

## Chapter 7

# Selecting Attributes and Location in QGIS Desktop

Summary: This tutorial covers selecting features in QGIS. If you are unfamiliar with the basics of the QGIS user interface, please read the tutorial **A Quick Tour of QGIS Desktop**.

Selecting features on a map is similar in concept to selecting text in a word processing document, except that instead of highlighting words or sentences, we focus on features in a map layer. We may want to select features for specific reasons. For example, a particular contaminated site may have recently made headlines. A city of Ottawa park that contains a high number of discarded needles within a 50-metre walking distance is the subject of an upcoming public meeting. Or, as may be the case with this tutorial, a hospital suddenly finds itself in the middle of a city block that has suddenly become a hot spot for parking tickets.

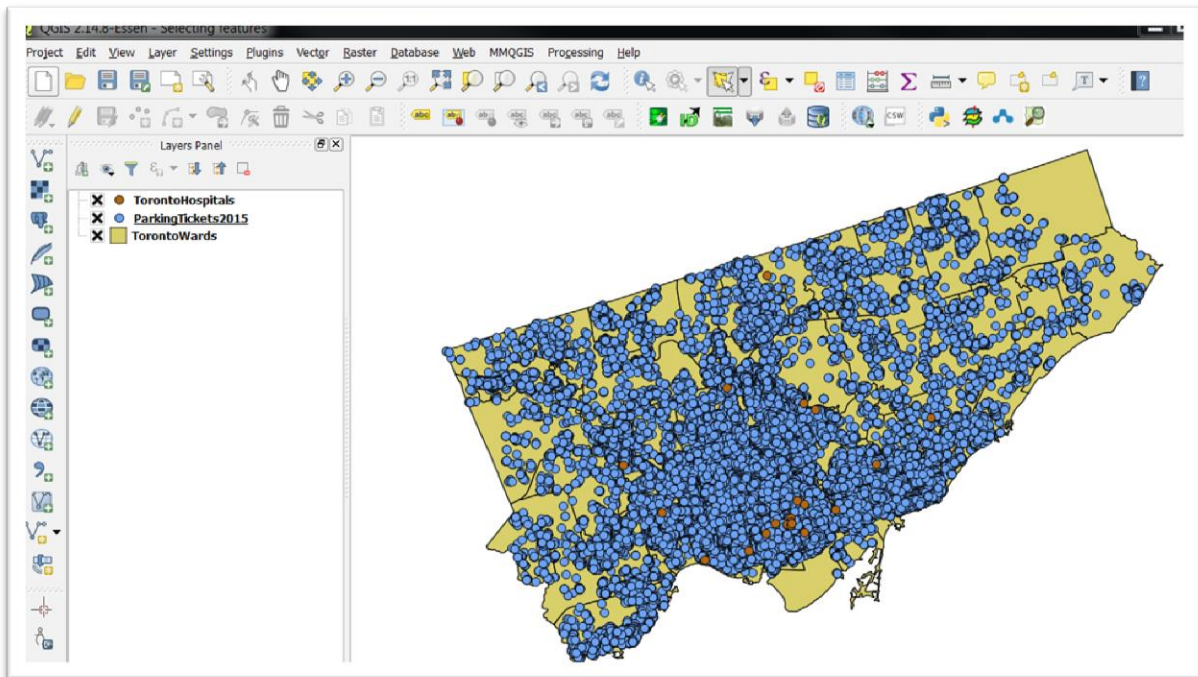
### What you will learn:

1. Selecting features manually.
2. Selecting from the attribute table.
3. Selecting by attributes.
4. Selecting by location.
5. Working with selected features.

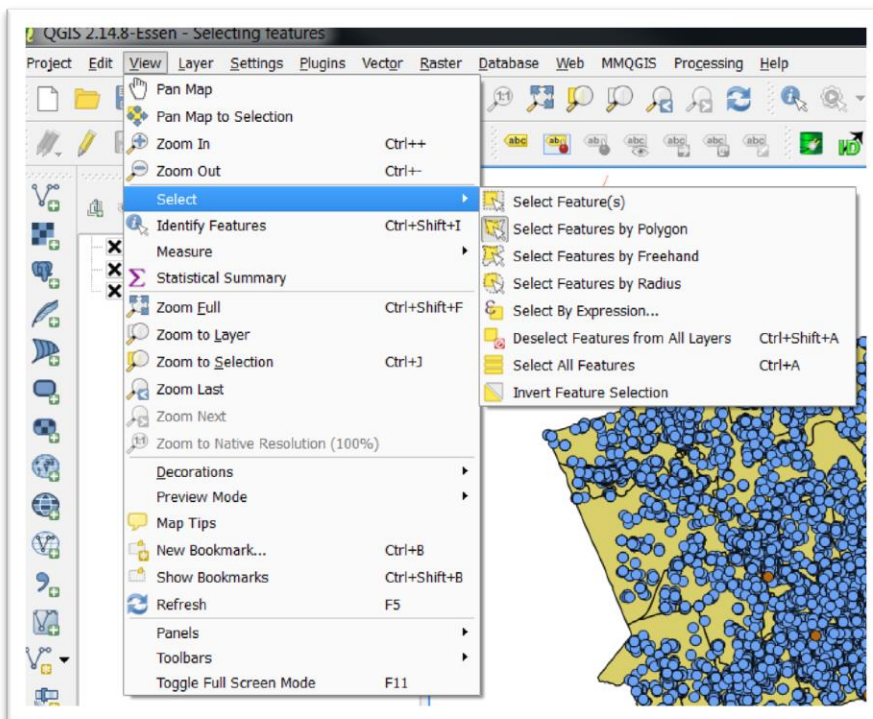
### Task 1: Selecting features manually.

The simplest way to select features in Qgis is manually with the select tool on the Tools toolbar. We'll work with three layers, hospitals in Toronto

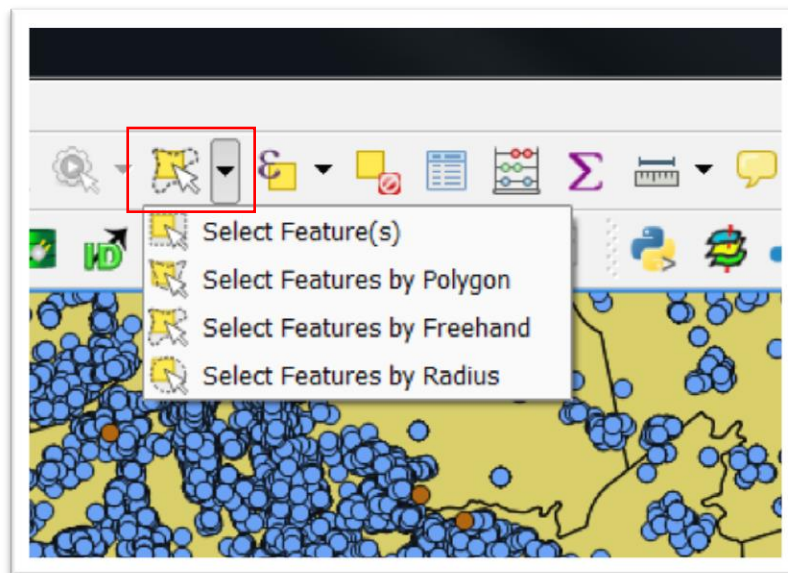
(“[TorontoHospitals](#)”), parking tickets handed out in 2015 (“[ParkingTickets2015](#)”) and the city’s ward boundaries (“[TorontoWards](#)” - 2010 ward map, with the NAD27 data)



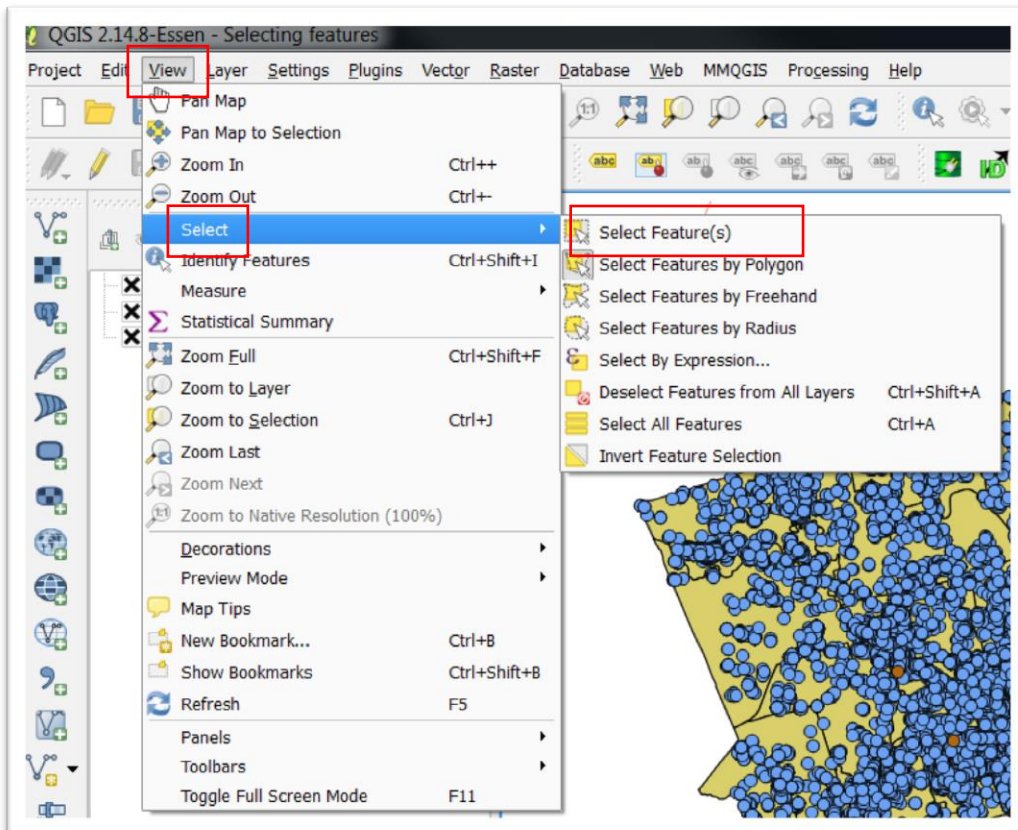
You can obtain the options for selecting by going to “View” in the menu, and then choosing the “Select” option from the drop-down menu.



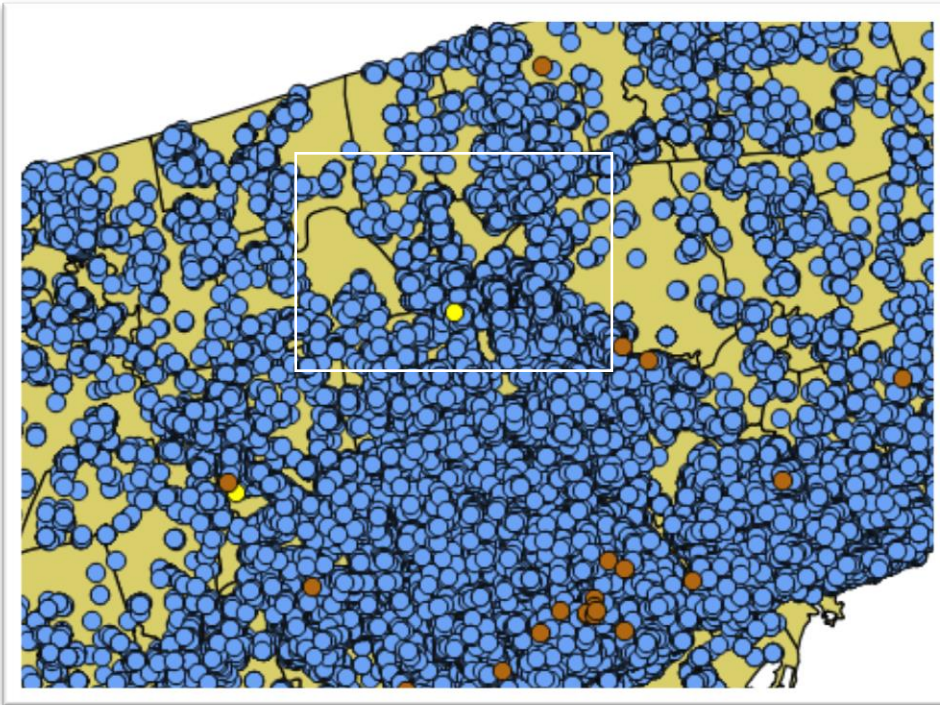
You can also obtain the options by selecting the “Select Features” icon on your menu.



The first option, “Select Feature(s)” allows you to do what its name suggests, select the desired features. Click on the layer on the left that contains the features you want to select. Let’s go with “TorontoHospitals”. Once it’s selected, go to “View”, “Select”, and then the first option, “Select Feature(s)”.



Clicking on one location selects, and assigns it a new colour, in the yellow circle in the middle of the screen grab below.



The selection also appears in the layer's attribute table. The selected row is highlighted in blue at the bottom.

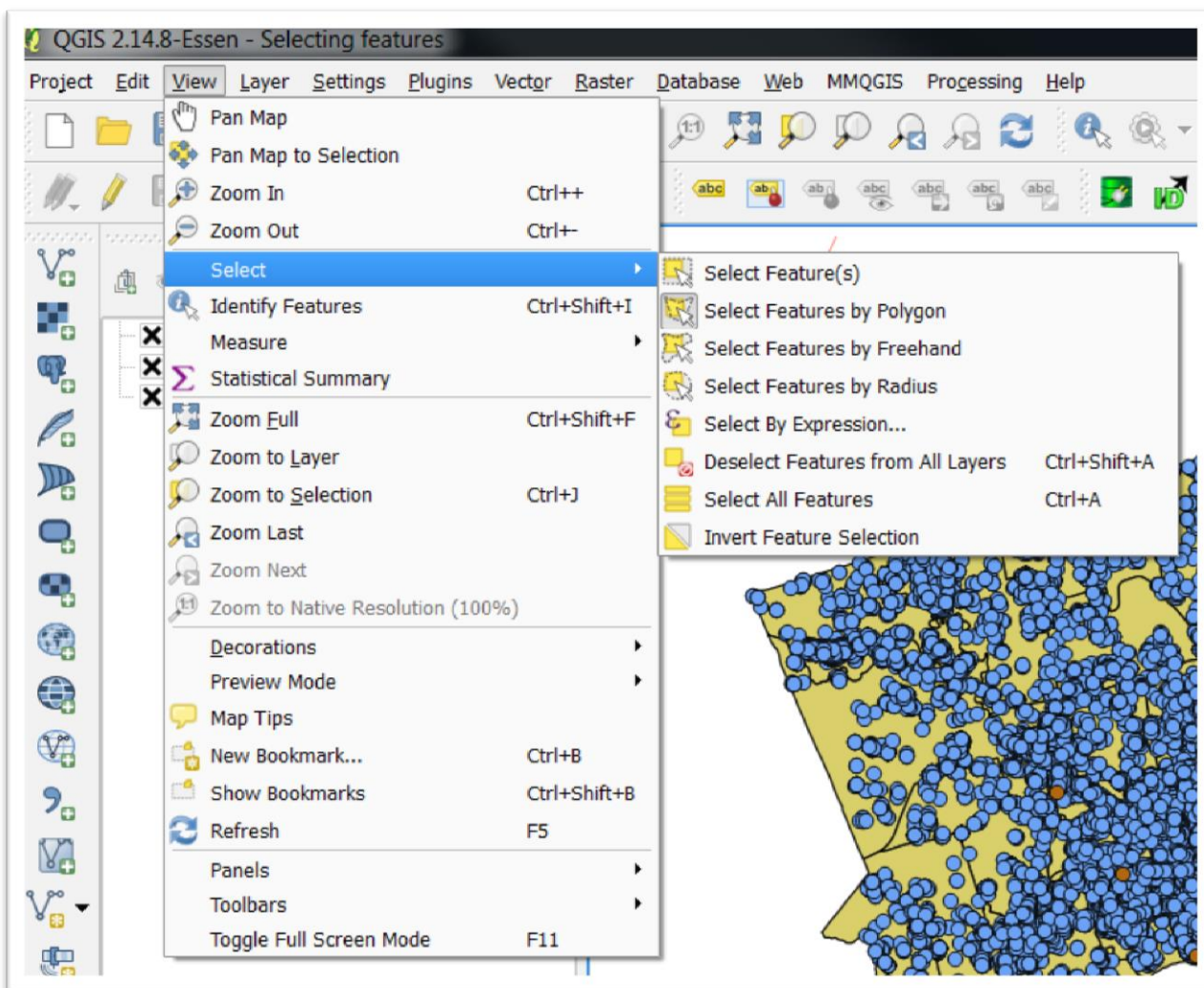
QGIS 2.14.8-Essen - Selecting features

TorontoHospitals : Features total: 22, filtered: 22, selected: 1

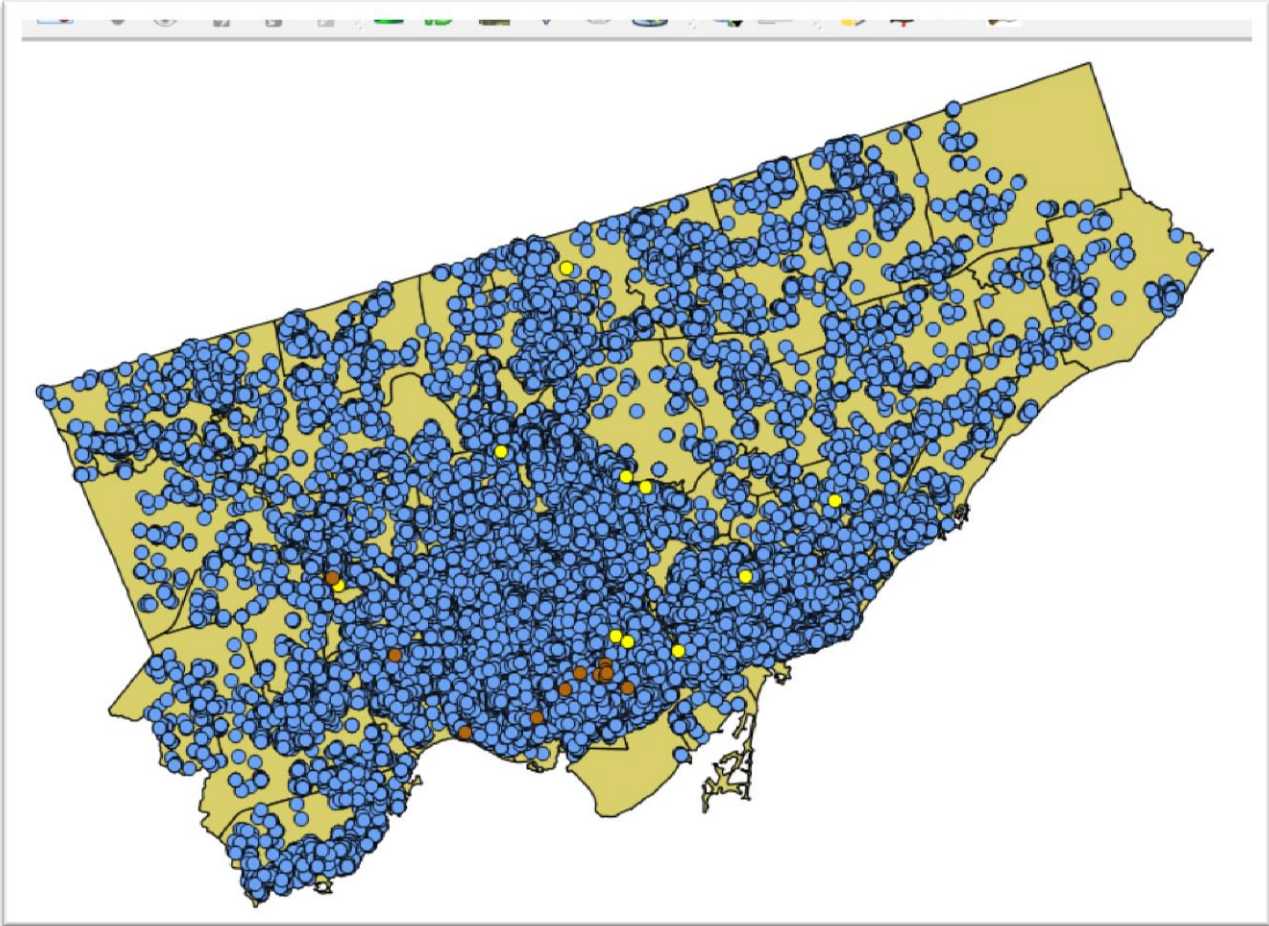
	Status	Hospital	Street	City	Province	Code
4	M	Toronto General Hospital Site, University Health Network	200 Elizabeth Street,	Toronto	Ontario	M5G 2C4
5	M	Sunnybrook Health Sciences Centre	2075 Bayview Avenue	Toronto	Ontario	M4N 3M5
6	M	St. Joseph's Health Centre	30 The Queensway	Toronto	Ontario	M6R 1B5
7	M	Salvation Army Toronto Grace Hospital (The)	650 Church Street	Toronto	Ontario	M4Y 2G5
8	M	St Michael's Hospital	30 Bond Street	Toronto	Ontario	M5B 1W8
9	M	Runnymede Healthcare Centre	625 Runnymede Road	Toronto	Ontario	M6S 3A3
10	M	St. John's Rehabilitation Hospital Site, Sunnybrook Health Sciences Site	285 Cummer Avenue	Toronto	Ontario	M2M 2G1
11	M	Providence Healthcare	3276 St. Clair Avenue East	Toronto	Ontario	M1L 1W1
12	M	Mount Sinai Hospital Site, Sinai Health System	600 University Avenue	Toronto	Ontario	M5G 1X5
13	M	Princess Margaret Hospital /The Ont.Cancer Institute Site, University Health Network	610 University Ave	Toronto	Ontario	M5G 2M9
14	M	Lyndhurst Hospital Site, University Health Network	520 Sutherland Drive	Toronto	Ontario	M4G 3V9
15	M	Queen Street Site, Centre for Addiction and Mental Health	1001 Queen Street	Toronto	Ontario	M6J 1H4
16	M	College Street Site, Centre for Addiction and Mental Health	250 College Street	Toronto	Ontario	M5T 1R8
17	M	Hospital For Sick Children (The)	555 University Avenue	Toronto	Ontario	M5G 1X8
18	M	Bridgepoint Hospital Site, Sinai Health System	14 St. Matthews Road	Toronto	Ontario	M4M 2B5
19	M	Bickle Centre Site (Dunn St), University Health Network	190 Elizabeth Street	Toronto	Ontario	M5G 2C4
20	M	Casey House Hospice	9 Huntley Street	Toronto	Ontario	M4Y 2K8
21	M	Baycrest Hospital	3560 Bathurst Street	Toronto	Ontario	M6A 2E1

Show All Features

While the first option under “Select” is fine, it only permits one choice at a time. Click on another hospital location, and that one is highlighted.



The next three selection options (polygon, freehand and radius, respectively) allow you to select multiple locations by drawing shapes around the areas of interest. So, for instance, with the freehand option, you can draw a radius around several locations.



Open the attribute table reveals the locations we've selected.

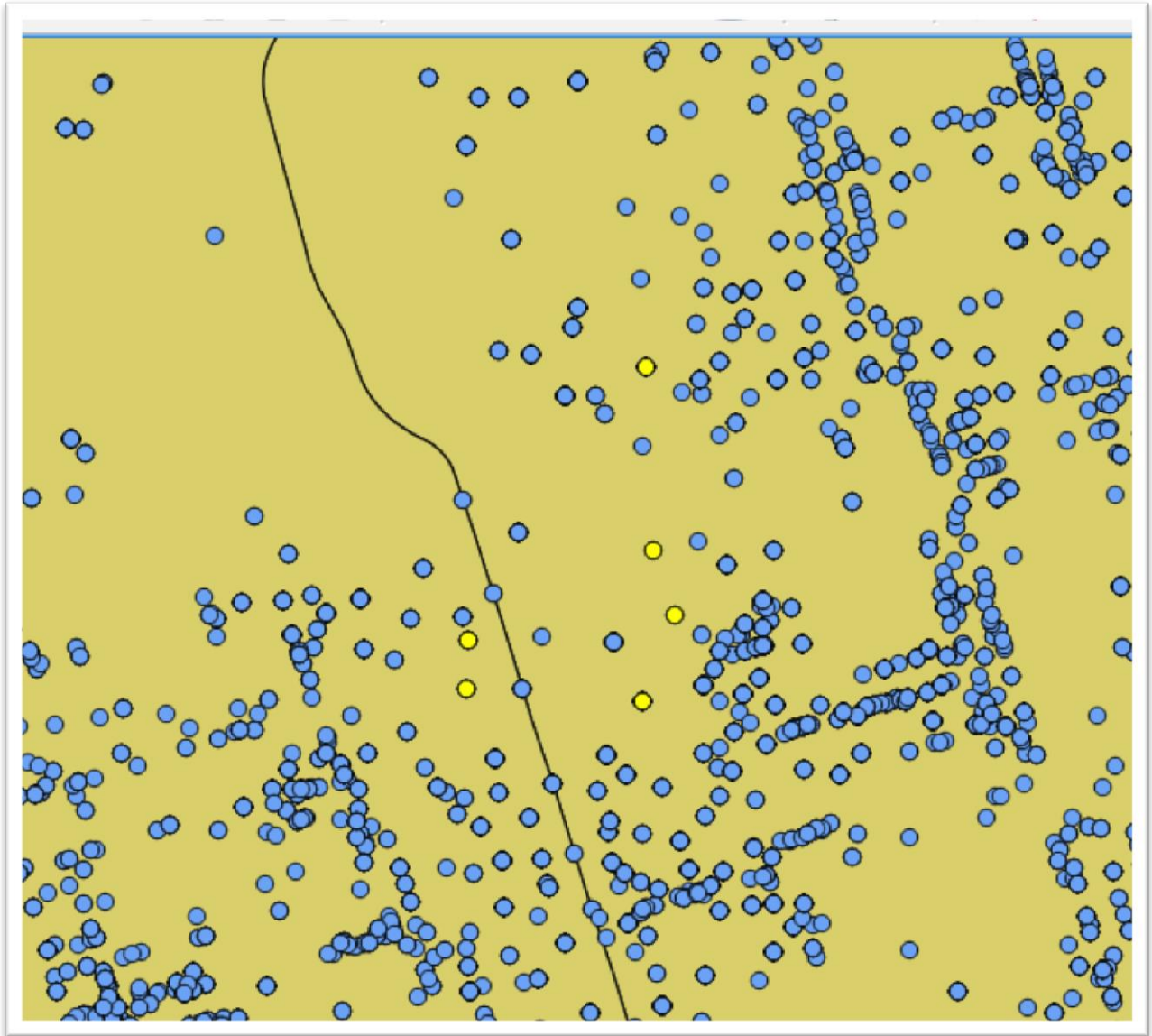
QGIS 2.14.8-Essen - Selecting features

TorontoHospitals :: Features total: 22, filtered: 22, selected: 9

	Status	Hospital	Street	City	Province	Code
0	M	West Park He...	82 Buttonwoo...	Toronto	Ontario	M6M 2J5
1	M	Women's Coll...	76 Grenville S...	Toronto	Ontario	M5S 1B2
2	M	Toronto East ...	825 Coxwell A...	Toronto	Ontario	M4C 3E7
3	M	Toronto West...	399 Bathurst ...	Toronto	Ontario	M5T 2S8
4	M	Toronto Gener...	200 Elizabeth ...	Toronto	Ontario	M5G 2C4
5	M	Sunnybrook H...	2075 Bayview...	Toronto	Ontario	M4N 3M5
6	M	St. Joseph's H...	30 The Queen...	Toronto	Ontario	M6R 1B5
7	M	Salvation Arm...	650 Church St...	Toronto	Ontario	M4Y 2G5
8	M	St Michael's H...	30 Bond Street	Toronto	Ontario	M5B 1W8
9	M	Runnymede H...	625 Runnymede...	Toronto	Ontario	M6S 3A3
10	M	St. John's Reh...	285 Cummer ...	Toronto	Ontario	M2M 2G1
11	M	Providence He...	3276 St. Clair...	Toronto	Ontario	M1L 1W1
12	M	Mount Sinai H...	600 University...	Toronto	Ontario	M5G 1X5
13	M	Princess Marg...	610 University...	Toronto	Ontario	M5G 2M9
14	M	Lyndhurst Hos...	520 Sutherland...	Toronto	Ontario	M4G 3V9
15	M	Queen Street ...	1001 Queen S...	Toronto	Ontario	M6J 1H4
16	M	College Street...	250 College S...	Toronto	Ontario	M5T 1R8
17	M	Hospital For S...	555 University...	Toronto	Ontario	M5G 1X8

Show All Features

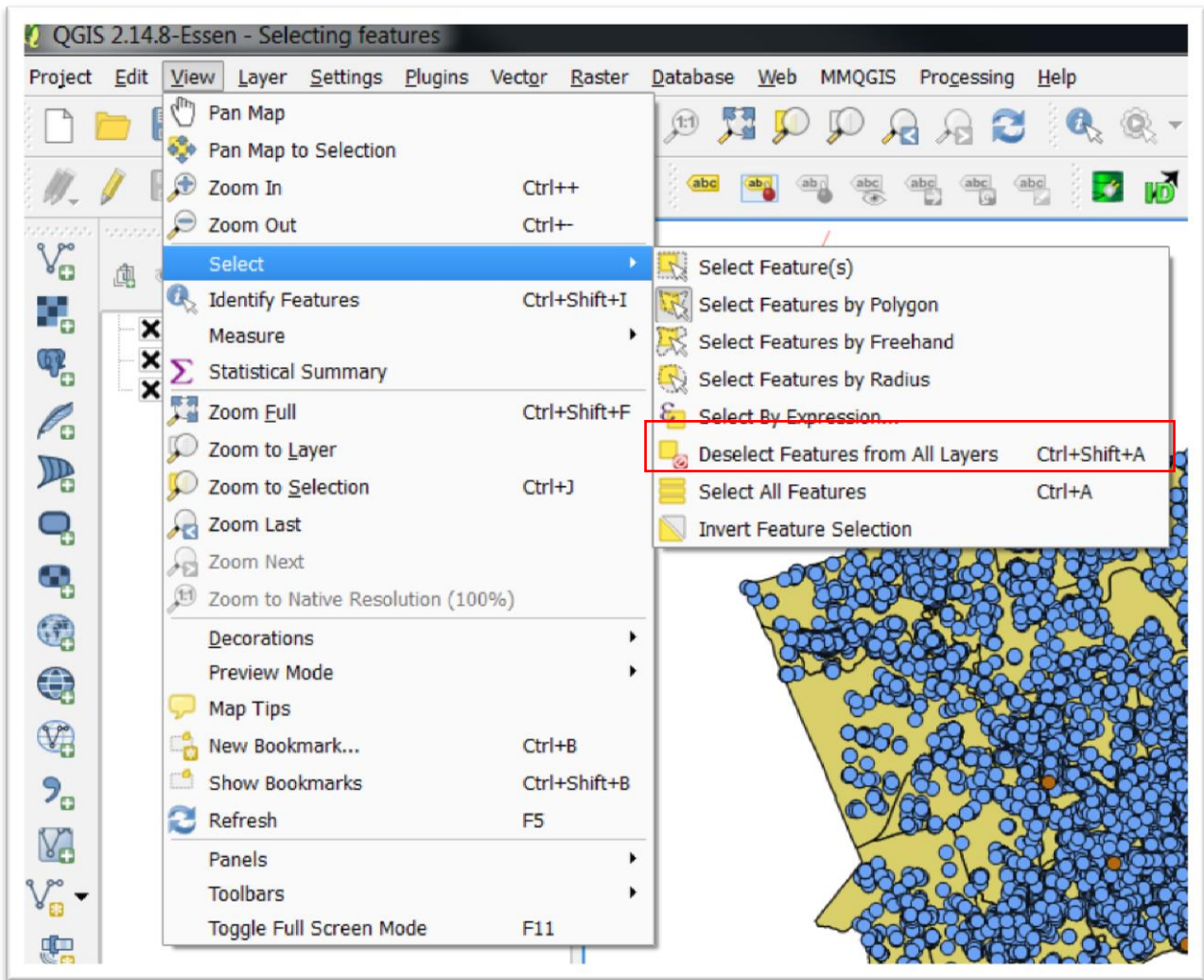
You can also achieve more precision by enlarging the area of your map that contains lots of parking tickets near hospitals, and using polygon, freehand or radius options to define the area of interest.



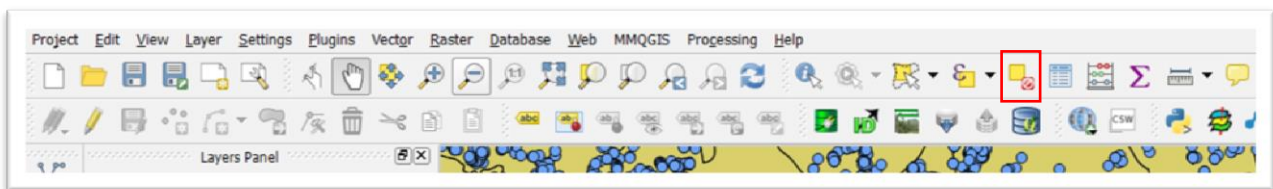
Opening the attribute table reveals that the Women's College Hospital and the Toronto General Hospital Site, University Health Network, are among the institutions close to clusters parking-ticket locations. We will explore ways to accomplish this task with more precision a little later in this tutorial.



To de-select the locations, return to your drop-down menu and select the “Deselect Features from All Layers” option.

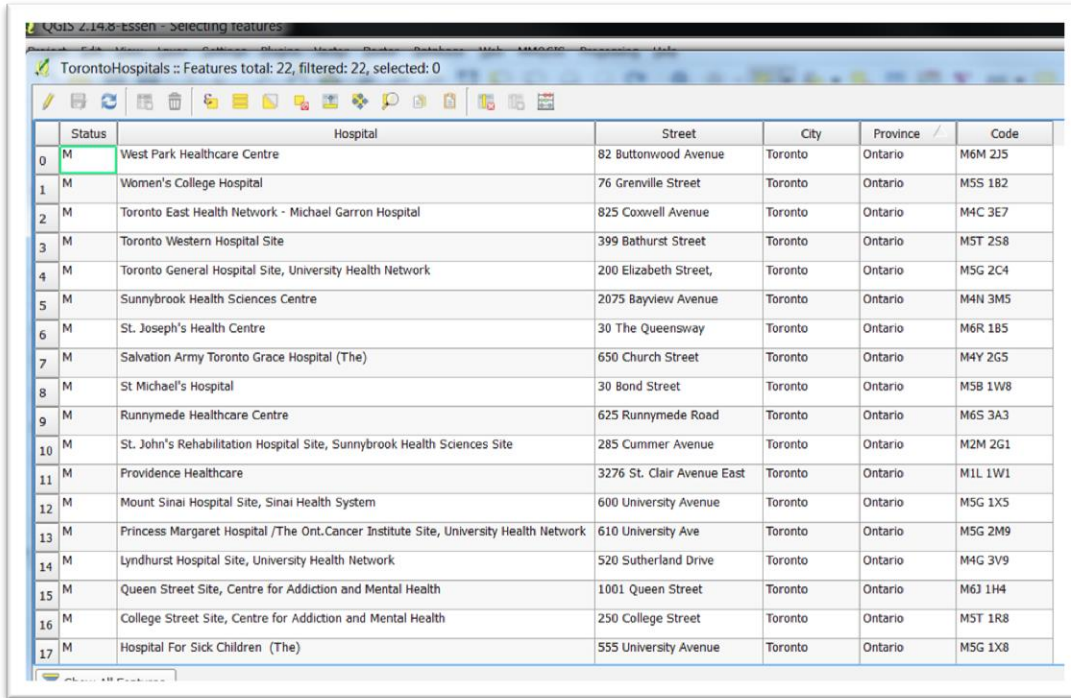


You can also de-select the features by clicking on the same icon located on your menu bar.



## Task 2: Selecting from the attribute table

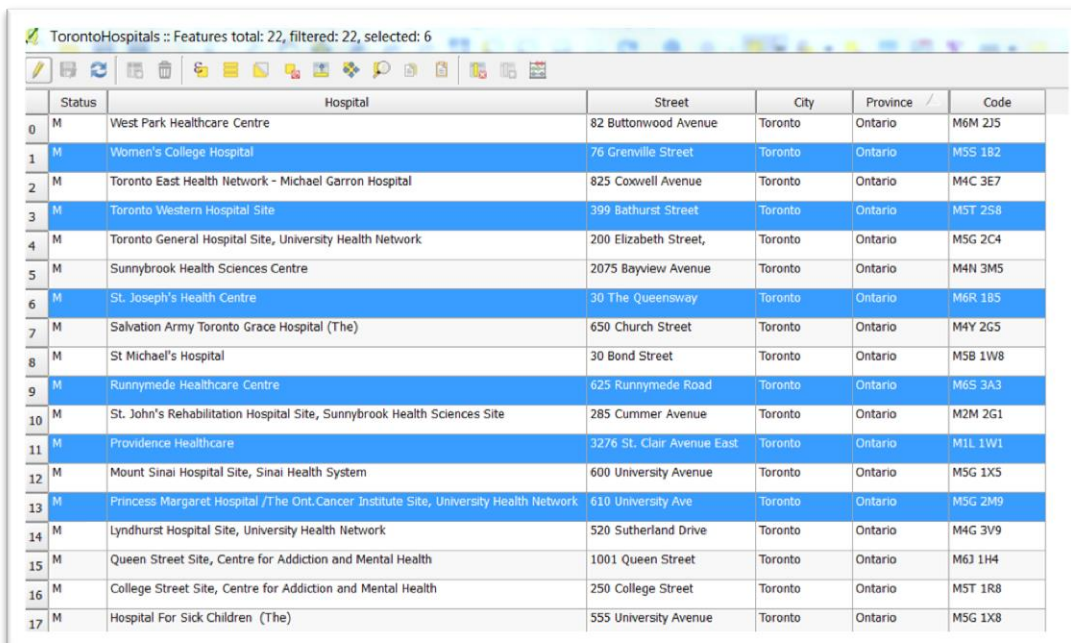
You can also select data by opening the attribute table for a map layer in question, and manually selecting rows in the table.



TorontoHospitals :: Features total: 22, filtered: 22, selected: 0

	Status	Hospital	Street	City	Province /	Code
0	M	West Park Healthcare Centre	82 Buttonwood Avenue	Toronto	Ontario	M6M 2J5
1	M	Women's College Hospital	76 Grenville Street	Toronto	Ontario	M5S 1B2
2	M	Toronto East Health Network - Michael Garron Hospital	825 Coxwell Avenue	Toronto	Ontario	M4C 3E7
3	M	Toronto Western Hospital Site	399 Bathurst Street	Toronto	Ontario	M5T 2S8
4	M	Toronto General Hospital Site, University Health Network	200 Elizabeth Street,	Toronto	Ontario	M5G 2C4
5	M	Sunnybrook Health Sciences Centre	2075 Bayview Avenue	Toronto	Ontario	M4N 3M5
6	M	St. Joseph's Health Centre	30 The Queensway	Toronto	Ontario	M6R 1B5
7	M	Salvation Army Toronto Grace Hospital (The)	650 Church Street	Toronto	Ontario	M4Y 2G5
8	M	St Michael's Hospital	30 Bond Street	Toronto	Ontario	M5B 1W8
9	M	Runnymede Healthcare Centre	625 Runnymede Road	Toronto	Ontario	M6S 3A3
10	M	St. John's Rehabilitation Hospital Site, Sunnybrook Health Sciences Site	285 Cummer Avenue	Toronto	Ontario	M2M 2G1
11	M	Providence Healthcare	3276 St. Clair Avenue East	Toronto	Ontario	M1L 1W1
12	M	Mount Sinai Hospital Site, Sinai Health System	600 University Avenue	Toronto	Ontario	M5G 1X5
13	M	Princess Margaret Hospital /The Ont.Cancer Institute Site, University Health Network	610 University Ave	Toronto	Ontario	M5G 2M9
14	M	Lyndhurst Hospital Site, University Health Network	520 Sutherland Drive	Toronto	Ontario	M4G 3V9
15	M	Queen Street Site, Centre for Addiction and Mental Health	1001 Queen Street	Toronto	Ontario	M6J 1H4
16	M	College Street Site, Centre for Addiction and Mental Health	250 College Street	Toronto	Ontario	M5T 1R8
17	M	Hospital For Sick Children (The)	555 University Avenue	Toronto	Ontario	M5G 1X8

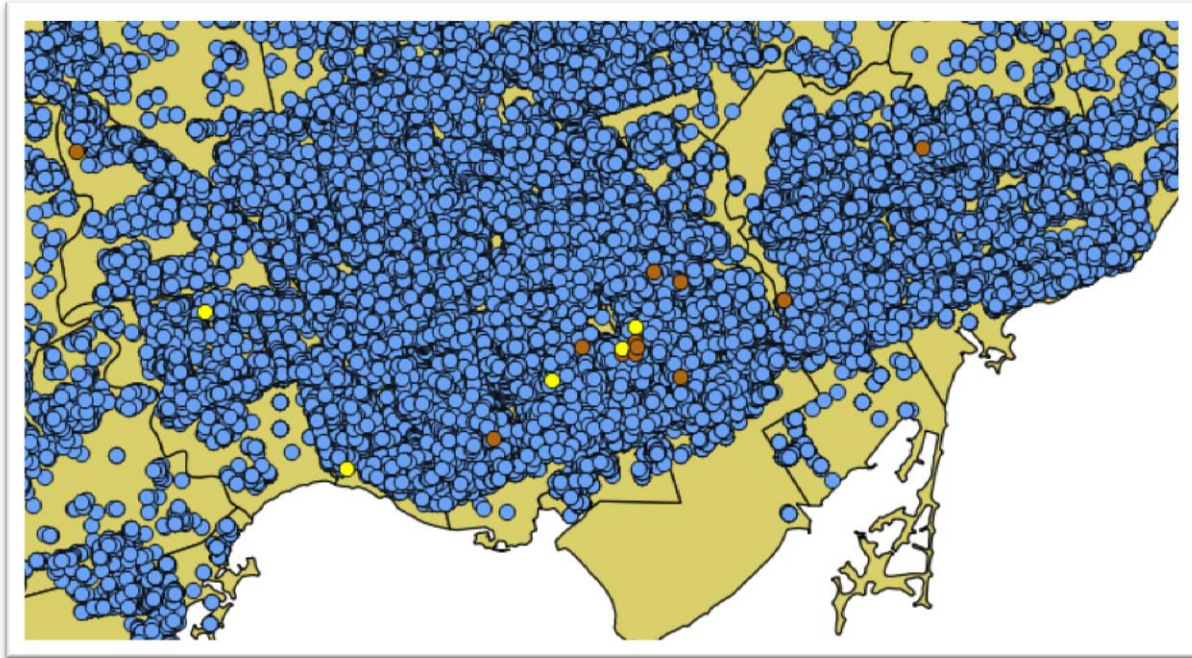
To do this, click on the desired row numbers consecutively, either holding down your “Ctrl” key for PCs or your apple key for Macs.



TorontoHospitals :: Features total: 22, filtered: 22, selected: 6

	Status	Hospital	Street	City	Province /	Code
0	M	West Park Healthcare Centre	82 Buttonwood Avenue	Toronto	Ontario	M6M 2J5
1	M	Women's College Hospital	76 Grenville Street	Toronto	Ontario	M5S 1B2
2	M	Toronto East Health Network - Michael Garron Hospital	825 Coxwell Avenue	Toronto	Ontario	M4C 3E7
3	M	Toronto Western Hospital Site	399 Bathurst Street	Toronto	Ontario	M5T 2S8
4	M	Toronto General Hospital Site, University Health Network	200 Elizabeth Street,	Toronto	Ontario	M5G 2C4
5	M	Sunnybrook Health Sciences Centre	2075 Bayview Avenue	Toronto	Ontario	M4N 3M5
6	M	St. Joseph's Health Centre	30 The Queensway	Toronto	Ontario	M6R 1B5
7	M	Salvation Army Toronto Grace Hospital (The)	650 Church Street	Toronto	Ontario	M4Y 2G5
8	M	St Michael's Hospital	30 Bond Street	Toronto	Ontario	M5B 1W8
9	M	Runnymede Healthcare Centre	625 Runnymede Road	Toronto	Ontario	M6S 3A3
10	M	St. John's Rehabilitation Hospital Site, Sunnybrook Health Sciences Site	285 Cummer Avenue	Toronto	Ontario	M2M 2G1
11	M	Providence Healthcare	3276 St. Clair Avenue East	Toronto	Ontario	M1L 1W1
12	M	Mount Sinai Hospital Site, Sinai Health System	600 University Avenue	Toronto	Ontario	M5G 1X5
13	M	Princess Margaret Hospital /The Ont.Cancer Institute Site, University Health Network	610 University Ave	Toronto	Ontario	M5G 2M9
14	M	Lyndhurst Hospital Site, University Health Network	520 Sutherland Drive	Toronto	Ontario	M4G 3V9
15	M	Queen Street Site, Centre for Addiction and Mental Health	1001 Queen Street	Toronto	Ontario	M6J 1H4
16	M	College Street Site, Centre for Addiction and Mental Health	250 College Street	Toronto	Ontario	M5T 1R8
17	M	Hospital For Sick Children (The)	555 University Avenue	Toronto	Ontario	M5G 1X8

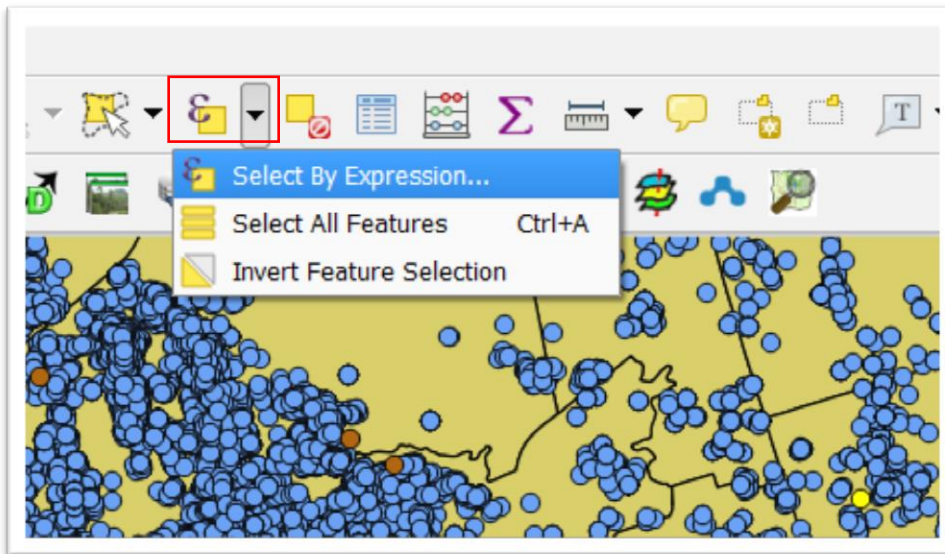
You may choose this option if you are familiar with the dataset, and are interested in specific locations that may have been in the news. For instance, the Ontario government has expressed concerns about hospitals raising revenues by charging patients and visitors to park. You may be interested in a hospital that has been notorious for charging high rates to see if drivers have been taking their chances parking for free on neighboring streets, only to end up with nasty surprises. If you close the attribute table, you can see the features selected on the map.



### **Task 3: Selecting by Attributes.**

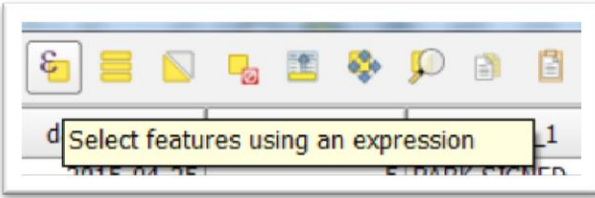
As discussed in Chapter 7 of *The Data Journalist*, a GIS program is a specialized form of database program, one that also works with geographic data. And just as you can use SQL queries in a relational database to select records, you can use SQL in Qgis to select map features.

This feature can be accessed either from the Selection menu.

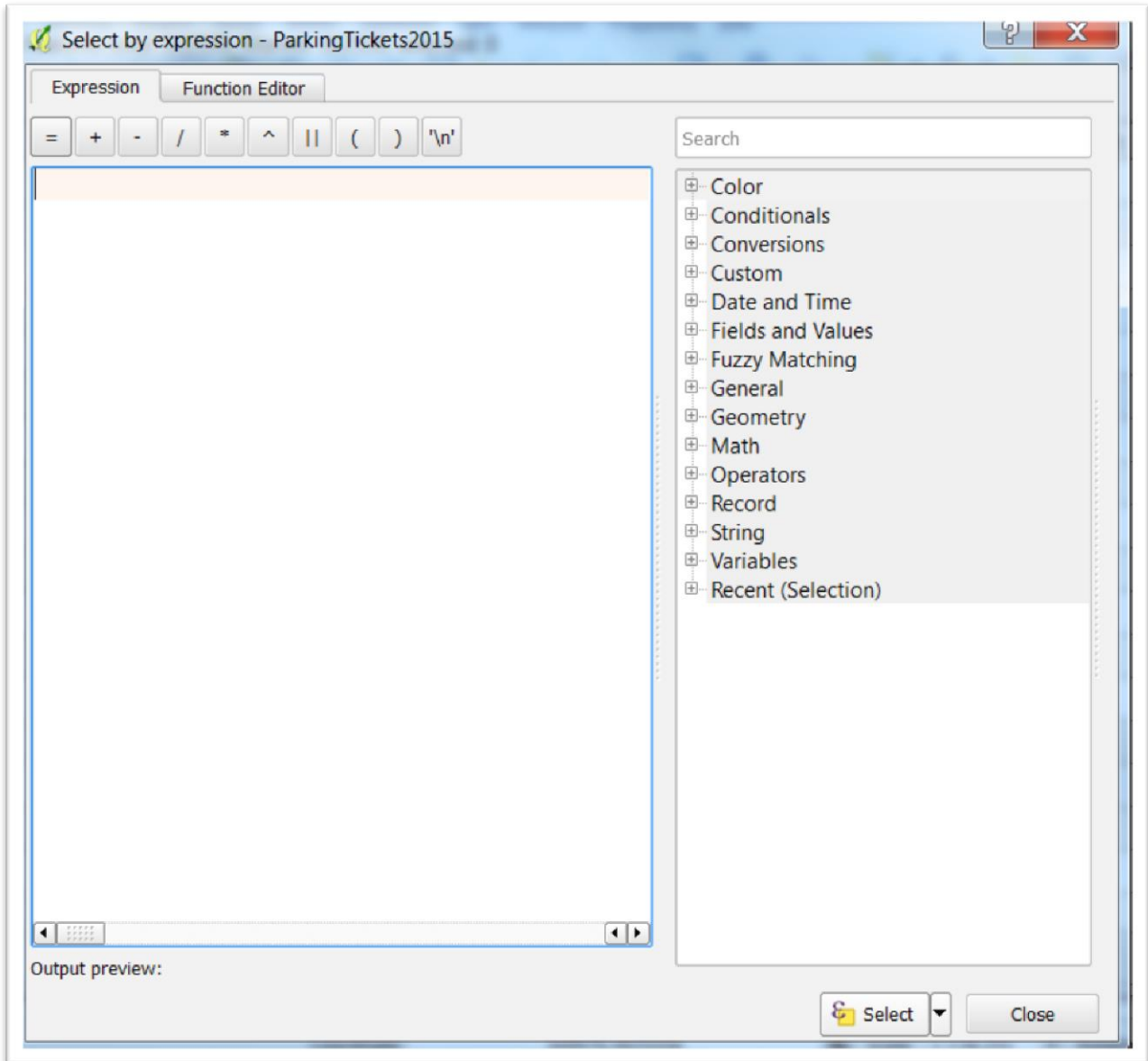


Or you can find the “Select By Expression” option by choosing a layer – in this case, “ParkingTickets2015” – and opening attribute the table.

A screenshot of the QGIS attribute table for the 'ParkingTickets2015' layer. The title bar shows 'ParkingTickets2015 :: Features total: 322539, filtered: 322539, selected: 0'. The table has 9 columns: tag\_number, date\_of\_in, infraction, infracti\_1, set\_fine\_a, time\_of\_in, location1, and lo. The first 14 rows are visible, showing various parking ticket records from 2015-04-25. The 'tag\_number' column contains values like '\*\*\*49268', '\*\*\*51398', etc. The 'date\_of\_in' column is '2015-04-25' for all. The 'infraction' column is '5 PARK-SIGNED ...'. The 'set\_fine\_a' column is '40'. The 'time\_of\_in' column has values like '1152', '1153', etc. The 'location1' column has values like 'NR', 'OPP', etc. The 'lo' column has values like '57 HA', '200 A', etc. The 'Select By Expression...' icon in the toolbar above the table is highlighted with a red rectangle.

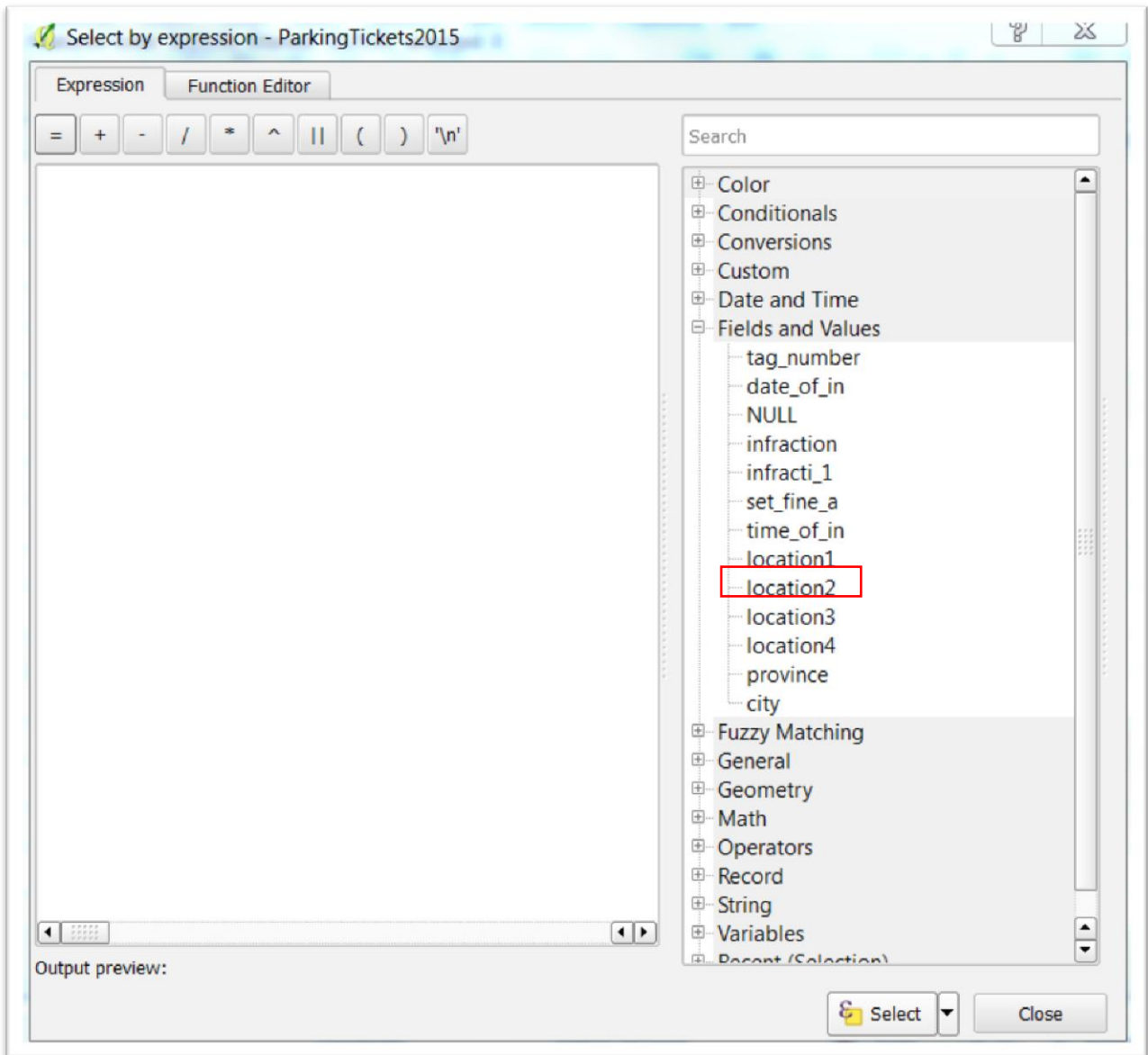


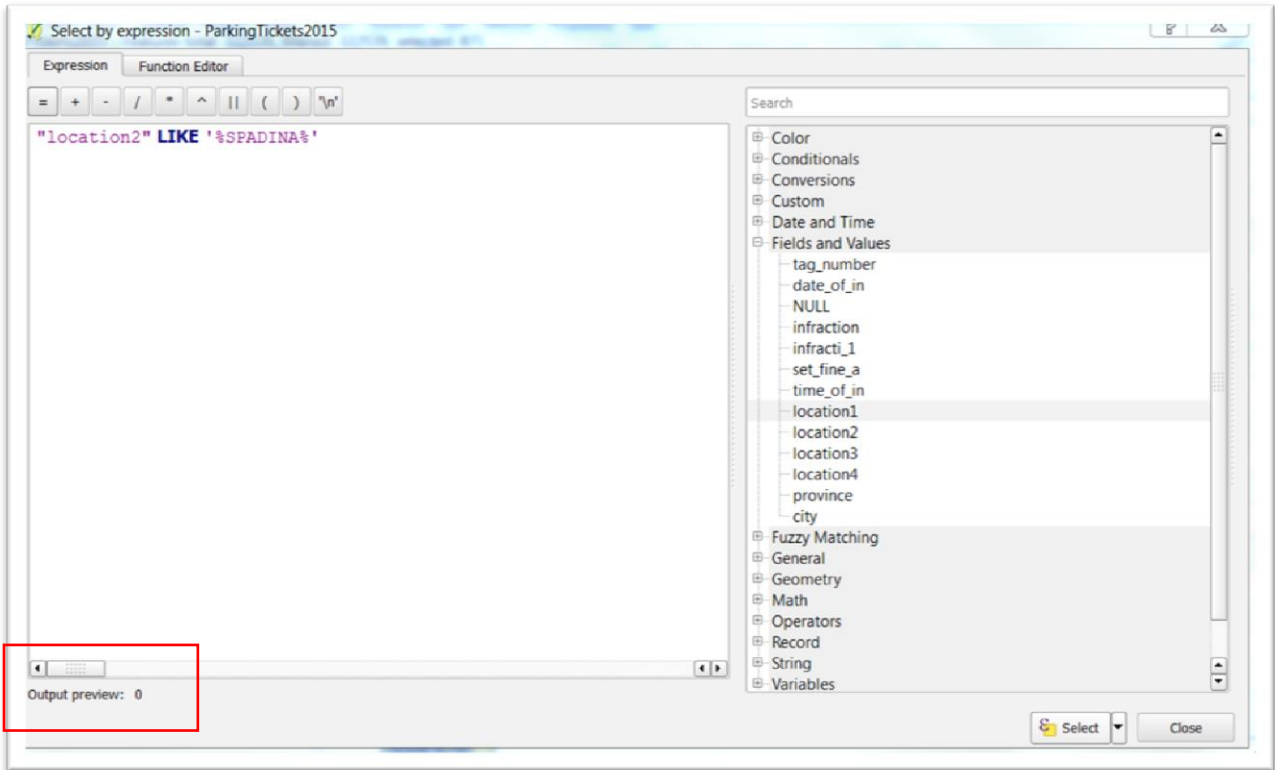
Selecting this option produces a “Select by expression” dialogue box. The drop-down menu on the right contains the columns in the parking-ticket table.



This interface looks similar to the MySQL front-end programs discussed in Chapter 5 on pages 86 to 87. The queries in Qgis – and ArcMap – are similar to the select queries and clauses discussed on pages 90-91.

Select “Fields and Values” from the menu on the right, and double-click on the column “location2”.





If you've read Chapter 5, this query should look familiar. To make sure we understand, let's break it down.

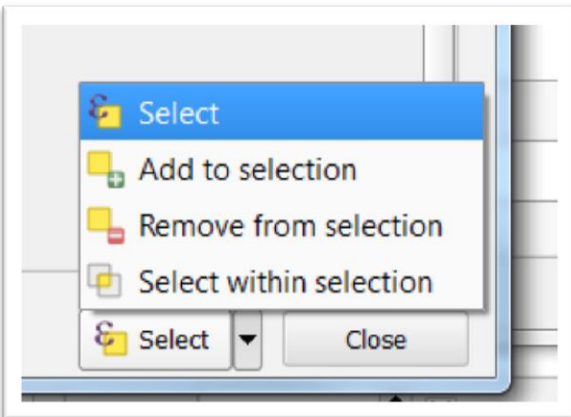
The first part of the SQL statement -- the `SELECT` and `FROM` clauses -- is created automatically. In the above example, we are selecting all records from the column "location2". We've used the `LIKE` operator to identify addresses that contain the name "SPADINA", which should give us all the parking locations on that street.

We've used the "%" as our wild card, and made sure that the expression is in single quotes. Statements in the `WHERE` clause are case-sensitive. So, for this example make sure that the term `SPADINA` is in caps.

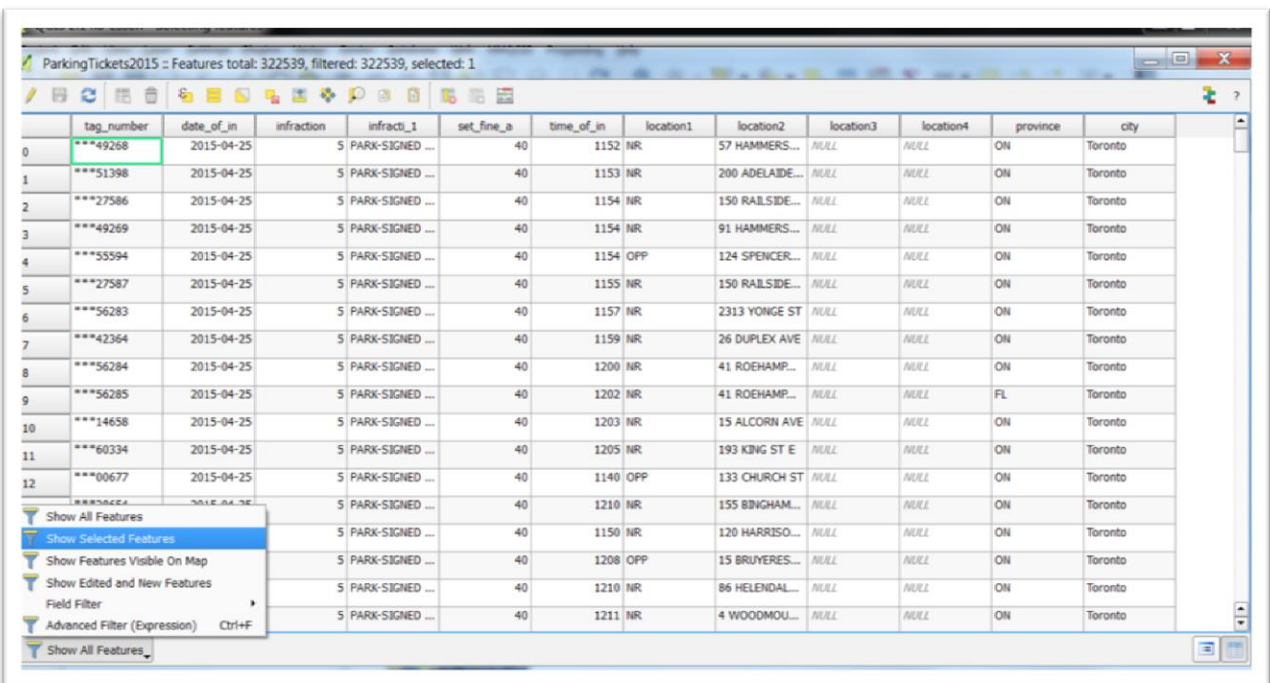
Neglecting to use single quotes, produces an error message instead of the "Output preview" at the bottom left of the dialogue box in the screen grab above.

All standard operators, including the Boolean operators `AND`, `OR` and `NOT`, are available for queries.

Select the arrow to the right of the “Select” tab at the bottom of the dialogue box.



Choose “Select”, and then close the dialogue box to return to the attribute table. To ensure that the selection has been made, click on the arrow to the right of the “Show All Features” tab at the attribute table’s bottom left-hand corner, and select the “Show Selected Features” option.



	tag_number	date_of_in	infraction	infracti_1	set_fine_a	time_of_in	location1	location2	location3	location4	province	city
0	***49268	2015-04-25		5 PARK-SIGNED ...	40	1152 NR	57 HAMMERS...	NULL	NULL	NULL	ON	Toronto
1	***51398	2015-04-25		5 PARK-SIGNED ...	40	1153 NR	200 ADELAIDE...	NULL	NULL	NULL	ON	Toronto
2	***27586	2015-04-25		5 PARK-SIGNED ...	40	1154 NR	150 RAILSIDE...	NULL	NULL	NULL	ON	Toronto
3	***49269	2015-04-25		5 PARK-SIGNED ...	40	1154 NR	91 HAMMERS...	NULL	NULL	NULL	ON	Toronto
4	***55594	2015-04-25		5 PARK-SIGNED ...	40	1154 OPP	124 SPENCER...	NULL	NULL	NULL	ON	Toronto
5	***27587	2015-04-25		5 PARK-SIGNED ...	40	1155 NR	150 RAILSIDE...	NULL	NULL	NULL	ON	Toronto
6	***56283	2015-04-25		5 PARK-SIGNED ...	40	1157 NR	2313 YONGE ST	NULL	NULL	NULL	ON	Toronto
7	***42364	2015-04-25		5 PARK-SIGNED ...	40	1159 NR	26 DUPLEX AVE	NULL	NULL	NULL	ON	Toronto
8	***56284	2015-04-25		5 PARK-SIGNED ...	40	1200 NR	41 ROEHAMP...	NULL	NULL	NULL	ON	Toronto
9	***56285	2015-04-25		5 PARK-SIGNED ...	40	1202 NR	41 ROEHAMP...	NULL	NULL	NULL	FL	Toronto
10	***14658	2015-04-25		5 PARK-SIGNED ...	40	1203 NR	15 ALCORN AVE	NULL	NULL	NULL	ON	Toronto
11	***60334	2015-04-25		5 PARK-SIGNED ...	40	1205 NR	193 KING ST E	NULL	NULL	NULL	ON	Toronto
12	***00677	2015-04-25		5 PARK-SIGNED ...	40	1140 OPP	133 CHURCH ST	NULL	NULL	NULL	ON	Toronto
	***00677	2015-04-25		5 PARK-SIGNED ...	40	1210 NR	155 BINGHAM...	NULL	NULL	NULL	ON	Toronto
	***00677	2015-04-25		5 PARK-SIGNED ...	40	1150 NR	120 HARRISO...	NULL	NULL	NULL	ON	Toronto
	***00677	2015-04-25		5 PARK-SIGNED ...	40	1208 OPP	15 BRUYERES...	NULL	NULL	NULL	ON	Toronto
	***00677	2015-04-25		5 PARK-SIGNED ...	40	1210 NR	86 HELENDAL...	NULL	NULL	NULL	ON	Toronto
	***00677	2015-04-25		5 PARK-SIGNED ...	40	1211 NR	4 WOODMOU...	NULL	NULL	NULL	ON	Toronto



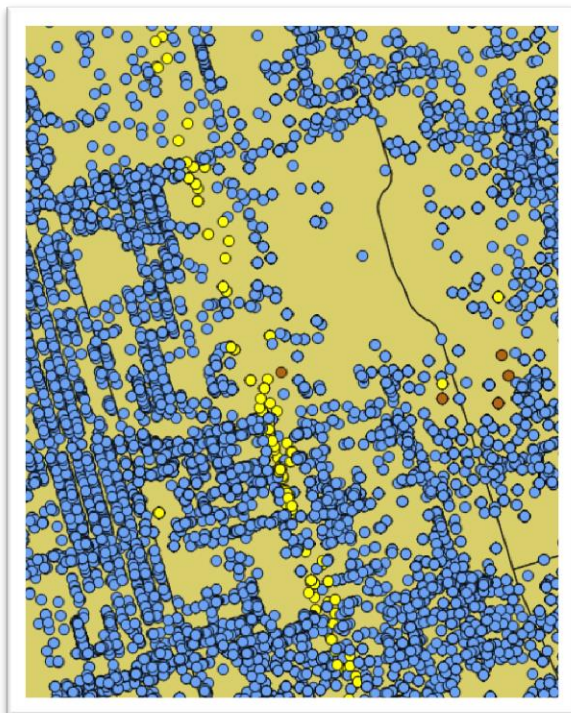
ParkingTickets2015 :: Features total: 322539, filtered: 871, selected: 871

	tag_number	date_of_in	infraction	infractions	set_fine_a	time_of_in	location1	location2	loc
297311	***94037	2015-03-30	S	PARK-SIGNED HWY-PROHIBIT DY/TM	40	1054	NR	197 SPADINA AVE	NULL
297468	***38926	2015-03-30	S	PARK-SIGNED HWY-PROHIBIT DY/TM	40	1242	NR	464 SPADINA RD	NULL
297474	***79637	2015-03-30	S	PARK-SIGNED HWY-PROHIBIT DY/TM	40	1248	OPP	411 SPADINA RD	NULL
297774	***61642	2015-03-30	S	PARK-SIGNED HWY-PROHIBIT DY/TM	40	1645	NR	362 SPADINA AVE	NULL
298333	***38950	2015-03-31	S	PARK-SIGNED HWY-PROHIBIT DY/TM	40	1230	NR	417 SPADINA RD	NULL
298537	***61669	2015-03-31	S	PARK-SIGNED HWY-PROHIBIT DY/TM	40	1517	NR	362 SPADINA AVE	NULL
300110	***33943	2015-04-01	S	PARK-SIGNED HWY-PROHIBIT DY/TM	40	1247	NR	383 SPADINA RD	NULL
301437	***79720	2015-04-02	S	PARK-SIGNED HWY-PROHIBIT DY/TM	40	1027	OPP	389 SPADINA RD	NULL
301941	***61743	2015-04-02	S	PARK-SIGNED HWY-PROHIBIT DY/TM	40	1622	NR	362 SPADINA AVE	NULL
302403	***31025	2015-04-03	S	PARK-SIGNED HWY-PROHIBIT DY/TM	40	1540	NR	408 SPADINA RD	NULL
302956	***33998	2015-04-04	S	PARK-SIGNED HWY-PROHIBIT DY/TM	40	1233	NR	410 SPADINA RD	NULL
303563	***27256	2015-04-05	S	PARK-SIGNED HWY-PROHIBIT DY/TM	40	1503	NR	620 SPADINA AVE	NULL
304351	***95195	2015-04-07	S	PARK-SIGNED HWY-PROHIBIT DY/TM	40	1147	NR	464 SPADINA RD	NULL
306236	***90577	2015-04-09	S	PARK-SIGNED HWY-PROHIBIT DY/TM	40	1156	NR	410 SPADINA RD	NULL
306446	***90594	2015-04-09	S	PARK-SIGNED HWY-PROHIBIT DY/TM	40	1449	NR	410 SPADINA RD	NULL
306487	***79749	2015-04-09	S	PARK-SIGNED HWY-PROHIBIT DY/TM	40	1526	OPP	387 SPADINA RD	NULL
307551	***99667	2015-04-10	S	PARK-SIGNED HWY-PROHIBIT DY/TM	40	1902	NR	487 SPADINA CRES	NULL
***81685	2015-04-11	S	PARK-SIGNED HWY-PROHIBIT DY/TM	40	1242	NR	464 SPADINA RD	NULL	

Show Selected Features

The number of cars that got nabbed on Spadina was 871. If you want to once again see all the features in the attribute table, you can select the “Show All Features” option. Don’t worry, though. The selections you obtained using your expression remain.

Close the attribute table and return to the map.



You can see the selected features along Spadina highlighted in yellow.

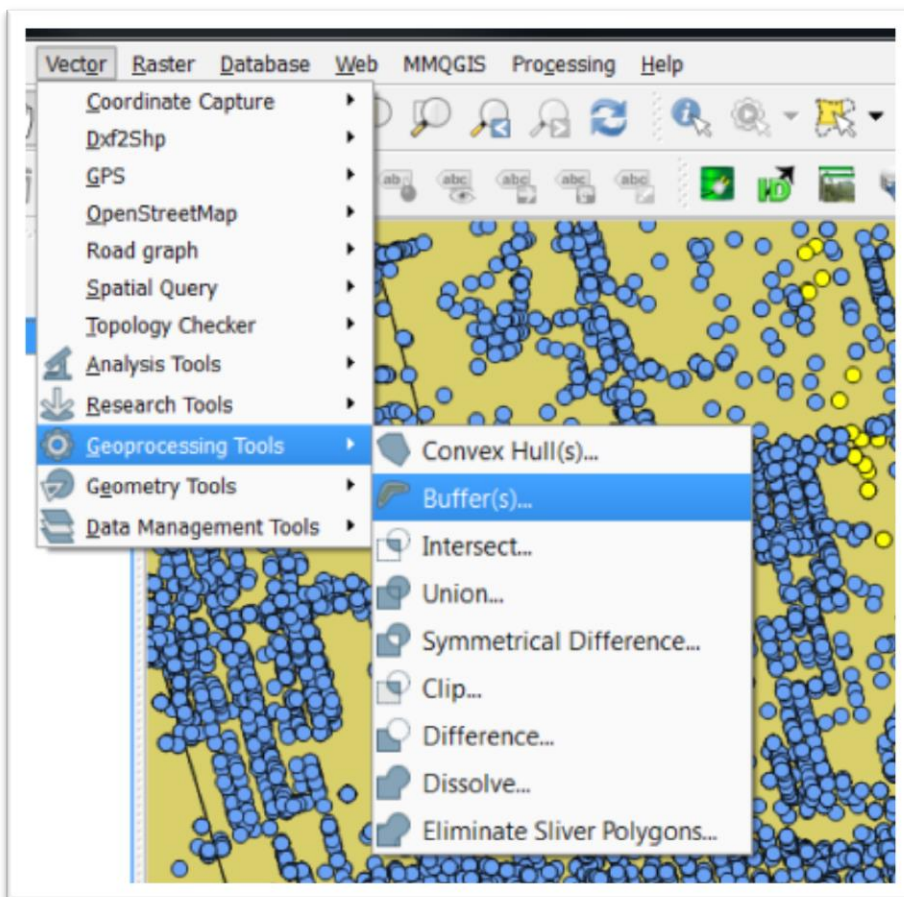
The selected features can be copied, put into a layer file, and exported to a new map layer, in the same way other selections can be.

## Select by Location

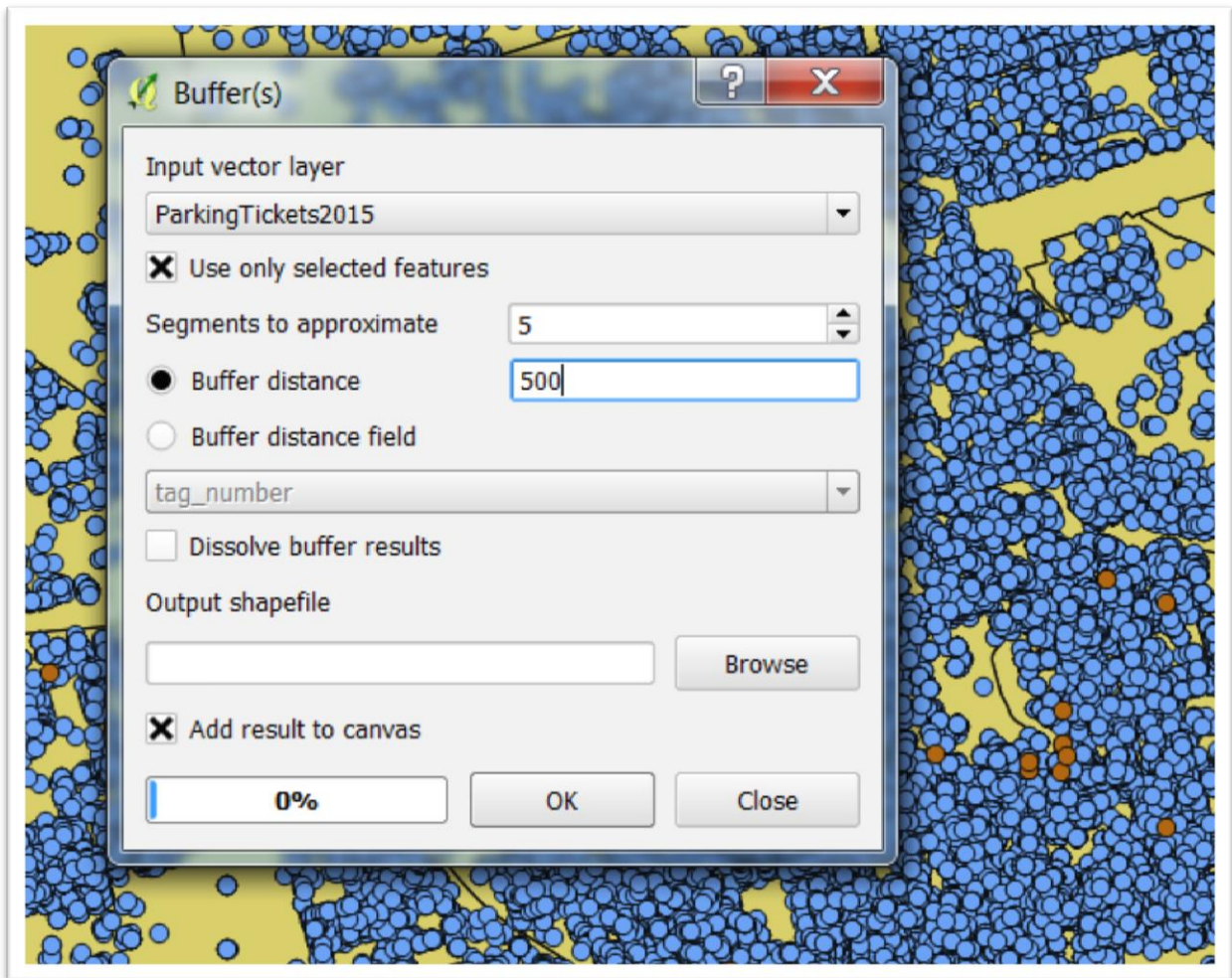
Select by location selects features based on their relationship to features in another map layer in the data frame. Features are selected from what is called the **target** layer, depending on their relationship to features in the **source** layer.

The map document used as an illustration for this tutorial which shows the locations of certain parking tickets in the City of Toronto, and of hospitals.

Select the “TorontoHospitals” layer and go to the “Vector” section in the menu above.



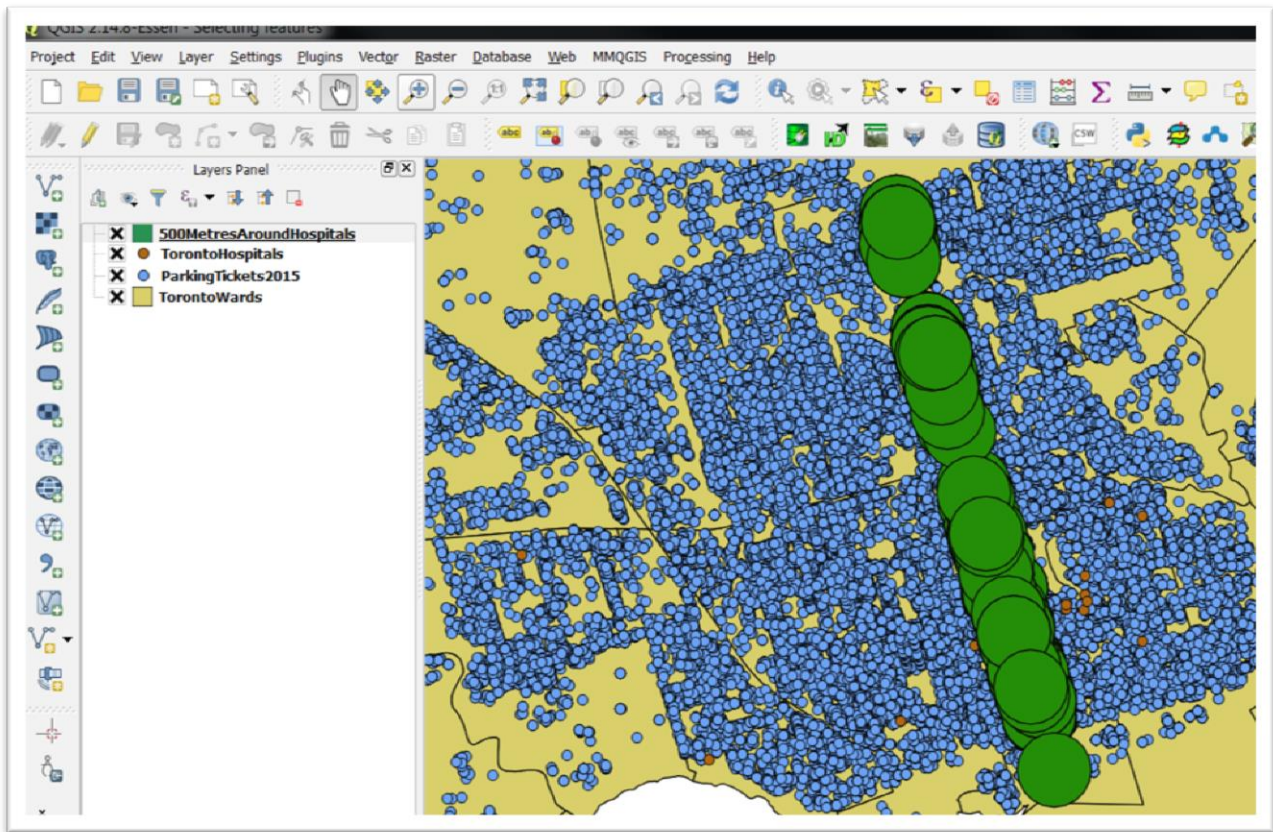
Go to “Geoprocessing Tools” and “Buffers”. We cover buffering in more detail in the 7\_10\_BufferinginQgis tutorial, and in Chapter 7 on page 155.



Toronto hospitals is your input vector layer.

To the right of “Buffer distance”, enter 500 (measures in metres). Because the Toronto parking tickets dataset is so large, let’s only create buffers around those locations we’ve selected along Spadina. So, make sure the box to the left of “Use only selected features” is checked.

QGIS will create a new layer.



As you can see, the selected features appear on the map.

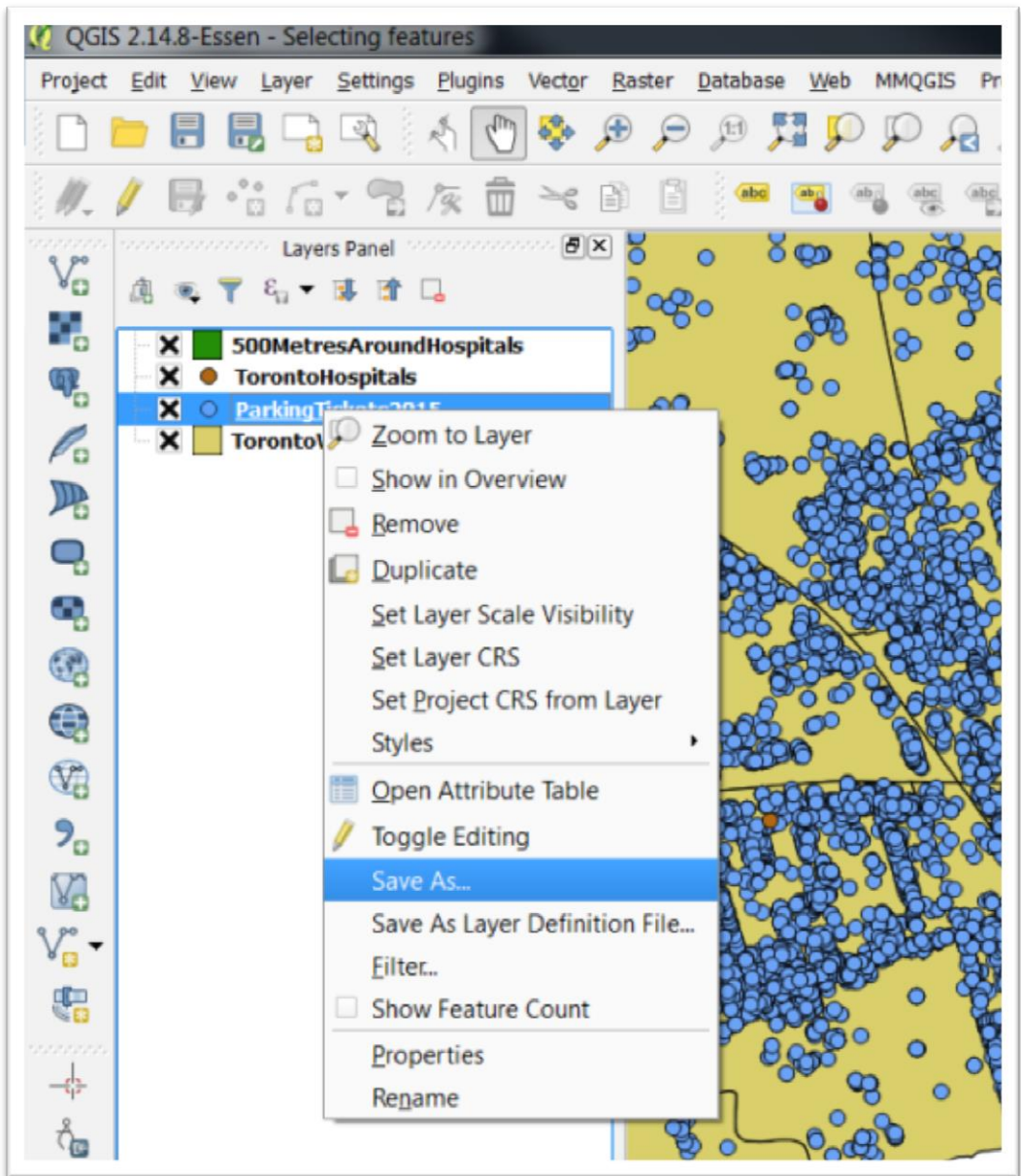
Select by location, like any tool that relies on area or distances, is affected by the coordinate system used on the map.

### **Task 5: Working with Selected Features**

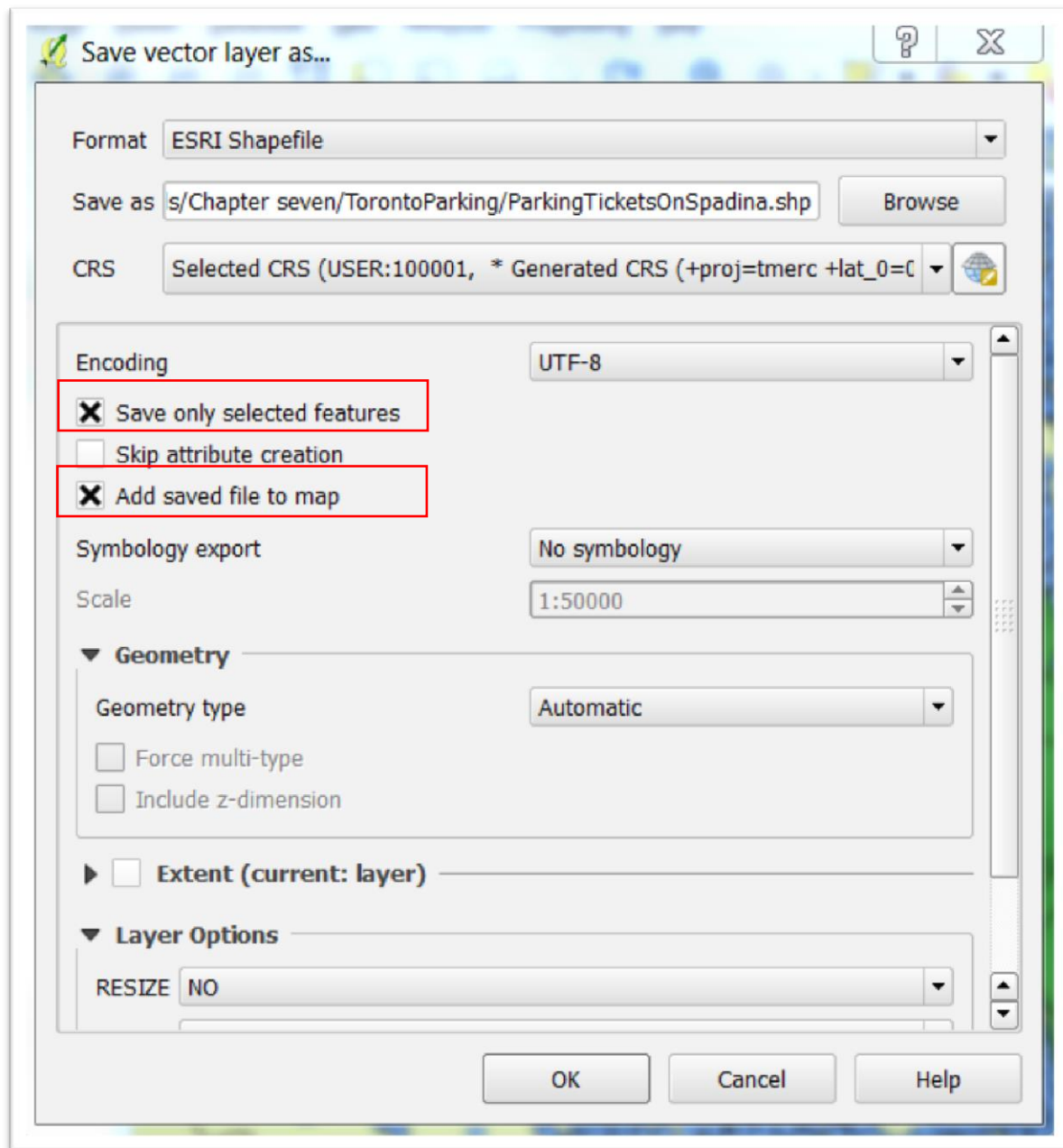
Once you have selected features, you are not limited to just looking at them.

So, let's say that we wanted to create a layer of parking ticket locations on Spadina. We could save a layer that has only those coordinates.

Right-click on the layer name in the table of contents, and choose the "Save as" option.



This produces a dialogue box.

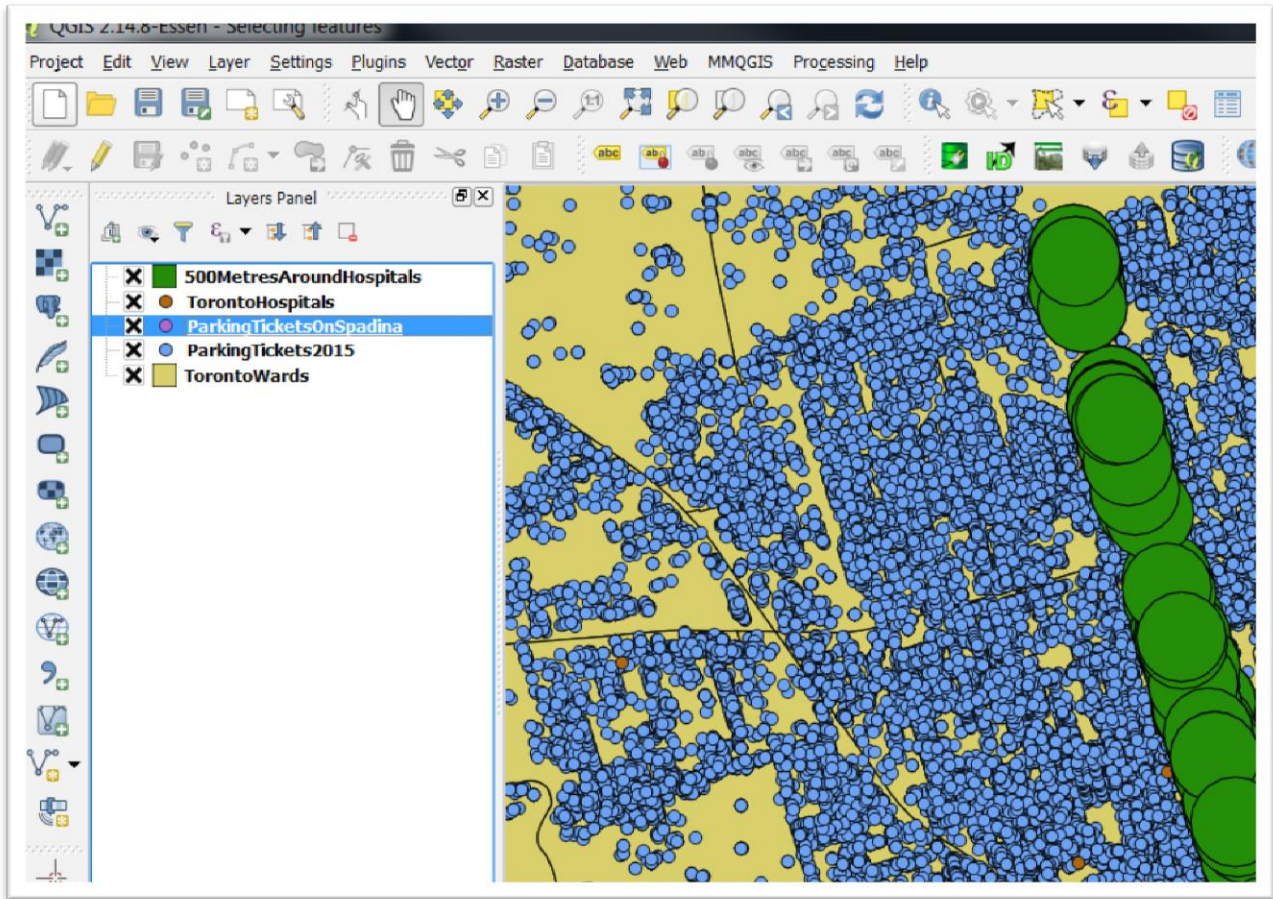


Call the new layer something like “ParkingTicketsOnSpadina”.

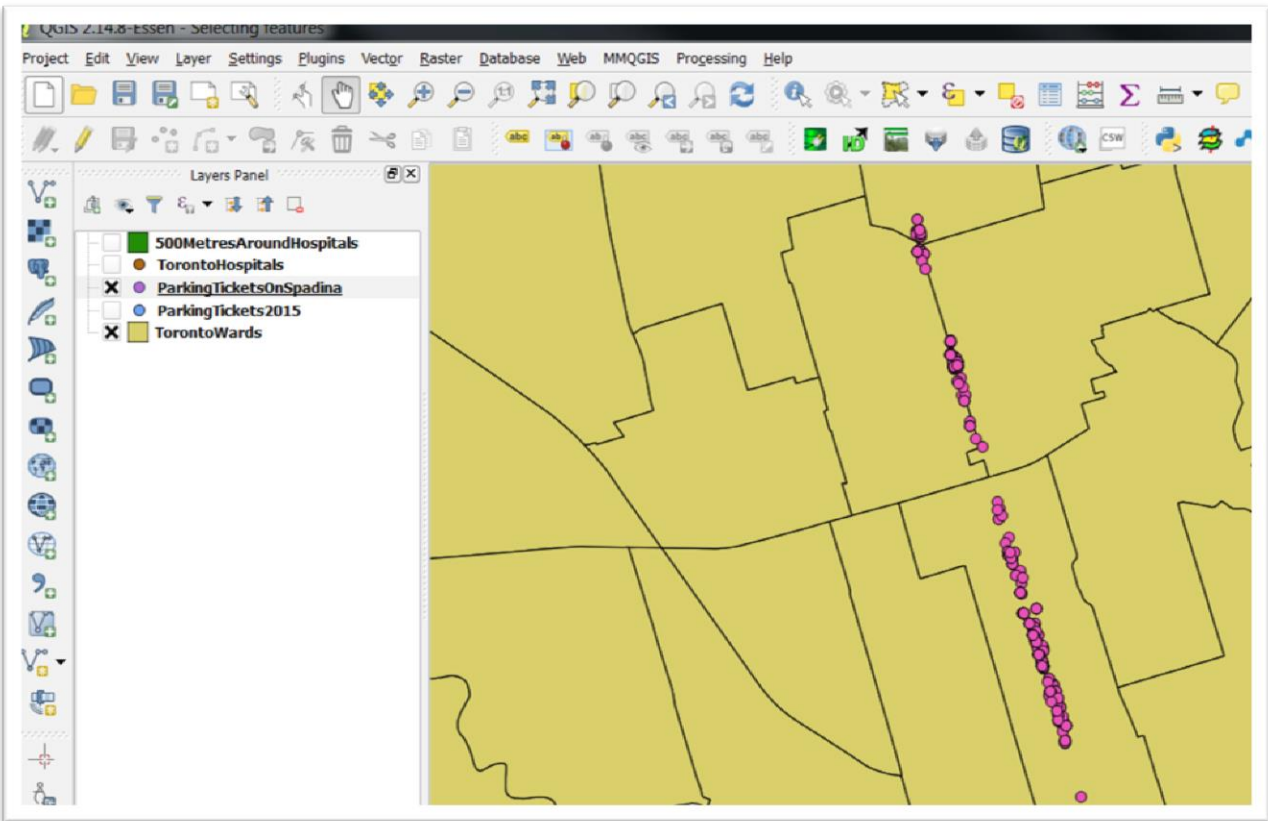
Browse to the location on your hard drive where you want to save the file, which should be in the same folder as the other layers for this tutorial.

Make sure the box to the left of the “Save only selected features” is selected, as well as the box to the left of the “Add saved file to map.”

Hit OK.



Now deselect the other layers to see the new one in the data frame to the right.



Selecting features is an excellent way to pull vital pieces of information out of your maps. As we've learned in *The Data Journalist*, the deeper you drill into the data, the more stories you'll find.