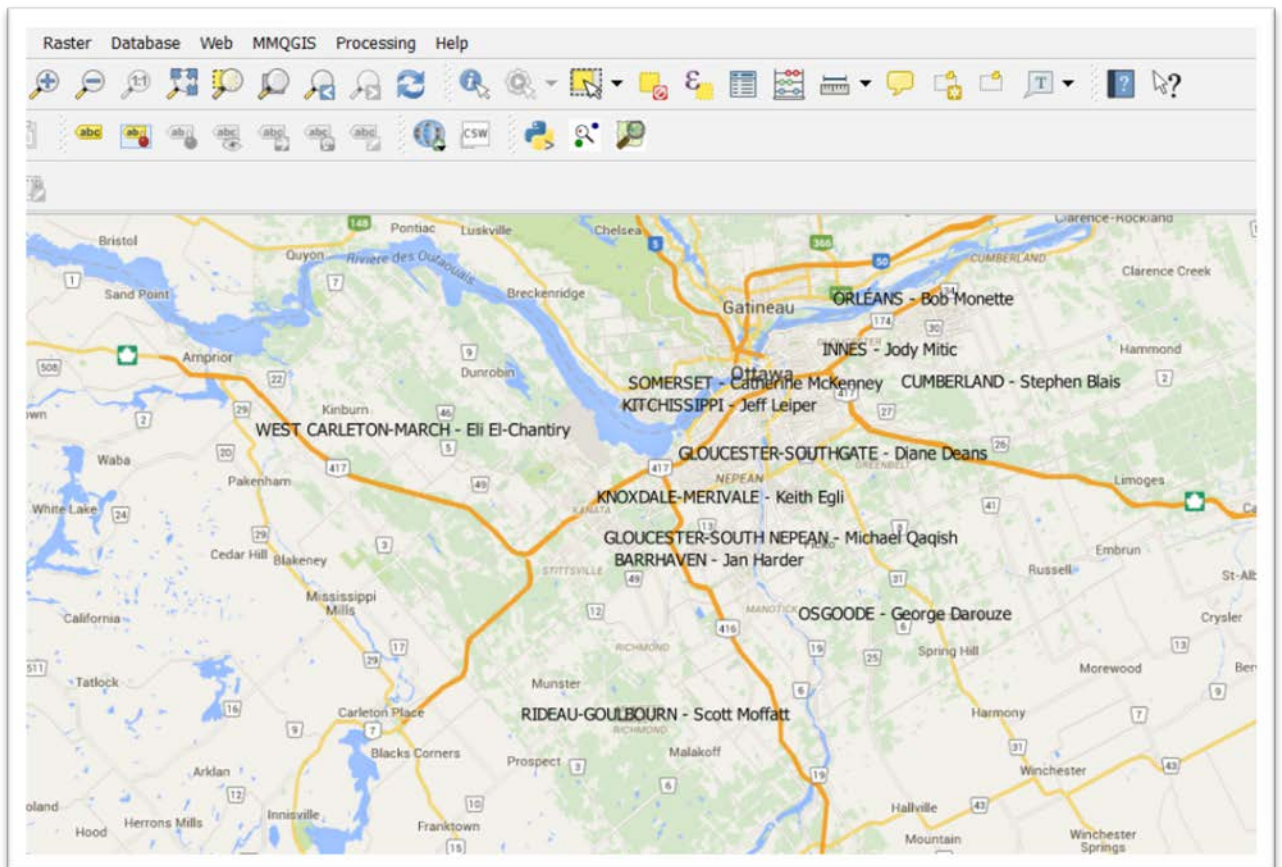
66. Close the attribute table.

67. Our map still needs a feature that allows us to get a better sense of the areas of the city these wards encompass. To do this, we'll have to add a base map.

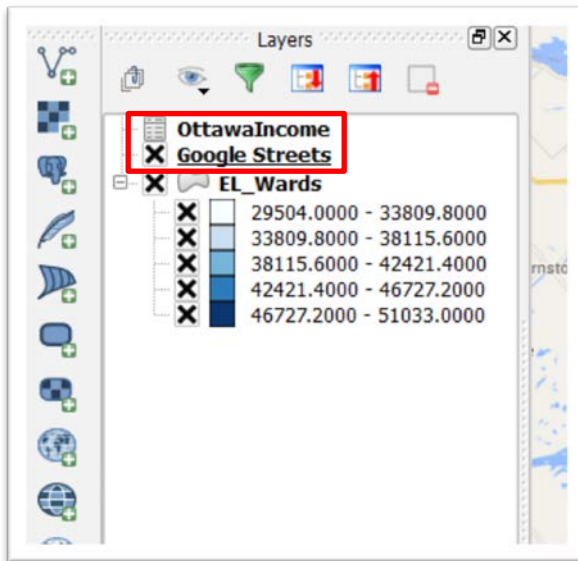
68. Select the “Web” section of the menu above.



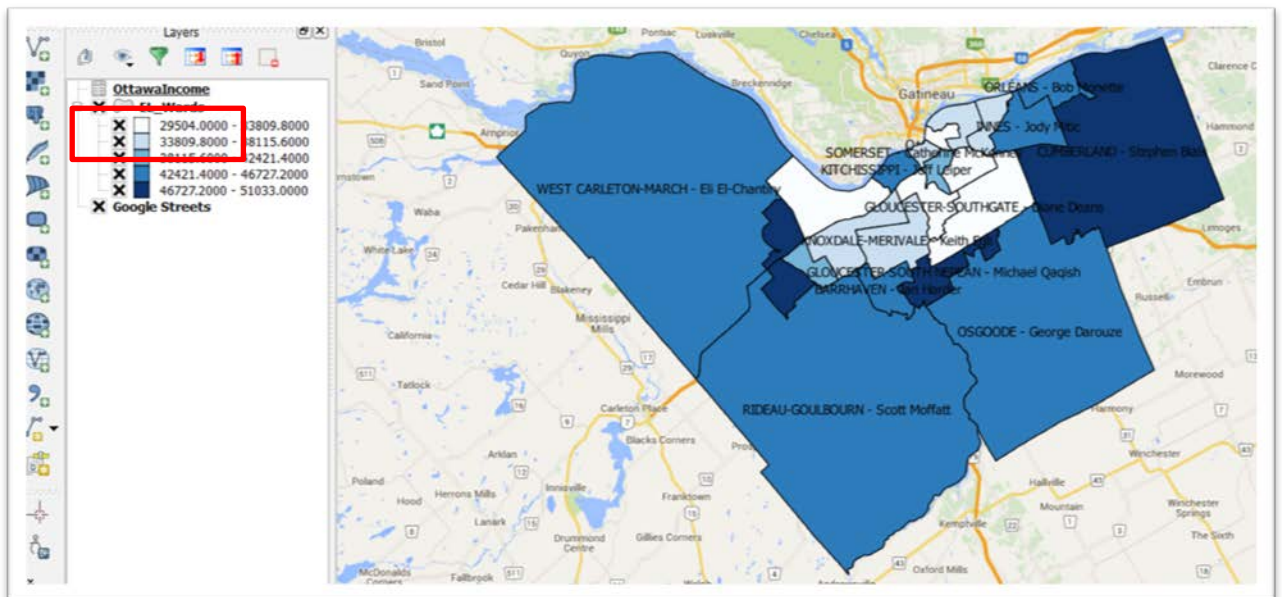
69. You can select a number of options. Click on the arrow to the right of “Google Maps, and choose “Google Streets”.



70. The map has obscured the wards, because it sits above the ward layer in the table of contents to the left.

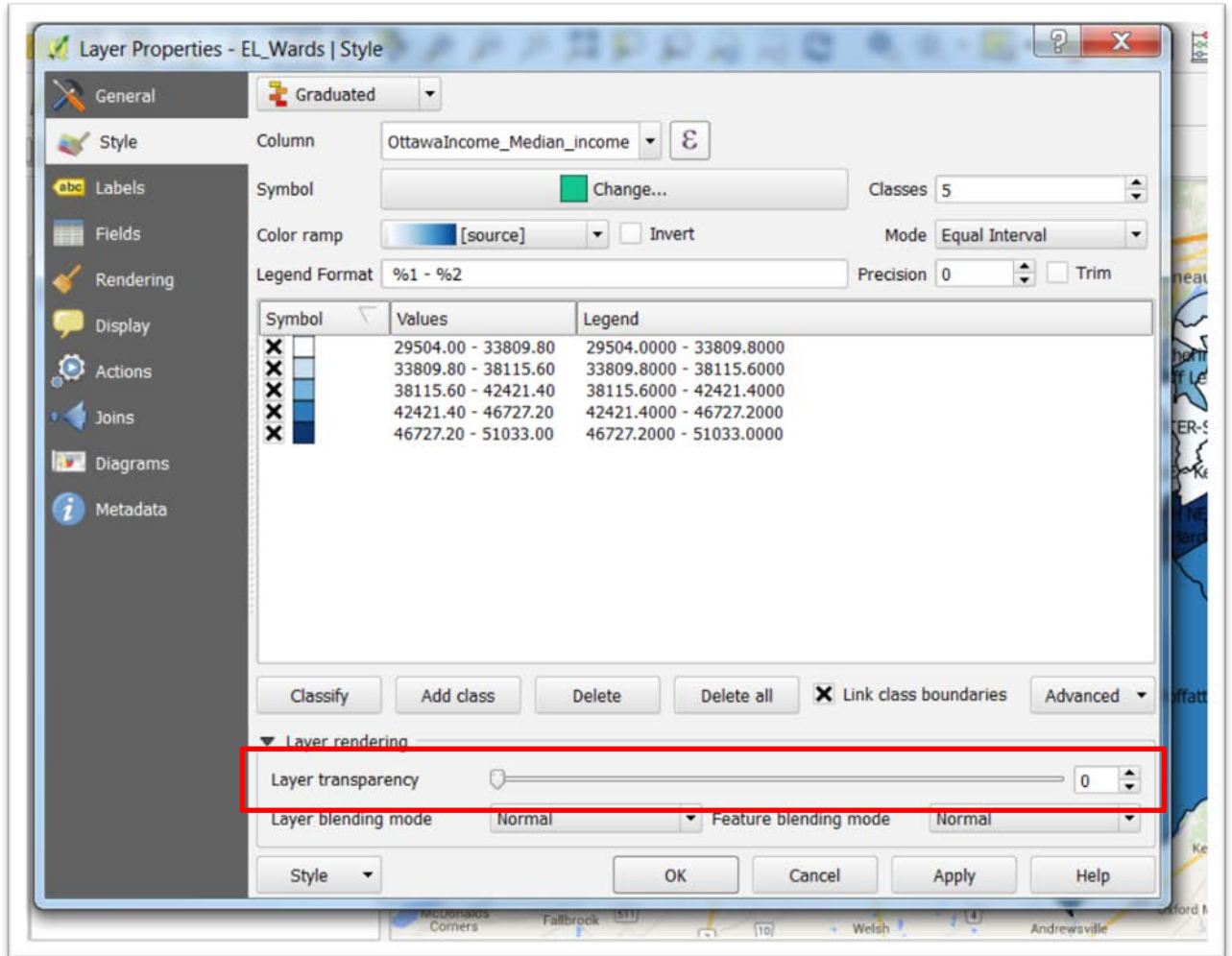


71. Right-click on the “Google Streets” layer and drag it below the “El_Wards” layer.

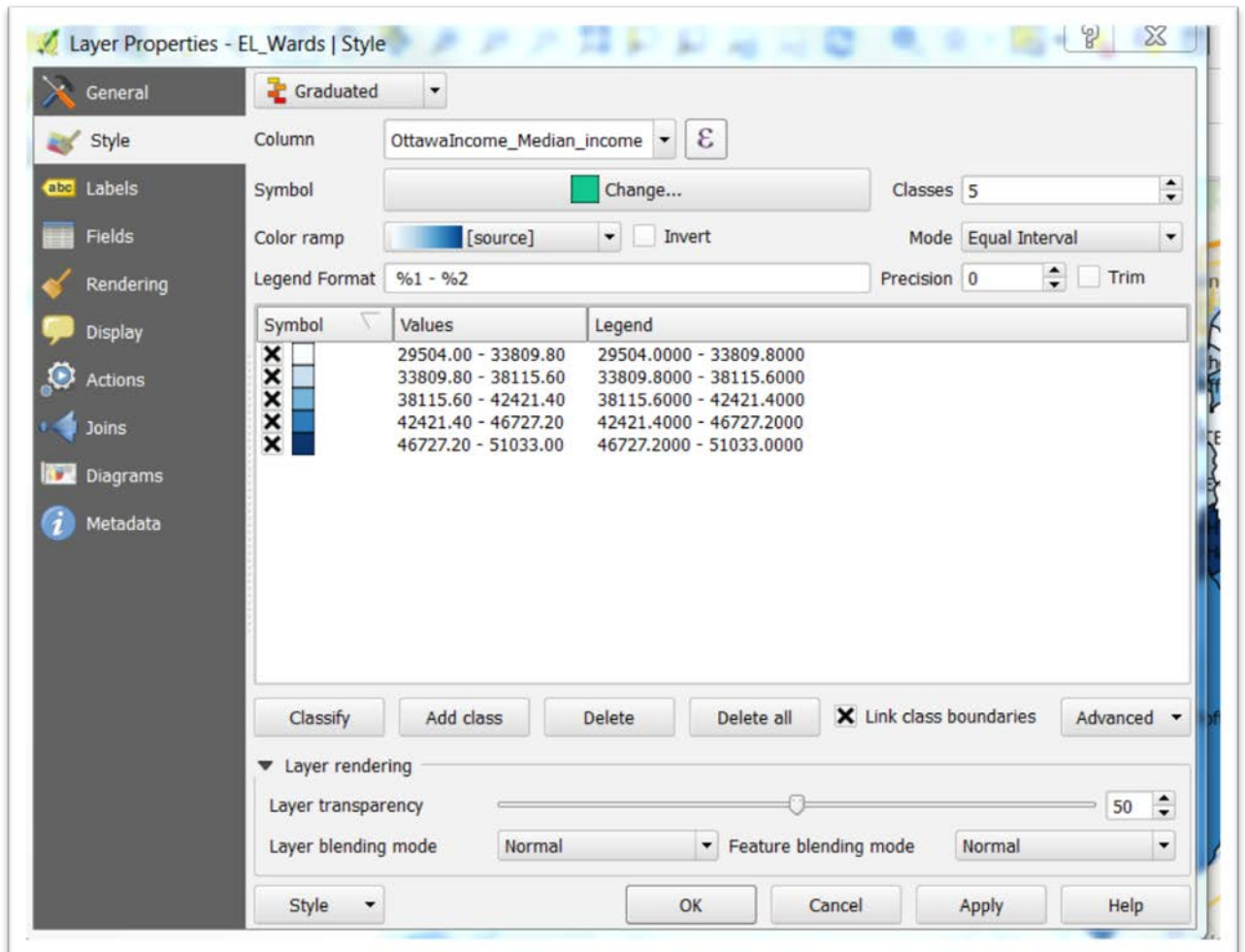


72. It's still difficult to see the streets. So let's make the ward shape file more transparent.
73. Return to properties, “Style” and adjust the setting on the “Layer transparency” section towards the bottom of the dialog

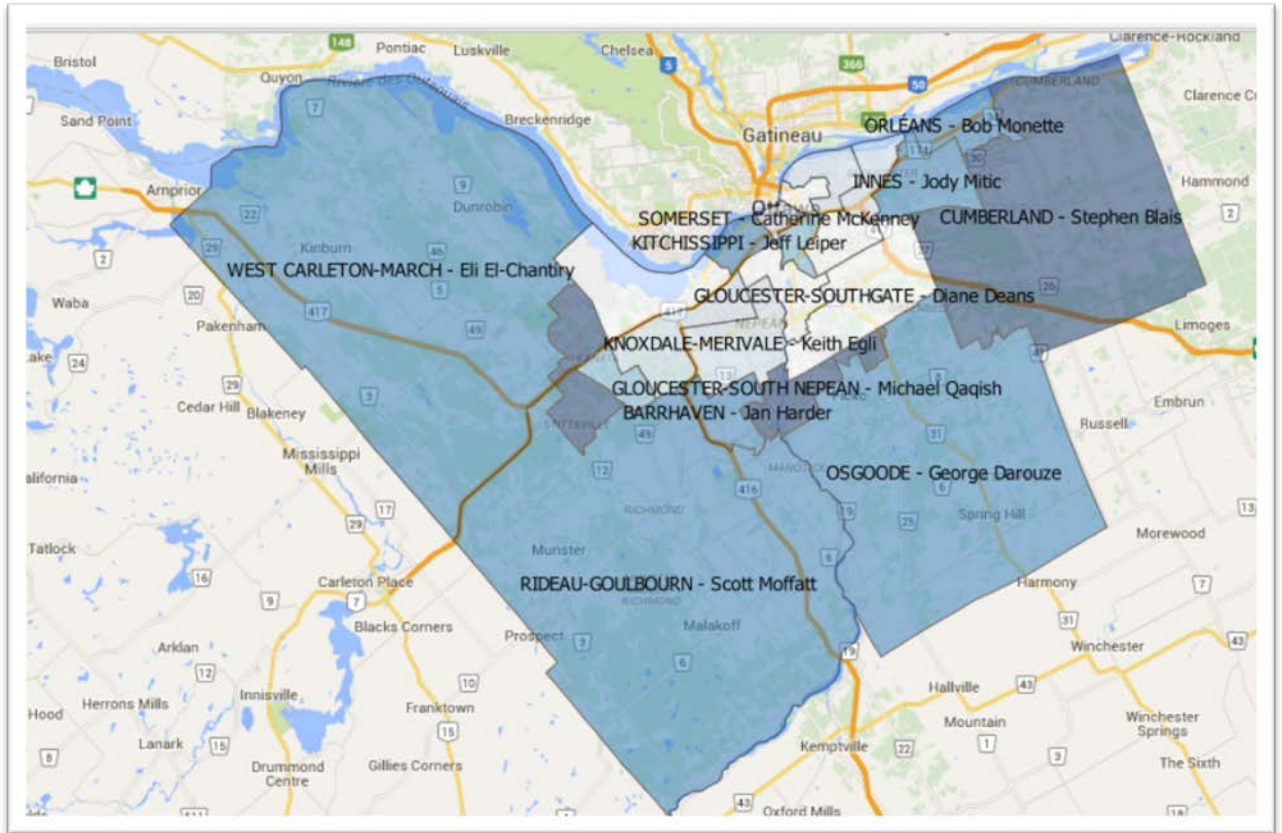
box.



74. Change it to 50 per cent. If that's too transparent, then try 30 per cent.



75. Select “Apply” and “OK”.

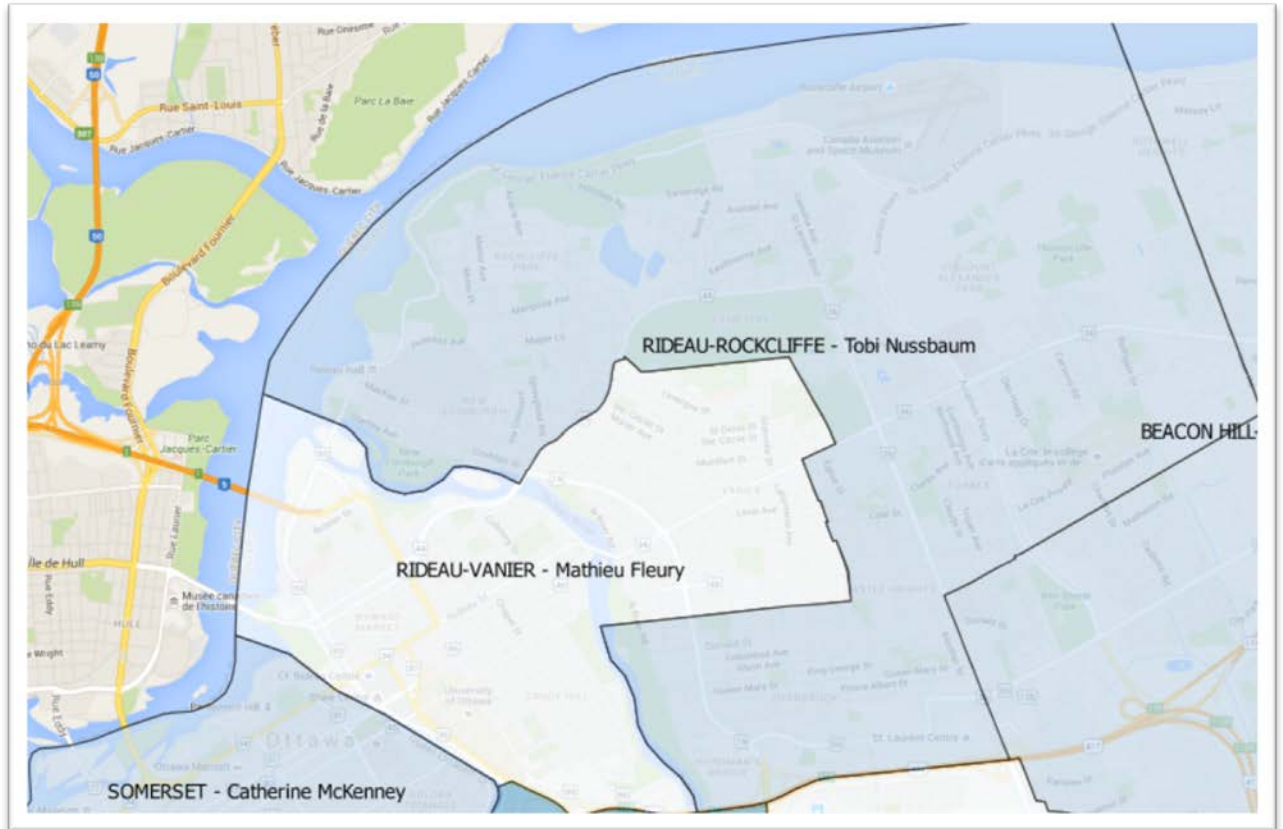


76. Now it's easier to see the streets.

77. Take some time to zoom in on the various wards to see what territory they take in. The wards also display the names of the councillors. If you don't like these labels, return to the “Labels” portion of the layer properties box and choose the title that only contains the ward name.

78. When we get a closer look at Rideau-Rockcliffe, a ward that arguably possesses the highest number of millionaire homes per capita, we can see why the median income is low compared to other wards. It takes in many lower-income neighborhoods the

farther south you move from the Ottawa River.



79. Take some time to explore some of the other wards, which amounts to testing your data in the real world.