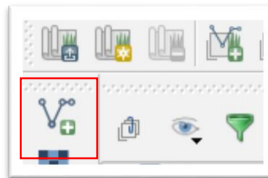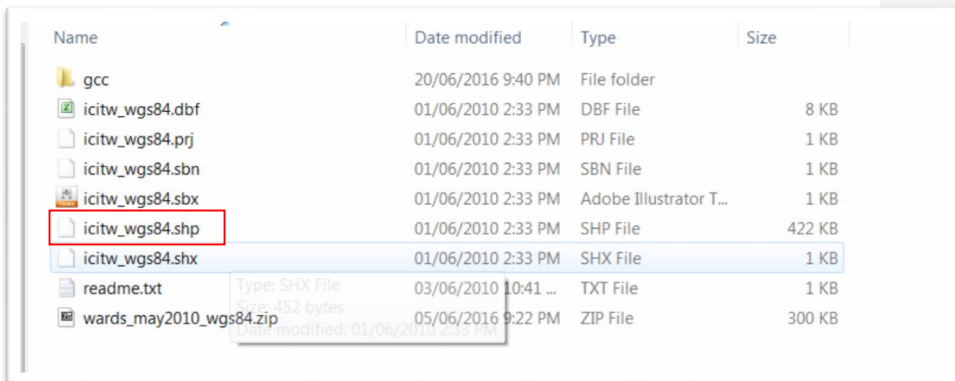# Steps for importing mapping and visualizing voter turnout

data into Qgis and ArcGIS Online
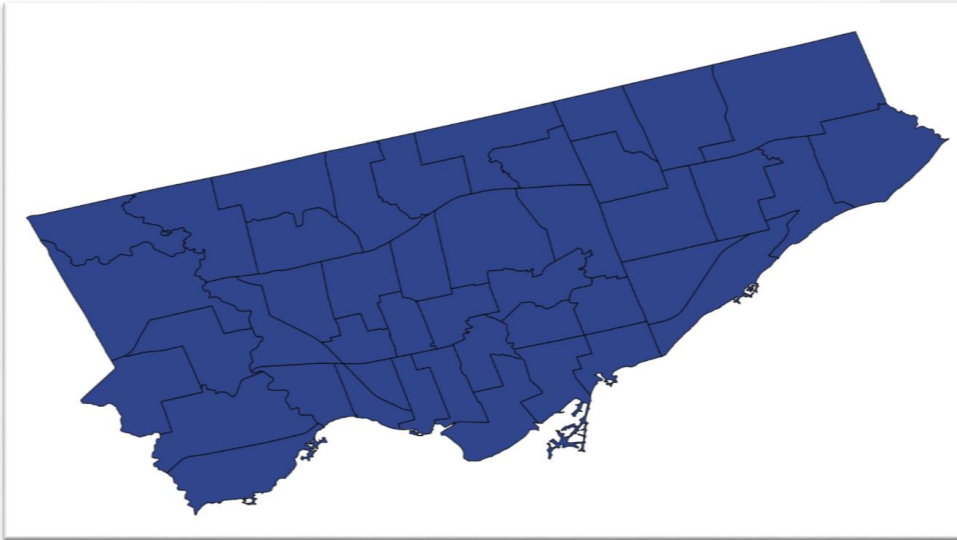
1) Open Qgis
2) Download Toronto's "City Wards" file.

3) Using the "Add vector layer" icon, import the ward shape file from your folder.

4) Your result should look similar to this:

5) Right click on the ward layer to the left to open the attribute
table.

6) We will use the "SCODE_NAME" column to join this
   table to the csv file we are about to import once we clean it
   up a bit.
7) Close the attribute table, and minimize Qgis.
8) Download Toronto's " 2014 municipal voter turnout stats
9) Open the file, which will look like this:

10)   Save the file as a backup.
11)   Working from the backup copy, click on the
   "Enabling Editing" tab.

12) As you scroll down, you'll notice that the results are breakdowns for each ward that ends with a row – highlighted in red -- that provides the totals:

	A	B	C	D	E	F	G	H	J
1	Ward	Sub	Total Electors	Additions to the Voters' List	Corrections to the Voters' List	Total Eligible Electors	Number Voted	% Voted	
131	4	23	428	33	3	461	273	59.22%	
132	4	24	384	95	5	479	291	60.75%	
133	4	25	377	36	5	413	258	62.47%	
134	4	26	89	20	1	109	27	24.77%	
135	4	27	1489	81	13	1570	790	50.32%	
136	4	28	2716	168	15	2884	1506	52.22%	
137	4	29	1839	69	9	1908	984	51.57%	
138	4	30	2067	114	16	2181	972	44.57%	
139	4	31	1825	85	7	1910	1006	52.67%	
140	4	32	2101	146	26	2247	894	39.79%	
141	4	33	348	61	9	409	243	59.41%	
142	4	34	1755	94	21	1849	792	42.83%	
143	4	35	384	264	0	648	364	56.17%	
144	4	36	729	97	0	826	299	36.20%	
145	4	38	59	109	109	168	133	79.17%	
146	4	97		8	3	8	32		
147	4	99		230	211	230	4189		
148	4 Total		37,790	3,156	742	40,946	25,259	61.69%	
149	5	1	1816	116	16	1932	1005	52.02%	
150	5	2	219	33	4	252	168	66.67%	

13) Since we are only interested in the totals for each ward, we can filter the table for "Totals".
14) Activate the filter
15) Type the word "total" into the filter's search box, and be sure to de-select "grand total"

16) Your result should look like this:

		Ward	Sub	Total Electors	Additions to the Voters' List	Corrections to the Voters' List	Total Eligible Electors	Number Voted	% Vot
+	148	4 Total		37,790	3,156	742	40,946	25,259	61.69%
+	196	5 Total		45,779	4,589	763	50,368	30,085	59.73%
+	243	6 Total		42,256	4,899	727	47,155	26,550	56.30%
+	268	7 Total		29,646	2,407	327	32,053	15,495	48.34%
+	305	8 Total		24,824	2,679	355	27,503	12,980	47.19%
+	332	9 Total		27,613	2,086	331	29,699	15,446	52.01%
+	375	10 Total		37,215	3,384	459	40,599	20,661	50.89%
+	416	11 Total		36,779	3,150	471	39,929	20,057	50.23%
+	451	12 Total		31,099	3,156	402	34,255	17,286	50.46%
+	497	13 Total		37,884	4,885	953	42,769	26,645	62.30%
+	532	14 Total		35,000	6,926	879	41,926	22,748	54.26%
+	576	15 Total		36,705	3,893	469	40,598	20,868	51.40%
+	606	16 Total		35,561	2,829	592	38,390	24,286	63.26%
+	627	17 Total		32,056	3,289	497	35,345	18,514	52.38%
+	657	18 Total		30,081	6,724	542	36,805	20,185	54.84%
+	702	19 Total		39,978	9,786	718	49,764	27,290	54.84%
+	773	20 Total		52,195	13,061	996	65,256	32,846	50.33%
+	808	21 Total		32,617	4,314	598	36,931	22,339	60.49%
+	853	22 Total		44,088	6,196	997	50,284	30,837	61.33%
+	920	23 Total		49,581	4,807	670	54,388	27,031	49.70%
+	972	24 Total		38,196	3,211	475	41,407	21,288	51.41%
+	1010	25 Total		38,273	3,272	543	41,545	25,056	60.31%
+	1062	26 Total		35,968	4,021	583	39,989	22,942	57.37%
+	1150	27 Total		53,167	9,846	1,039	63,013	35,397	56.17%
+	1216	28 Total		43,765	8,035	948	51,800	28,096	54.24%
+	1242	29 Total		31,043	3,561	557	34,604	20,965	60.59%
+	1273	30 Total		34,987	5,662	824	40,649	25,042	61.61%
+	1309	31 Total		32,882	3,760	568	36,642	21,399	58.40%
+	1343	32 Total		38,121	4,848	719	42,969	27,273	63.47%

2014 Voter Turnout

17) You can't see the entire table here, but you should have totals for the 44 wards.

18) Select and copy the table.

19)   Using "paste special" option – which strips the table of its subtotal formatting – place the table into a new tab:

A1				fx	Ward				
	A	B	C	D	E	F	G	H	I
1	Ward	Sub	TotalElecto	Additionsto	Correction	Total Eligib	NumberVo	% Voted	
2	1 Total		30544	3114	408	33658	16848	0.500565	
3	2 Total		33908	3670	535	37578	20305	0.540343	
4	3 Total		37004	2578	603	39582	23113	0.583927	
5	4 Total		37790	3156	742	40946	25259	0.616886	
6	5 Total		45779	4589	763	50368	30085	0.597304	
7	6 Total		42256	4899	727	47155	26550	0.563037	
8	7 Total		29646	2407	327	32053	15495	0.483418	
9	8 Total		24824	2679	355	27503	12980	0.471949	
10	9 Total		27613	2086	331	29699	15446	0.520085	
11	10 Total		37215	3384	459	40599	20661	0.508904	
12	11 Total		36779	3150	471	39929	20057	0.502317	
13	12 Total		31099	3156	402	34255	17286	0.504627	
14	13 Total		37884	4885	953	42769	26645	0.622998	
15	14 Total		35000	6926	879	41926	22748	0.542575	
16	15 Total		36705	3893	469	40598	20868	0.514015	
17	16 Total		35561	2829	592	38390	24286	0.632613	
18	17 Total		32056	3289	497	35345	18514	0.523808	
19	18 Total		30081	6724	542	36805	20185	0.548431	
20	19 Total		39978	9786	718	49764	27290	0.548388	
21	20 Total		52195	13061	996	65256	32846	0.503341	
22	21 Total		32617	4314	598	36931	22339	0.604885	
23	22 Total		44088	6196	997	50284	30837	0.613257	
24	23 Total		49581	4807	670	54388	27031	0.497003	
25	24 Total		38196	3211	475	41407	21288	0.514116	
26	25 Total		38273	3272	543	41545	25056	0.603105	
27	26 Total		35968	4021	583	39989	22942	0.573708	
28	27 Total		53167	9846	1039	63013	35397	0.561741	
29	28 Total		43765	8035	948	51800	28096	0.542394	
30	29 Total		31043	3561	557	34604	20965	0.605855	
31	30 Total		34987	5662	824	40649	25042	0.616055	
32	31 Total		32882	3760	568	36642	21399	0.584002	

2014 Voter Turnout   Sheet1   +

20)   You'll notice that the numbers in column H have lost their formatting and column B is now empty.

21)   Reformat the numbers in column H as percent with one decimal place.
22)   To verify the calculations, let's create a new column in "I" to create our own.
23)   To obtain the percent of residents who voted in each ward, we will divide the values in the "Number of voted" – column G – by the values in the "Number of eligible voters" – column F. And be sure to reformat the numbers as percentages with one decimal place and, then copy the

formula to the bottom to get this result:

	A	B	C	D	E	F	G	H	I	J
1	Ward	Sub	TotalElecto	Additionsto	Correction	Total Eligib	NumberVo	% Voted	Percent	
2	1 Total		30544	3114	408	33658	16848	50.1%	50.1%	
3	2 Total		33908	3670	535	37578	20305	54.0%	54.0%	
4	3 Total		37004	2578	603	39582	23113	58.4%	58.4%	
5	4 Total		37790	3156	742	40946	25259	61.7%	61.7%	
6	5 Total		45779	4589	763	50368	30085	59.7%	59.7%	
7	6 Total		42256	4899	727	47155	26550	56.3%	56.3%	
8	7 Total		29646	2407	327	32053	15495	48.3%	48.3%	
9	8 Total		24824	2679	355	27503	12980	47.2%	47.2%	
10	9 Total		27613	2086	331	29699	15446	52.0%	52.0%	
11	10 Total		37215	3384	459	40599	20661	50.9%	50.9%	
12	11 Total		36779	3150	471	39929	20057	50.2%	50.2%	
13	12 Total		31099	3156	402	34255	17286	50.5%	50.5%	
14	13 Total		37884	4885	953	42769	26645	62.3%	62.3%	
15	14 Total		35000	6926	879	41926	22748	54.3%	54.3%	
16	15 Total		36705	3893	469	40598	20868	51.4%	51.4%	
17	16 Total		35561	2829	592	38390	24286	63.3%	63.3%	
18	17 Total		32056	3289	497	35345	18514	52.4%	52.4%	
19	18 Total		30081	6724	542	36805	20185	54.8%	54.8%	
20	19 Total		39978	9786	718	49764	27290	54.8%	54.8%	
21	20 Total		52195	13061	996	65256	32846	50.3%	50.3%	
22	21 Total		32617	4314	598	36931	22339	60.5%	60.5%	
23	22 Total		44088	6196	997	50284	30837	61.3%	61.3%	
24	23 Total		49581	4807	670	54388	27031	49.7%	49.7%	
25	24 Total		38196	3211	475	41407	21288	51.4%	51.4%	
26	25 Total		38273	3272	543	41545	25056	60.3%	60.3%	
27	26 Total		35968	4021	583	39989	22942	57.4%	57.4%	
28	27 Total		53167	9846	1039	63013	35397	56.2%	56.2%	
29	28 Total		43765	8035	948	51800	28096	54.2%	54.2%	
30	29 Total		31043	3561	557	34604	20965	60.6%	60.6%	
31	30 Total		34987	5662	824	40649	25042	61.6%	61.6%	
32	31 Total		32882	3760	568	36642	21399	58.4%	58.4%	

2014 Voter Turnout   Sheet1   +

24)   So far so good. The numbers check out. It is always a good habit to do the math yourself to double-check the numbers, even when downloading datasets where the math is performed for you.

25)   Now that we've done that, delete column "I"

26)   Rename the worksheet "Totals"

27) Copy the table and paste the table into a new worksheet.

28) Create a new column to the right of "A" and label it "WardNo". Use the left function <<=left(A2,2)>> to separate the number from the word "Total", and copy the result. Your table should look like this (minus column B if

you have deleted it:

29) Select, and copy column B and re-paste it using the "paste special" to get rid of the formula you used to create the new column.

30) Now when you click on the number "1" in B1, you will see the number "1" in the formula bar instead of the

formula we used to extract the numbers.

	A	B	C	D	
1	Ward	WardNo	Sub	TotalElecto	Addi
2	1 Total	1		30544	
3	2 Total	2		33908	
4	3 Total	3		37004	
5	4 Total	4		37790	
6	5 Total	5		45779	
7	6 Total	6		42256	

31)   Delete column A so that your first column is
"WardNo".

32)   You can also delete the "Sub" column so that your
worksheet looks like this (I have deleted the empty "Sub"
column):

	A	B	C	D	E	F	G	H
1	WardNo	TotalElecto	Additionsto the Voters' List	Corrections to the Voters' List	Total EligibleElectors	NumberVoted	% Voted	
2	1	30544	3114	408	33658	16848	50.1%	
3	2	33908	3670	535	37578	20305	54.0%	
4	3	37004	2578	603	39582	23113	58.4%	
5	4	37790	3156	742	40946	25259	61.7%	
6	5	45779	4589	763	50368	30085	59.7%	
7	6	42256	4899	727	47155	26550	56.3%	
8	7	29646	2407	327	32053	15495	48.3%	
9	8	24824	2679	355	27503	12980	47.2%	
10	9	27613	2086	331	29699	15446	52.0%	
11	10	37215	3384	459	40599	20661	50.9%	
12	11	36779	3150	471	39929	20057	50.2%	
13	12	31099	3156	402	34255	17286	50.5%	
14	13	37884	4885	953	42769	26645	62.3%	
15	14	35000	6926	879	41926	22748	54.3%	
16	15	36705	3893	469	40598	20868	51.4%	
17	16	35561	2829	592	38390	24286	63.3%	
18	17	32056	3289	497	35345	18514	52.4%	
19	18	30081	6724	542	36805	20185	54.8%	
20	19	39978	9786	718	49764	27290	54.8%	
21	20	52195	13061	996	65256	32846	50.3%	
22	21	32617	4314	598	36931	22339	60.5%	

33)   Rename the worksheet "WorkingCopy"

34) Copy and paste the table into a new file
35) Format column A as text.

	A	B	C	D	E	F	G
1	WardNo	TotalElect	Additionsto the Voters' List	Corrections to the Voters' List	Total EligibleElectors	NumberVoted	% Voted
2	1	30544	3114	408	33658	16848	50.1%
3	2	33908	3670	535	37578	20305	54.0%
					39582	23113	58.4%
					40946	25259	61.7%
					50368	30085	59.7%
					47155	26550	56.3%
					32053	15495	48.3%
					27503	12980	47.2%
					29699	15446	52.0%
					40599	20661	50.9%
					39929	20057	50.2%
					34255	17286	50.5%
					42769	26645	62.3%
					41926	22748	54.3%
					40598	20868	51.4%
					38390	24286	63.3%
					35345	18514	52.4%
					36805	20185	54.8%
					49764	27290	54.8%
					65256	32846	50.3%
					36931	22339	60.5%
					50284	30837	61.3%
					54388	27031	49.7%
					41407	21288	51.4%
					41545	25056	60.3%
					39989	22942	57.4%
					63013	35397	56.2%
29	28	43765	8035	948	51800	28096	54.2%

Format Cells

Number | Alignment | Font | Border | Fill | Protection

Category:
General
Number
Currency
Accounting
Date
Time
Percentage
Fraction
Scientific
Text
Special
Custom

Sample

WardNo

Text format cells are treated as text even when a number is in the cell. The cell is displayed exactly as entered.

OK   Cancel

36) Add a zero before the numbers one to nine, by double-clicking inside the cell for each of the numbers and adding a zero before the actual number <<01, 02, 03, etc.>>> This means that the numbers from one to nine will have leading

zeros.

	A	B	C	D	E	F	G
	WardNo	TotalElect(	Additionsto the Voters' List	Corrections to the Voters' List	Total EligibleElector:	NumberVoted	% Voted
1							
2	01	30544	3114	408	33658	16848	50.1%
3	02	33908	3670	535	37578	20305	54.0%
4	03	37004	2578	603	39582	23113	58.4%
5	04	37790	3156	742	40946	25259	61.7%
6	05	45779	4589	763	50368	30085	59.7%
7	06	42256	4899	727	47155	26550	56.3%
8	07	29646	2407	327	32053	15495	48.3%
9	08	24824	2679	355	27503	12980	47.2%
10	09	27613	2086	331	29699	15446	52.0%
11	10	37215	3384	459	40599	20661	50.9%
12	11	36779	3150	471	39929	20057	50.2%

(Cell reference box shows: A11, value 10)

37)   Save the table as a csv file.

38)   Open a notepad to create a file which should look like
this: We will eventually save it as a "csvt" file.

```
File  Edit  Format  View  Help
"string","integer","integer","integer","integer","integer","string"
```

39)   THIS IS A CRUCIAL STEP. SO SLOW YOURSELF
DOWN TO MAKE SURE THAT YOU UNDERSTAND
IT!!!!! Call the "csvt" file the same name as your csv file,
give it a "csvt" extension, and then place it in the same
folder as the csv file. The "csvt" file defines the datatype in
Qgis. This is important because in order to join two fields,
the datatypes must be the same. In this case, Qgis has
imported the ward numbers as text, which we know
because the values are left-justified, as we can see in the
attribute table in step five. By placing zeros in front of the
numbers one through nine in the voter turnout csv file, and
saving it as text, we help to ensure that Qgis can pull it in

as text. In order to complete the process, we create the csvt
file, which assigns a datatype for each column in the csv
file: "string" to ensure the value is imported as text;
"integer" to ensure the value is imported as a number.
(NOTE: Your program may tack on an extra "txt"
extension after the "csvt". If this happens, simply delete the
extra "txt" extension.)

40)   To repeat: Be sure to give the "csvt" file the SAME
name as the csv file and save it in the SAME folder. This is
important because Qgis will reference it when importing
the voter turnout table.

41)   Now we can import the csv file into Qgis using the
"Add delimited text layer" icon either on the left-hand side
or the "Add layer" option in the menu at the top. The icon

that looks like this:

42) Once imported, right click on the csv icon and select the "attribute table" to see the data.

Attribute table - VoterTurnout :: Features total: 44, filtered: 44, selected: 0

	WardNo	Total Electors	Additions o the Voters' Lis	Corrections o the Voters' Lis	Total Eligible Electors	Number Voted	% Voted
0	01	30544	3114	408	33658	16848	50.1%
1	02	33908	3670	535	37578	20305	54.0%
2	03	37004	2578	603	39582	23113	58.4%
3	04	37790	3156	742	40946	25259	61.7%
4	05	45779	4589	763	50368	30085	59.7%
5	06	42256	4899	727	47155	26550	56.3%
6	07	29646	2407	327	32053	15495	48.3%
7	08	24824	2679	355	27503	12980	47.2%
8	09	27613	2086	331	29699	15446	52.0%
9	10	37215	3384	459	40599	20661	50.9%
10	11	36779	3150	471	39929	20057	50.2%
11	12	31099	3156	402	34255	17286	50.5%
12	13	37884	4885	953	42769	26645	62.3%
13	14	35000	6926	879	41926	22748	54.3%
14	15	36705	3893	469	40598	20868	51.4%
15	16	35561	2829	592	38390	24286	63.3%
16	17	32056	3289	497	35345	18514	52.4%
17	18	30081	6724	542	36805	20185	54.8%
18	19	39978	9786	718	49764	27290	54.8%
19	20	52195	13061	996	65256	32846	50.3%
20	21	32617	4314	598	36931	22339	60.5%
21	22	44088	6196	997	50284	30837	61.3%
22	23	49581	4807	670	54388	27031	49.7%

Show All Features

43) The values in the "WardNo" column have been pulled in as text, with zeros before the values between one and nine. If you compare this column, to the column in the attribute table in step five, you'll see that they are the same, which will allow for an easy join.

44) The last column – "% Voted" – is pulled in as text, which means that we are unable to perform math on it.

45)	So we'll have to create a new column which we will populate with the voter percent values as numbers rather than text.

46)	Open the csv file's attribute table, and select the "Field calculator" icon at the top, which looks like this:
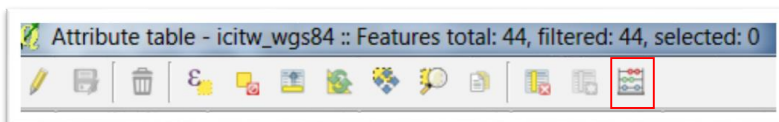
47) Selecting the "Open field calculator" button produces
a dialog box.
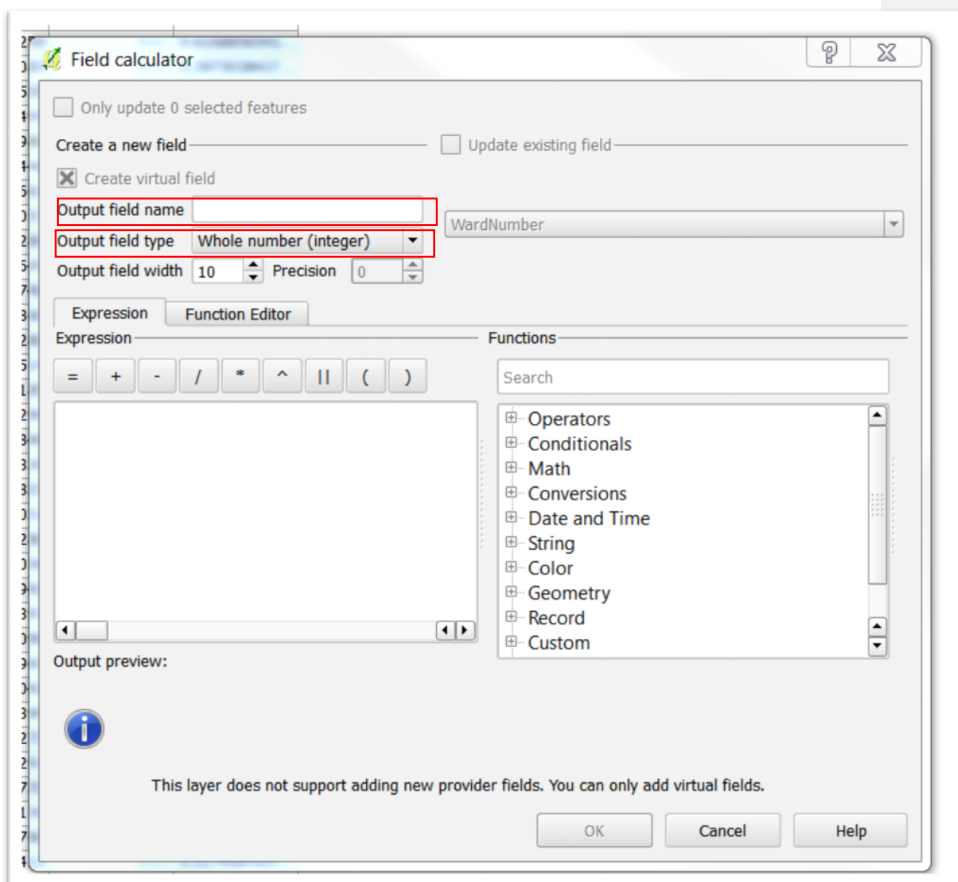
48) Type a new name into the space to the right of the
"Output field name" option. You can call it "Percent".

49) Use the vertical scroll bar in the field list to choose the "Fields and Values" option in the field list.
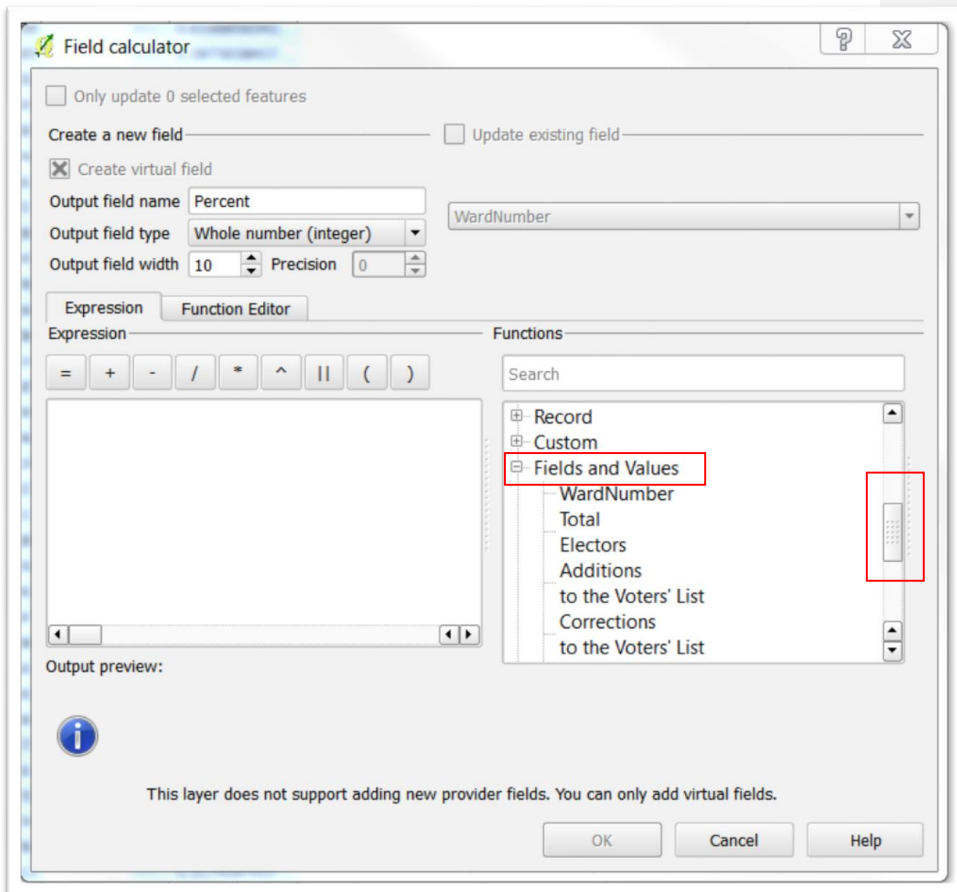
50) We will divide the values in the "Number Voted" column by the values in the "Total Eligible Electors" column, and then identify the "Output field type" as a "Decimal number (double)", which will recognize the decimal. (NOTE: If you choose a "Whole number", you'll get a "NULL" value)

51)   Double click on the "Number Voted" field, then the
        division sign, then double click on "Total Eligible
        Electors". Make sure that the "Output field type is a
        "Decimal Number (double)".
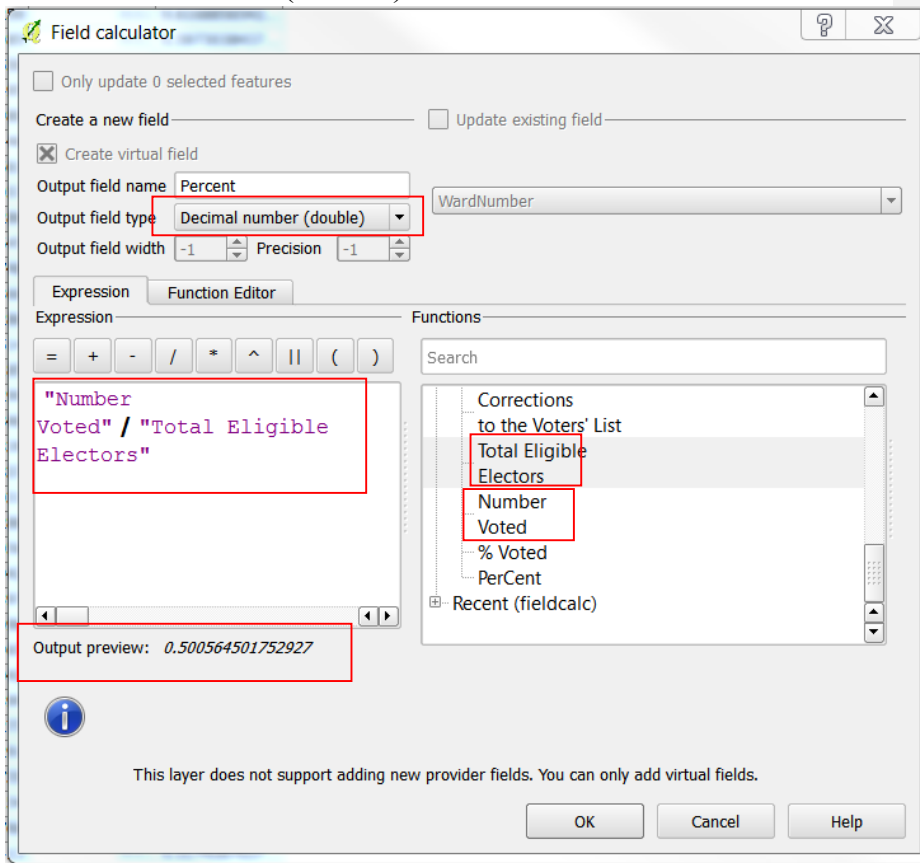
52)   Select the OK tab.

53) Your attribute table should have a new field.

|	/ardNumbe	Total Electors	Additions o the Voters' Lis	Corrections o the Voters' Lis	Total Eligible Electors	Number Voted	% Voted	PerCent
0	01	30544	3114	408	33658	16848	NULL	0.5005645017...
1	02	33908	3670	535	37578	20305	NULL	0.5403427537...
2	03	37004	2578	603	39582	23113	NULL	0.5839270375...
3	04	37790	3156	742	40946	25259	NULL	0.6168856542...
4	05	45779	4589	763	50368	30085	NULL	0.5973038437...
5	06	42256	4899	727	47155	26550	NULL	0.5630367935...
6	07	29646	2407	327	32053	15495	NULL	0.4834180887...
7	08	24824	2679	355	27503	12980	NULL	0.4719485147...
8	09	27613	2086	331	29699	15446	NULL	0.5200848513...
9	10	37215	3384	459	40599	20661	NULL	0.5089041602...
10	11	36779	3150	471	39929	20057	NULL	0.5023166119...
11	12	31099	3156	402	34255	17286	NULL	0.5046270617...
12	13	37884	4885	953	42769	26645	NULL	0.6229979658...
13	14	35000	6926	879	41926	22748	NULL	0.5425750131...
14	15	36705	3893	469	40598	20868	NULL	0.5140154687...
15	16	35561	2829	592	38390	24286	NULL	0.6326126595...
16	17	32056	3289	497	35345	18514	NULL	0.5238081765...
17	18	30081	6724	542	36805	20185	NULL	0.5484309197...
18	19	39978	9786	718	49764	27290	NULL	0.5483883932...
19	20	52195	13061	996	65256	32846	NULL	0.5033406889...
20	21	32617	4314	598	36931	22339	NULL	0.6048847851...
21	22	44088	6196	997	50284	30837	NULL	0.6132567019...
22	23	49581	4807	670	54388	27031	NULL	0.4970030153...
23	24	38196	3211	475	41407	21288	NULL	0.5141159707...
24	25	38273	3272	543	41545	25056	NULL	0.6031050667...
25	26	35968	4021	583	39989	22942	NULL	0.5737077696...
26	27	53167	9846	1039	63013	35397	NULL	0.5617412280...
27	28	43765	8035	948	51800	28096	NULL	0.5423938223...

Attribute table - VoterTurnoutStats_2016 :: Features total: 44, filtered: 44, selected: 0

54) Close the attribute table.
55) Select the City Ward layer, right-click to get the "Properties" from the drop-down menu, and chose the "Joins" option.
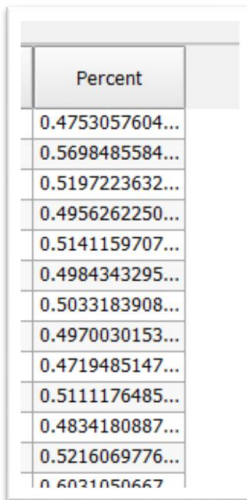
56)   Click on the plus sign to obtain a dialog box.
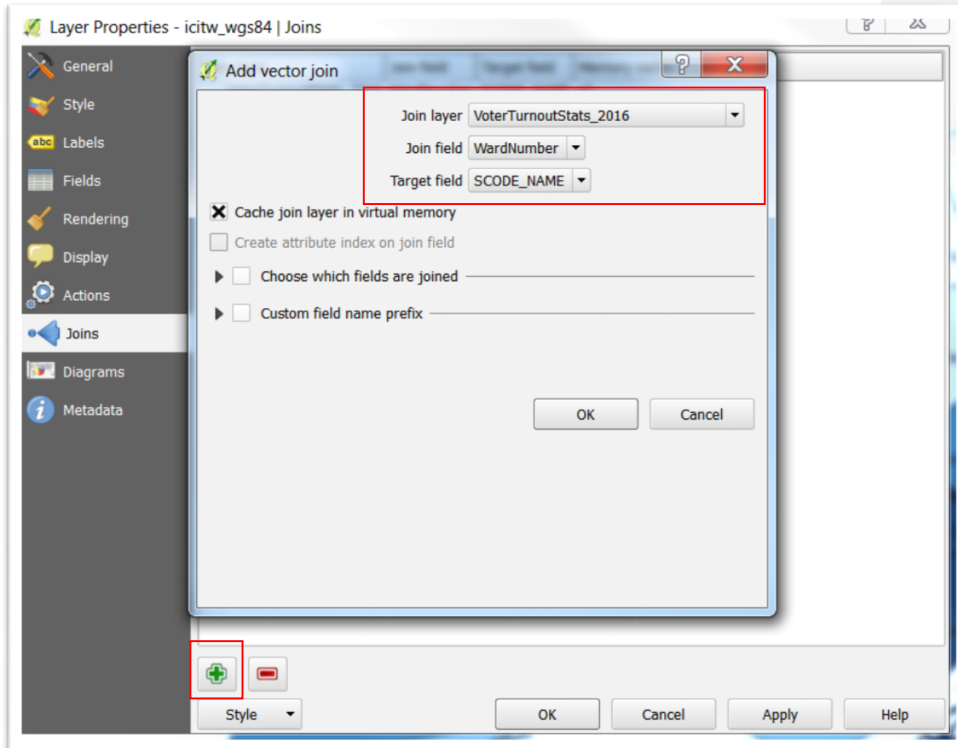
57)   As we can see in the selected criteria, we are joining
the voter turnout layer to the city ward layer, using the
"WardNumber" (NOTE" this label is different from the
"WardNo" in step 28. Please ignore the inconsistency.)
field in the csv file with the "SCODE_Name" field in the
shape file.

58) Now the two files are joined, which you can see by opening the attribute table and scrolling to the far right.

Percent
0.4753057604...
0.5698485584...
0.5197223632...
0.4956262250...
0.5141159707...
0.4984343295...
0.5033183908...
0.4970030153...
0.4719485147...
0.5111176485...
0.4834180887...
0.5216069776...
0.6031050667

59) Close the attribute table, and right click on the layer to return to the "Properties" dialog box.
60) Select the "Style" tab, the "Graduated" option to obtain a color ramp.
61) Select Percent for your column from the drop-down menu in the "Column" section.
62) Qgis defaults to five classes or categories, which you can change. We can also choose a source from the "Colour ramp", and select the "Classify" button to obtain our categories. Your dialog box should look something like

this:
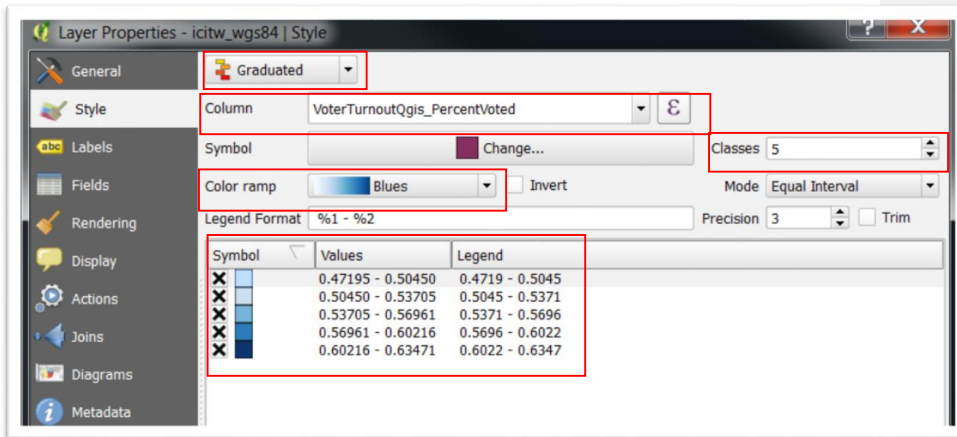
63)   Select the "Apply" and "OK" tabs.
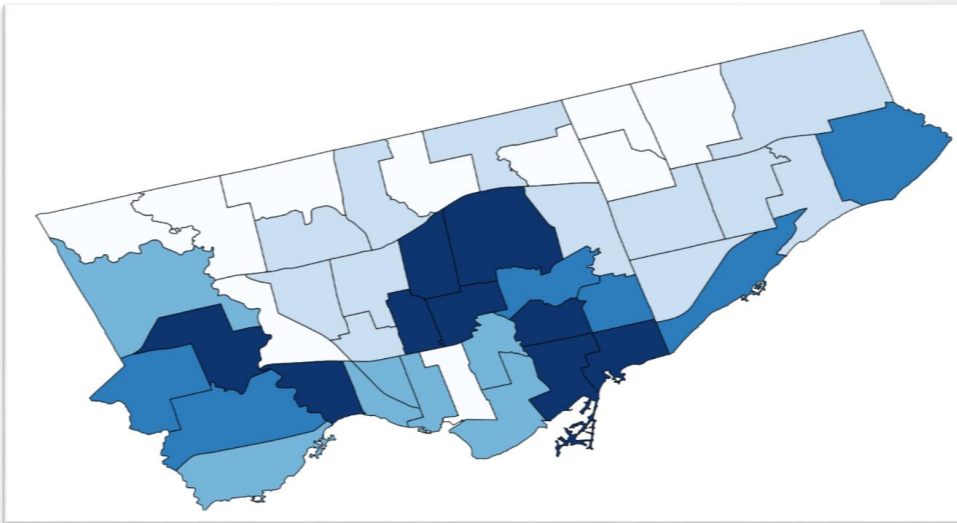
64)   Not bad. We can see that the wards with the darkest
       shadings had the highest turnout. However, it would be
       helpful to know which wards they are. For this, we'll need
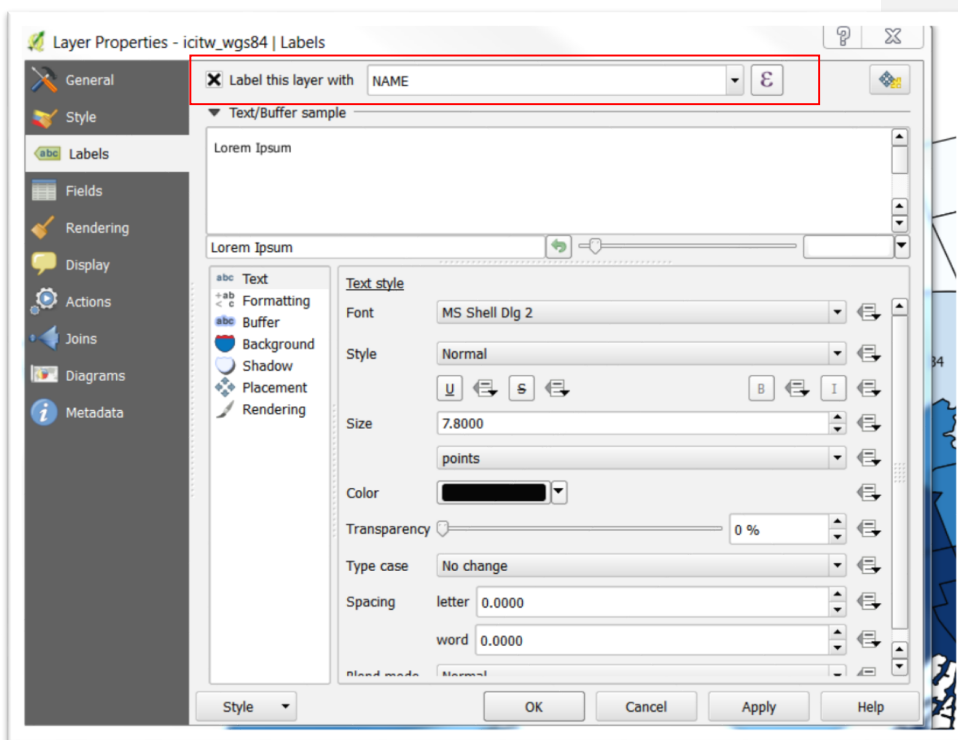   the labels.

65) Right-click on the layer and return to properties.
66) Select the "Labels" option, click the box to the left of "Label this layer with", and choose the column that contains the ward names.

67)   Select the "Apply", and then "OK."
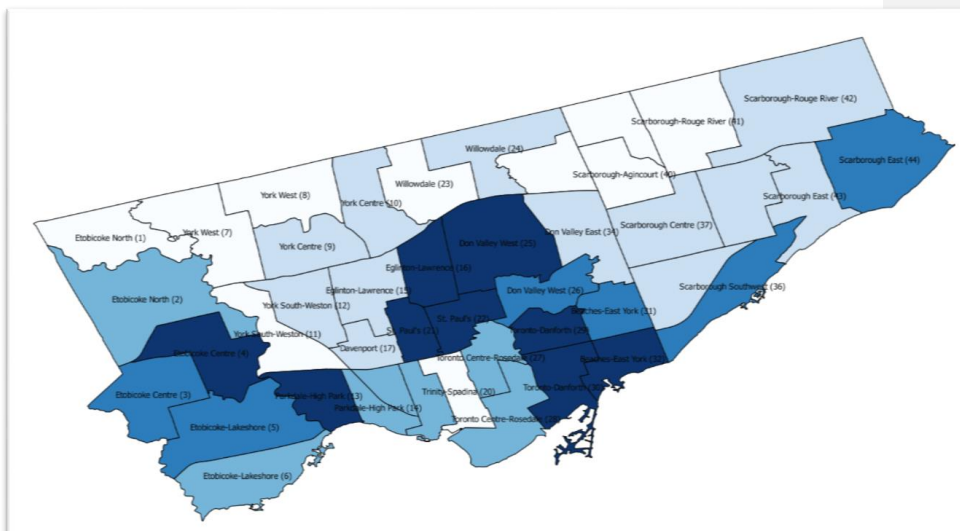
68)   Be sure to save as you go.
69)   We can also import a basemap to give our
    visualization a sense of place. To import a basemap, go to
    the "Web" portion of your menu to the
    "OpenLayersPlugin" option and select "Google Streets" in

"Google Maps".

70)   Now it's time to export this creation and display for the world to see.
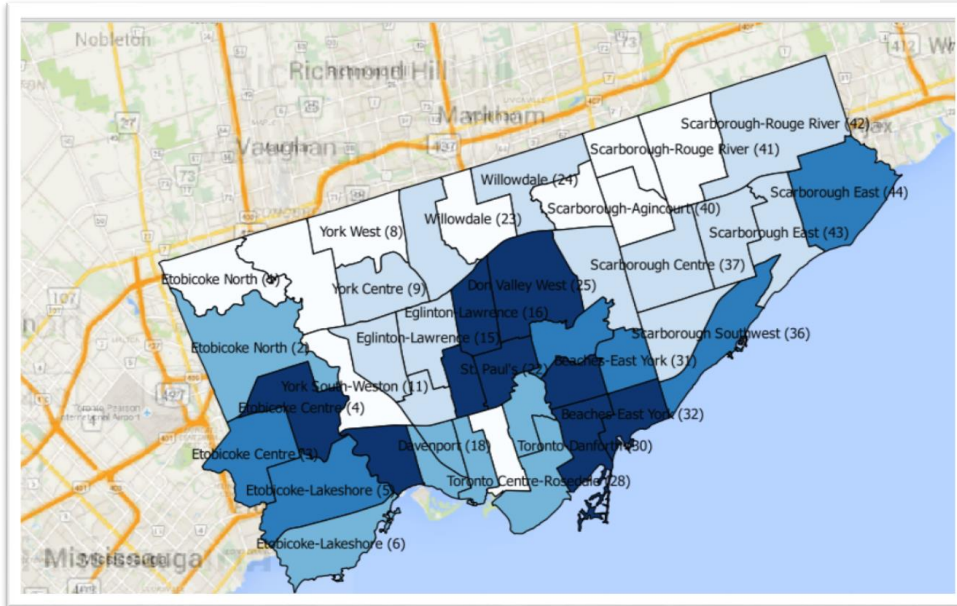
71)   Right-click on the new layer, and save it as a "shape" file. (Remember, we must convert each new layer into a shape file)

72)   Go to the folder where you've saved the file to see the different parts of the shape file. (NOTE: Shape files travel in groups, which means that they come with a number of "helper" files with extensions such as "prj", "shx" an "dbf". These files contain details the program needs in order to

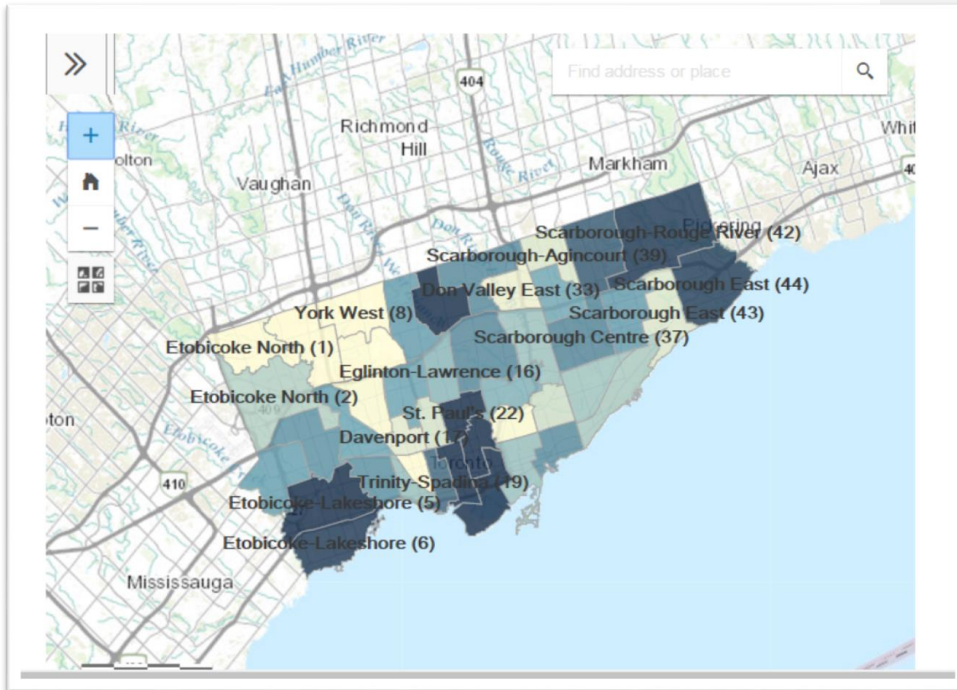know the map's projection, attributes and other
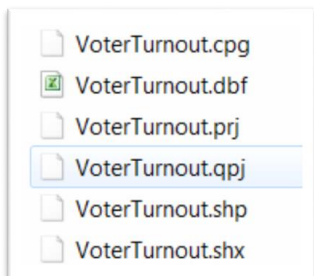
information.)
73)   We now want to visualize the our map in ArcGIS Online.
74)   To create an account, please go to this tutorial and follow the instructions.
75)   Once you've created an account, we will import the voter turnout zip file to create a map which we can embed

to get a result something like this:

76)   You can also visualize the map in Google Fusion table.

77)   To to do, return to Qgis, right-click on the layer and save it as a "KML" (which stands for Keyhole Markup Language) file, the format Google uses, as opposed to the shape file, which mapping software like Qgis and ArcGIS uses.)

78)   We can also save the layer in Google's Fusion Tables.

79)   Save the new layer as a KML file and upload it to
    Google Fusion Table.