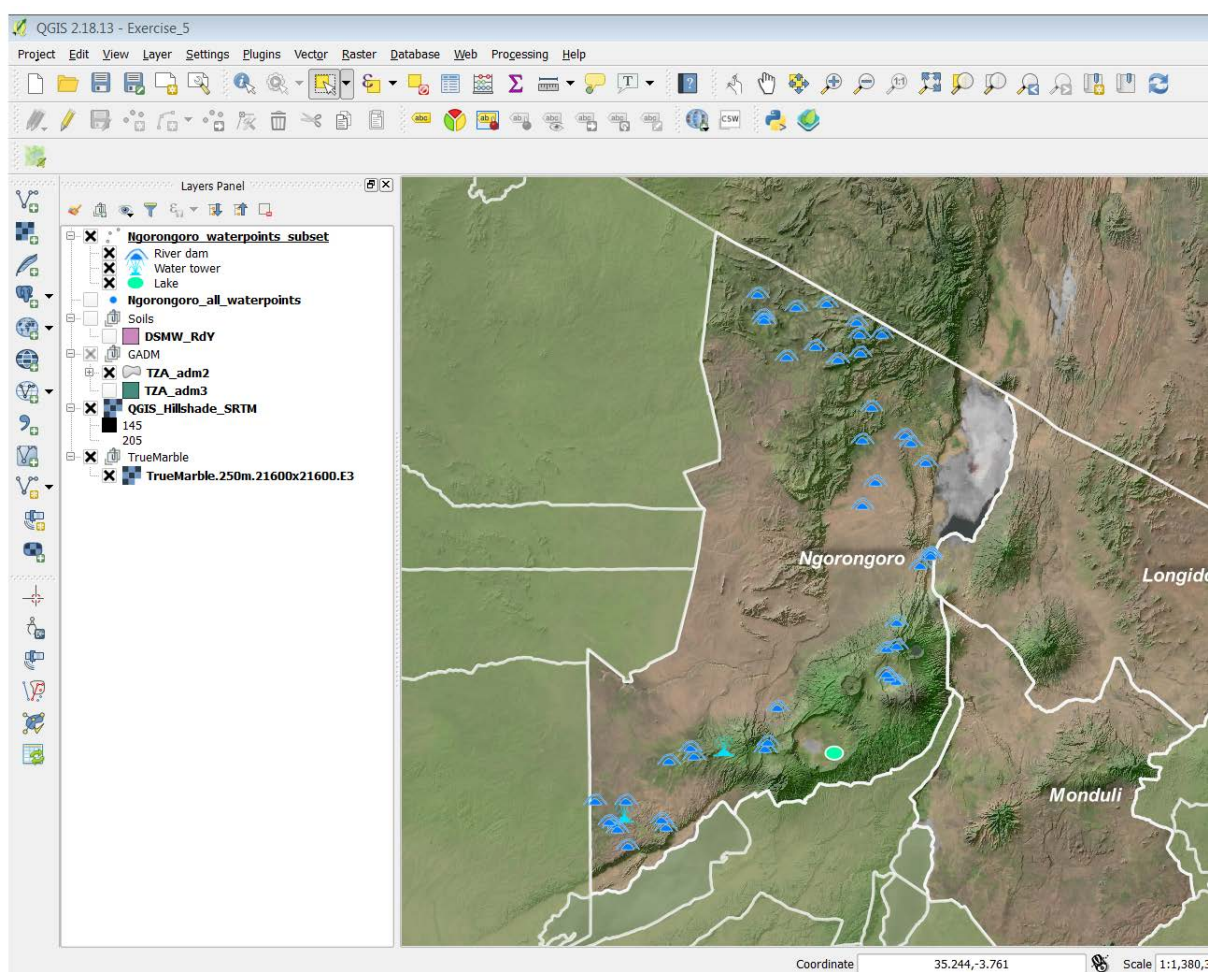


# Exercise 5 – Query and Analysis

**Objectives:** The purpose of this exercise is to become familiar with Selections and Queries within QGIS. This exercise will use data extracted from Open Street Map for a region in Tanzania, Ngorongoro.

## Part 1 - Selections

1. Open **Exercise\_5.qgs** from here:  
C:\Intro\_Quantum\_GIS\Exercises
  - The map shows a subset of waterpoints in Ngorongoro that have been extracted from OSM. These have been symbolised and queried to show only certain types of water points. (Note, this uses the same data-defined query process as demonstrated in exercise 3, i.e. labelling particular features in particular ways – a powerful feature of QGIS – feel free to explore and subset further types of waterpoint.)



2. View all the waterpoints in the project,
  - switch off *Ngorongoro\_waterpoints\_subset* and switch on *Ngorongoro\_all\_waterpoints*



3. Use the **Identify Features** tool to click on a water point. The attributes for that water point will be returned.
  - Remember to make the **Ngorongoro\_all\_waterpoints** layer active by selecting it in the Layers window.



4. Click on the **Select features by** tool and experiment with the different selection methods available from the dropdown.
  - Try selecting a number of features, then holding down the **Shift** key on the keyboard while selecting other features. What happens?
  - Now, with a number of features selected, hold down the **Ctrl** key and click on or draw a box around (depending on the selection tool) one or more of the currently selected features, but not all. What happens?
  - If you open the Attribute table for the **Ngorongoro\_all\_waterpoints** layer, you will see the currently selected features are also highlighted.

Ngorongoro\_waterpoints :: Features total: 118, filtered: 118, selected: 5

	access	landuse	man_made	name	natural	operator	water	waterway	notes	salt	id	fenced
25	unknown			Embulul				dam		no	578069	no
26											578621	
27				Masekggji	spring					low	578740	no
28	open		water_tank	Kakesio		government				high	579361	no
29	open		water_tower	Kakesio DP		government				high	579362	no
30				Kakesio Cattle Trough							579364	
31				ItaananOludo				dam			580394	no
32								dam			602918	
33								dam			602919	
34				Itulele				dam		low	604700	

Show All Features

5. Explore the different selection methods available within the attribute table.
  - Single click on the number on the left of a row in the attribute table to select that feature.
  - Select one feature, hold down the **Shift** key and click on another feature. You will see that all the rows between the two you have clicked on are now selected.
  - Now hold down the **Ctrl** key and click on a number of features. You can use this method to select/unselect multiple features which aren't next to each other.
  - Make sure some features are selected in the attribute table and press the **Invert**



**Selection** button.

- Now select the **Show selected only** option from the drop-down menu in the bottom left of the Attribute table. Only the selected features will be visible on the attribute table, but they will all still be visible on the map canvas.

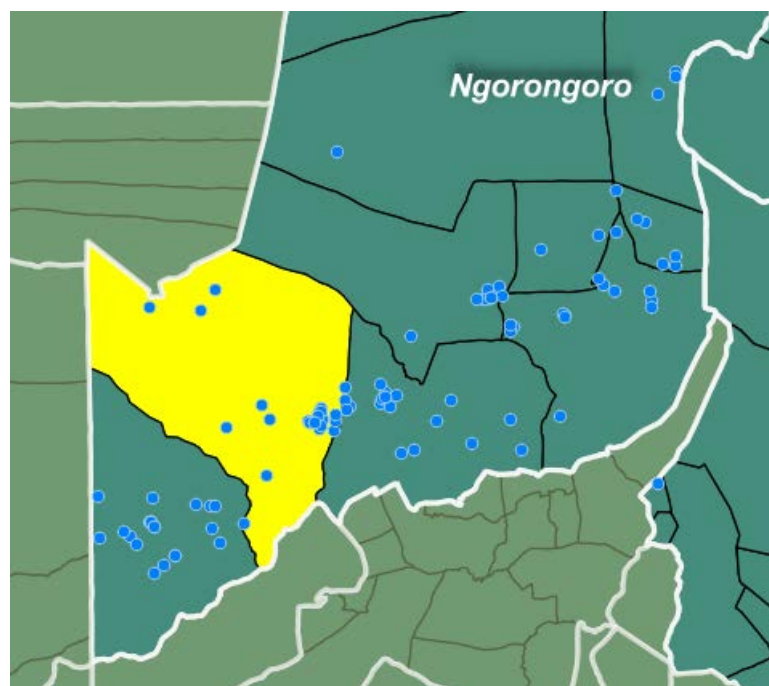
6. Try using the **Zoom to selected rows** tool from within the main QGIS window
  - Make sure you have some features selected before you use this tool.



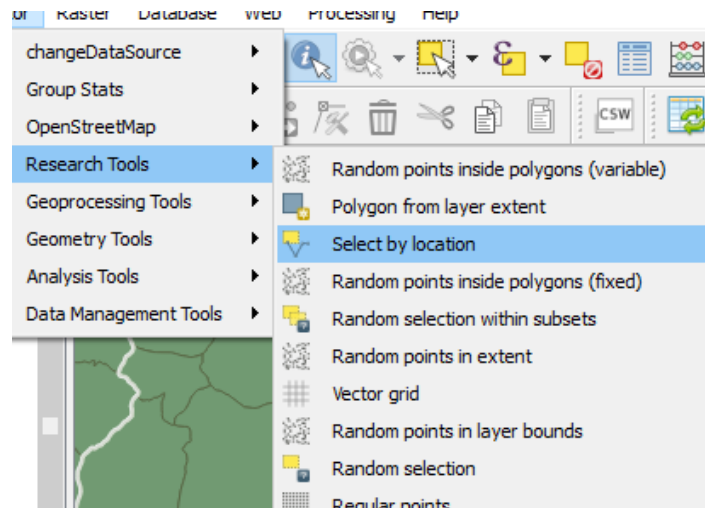
## Part 2 – Spatial Queries

A spatial query chooses particular records from a data set, based on where the records lie on the map or what their geographic relationship is to other objects.

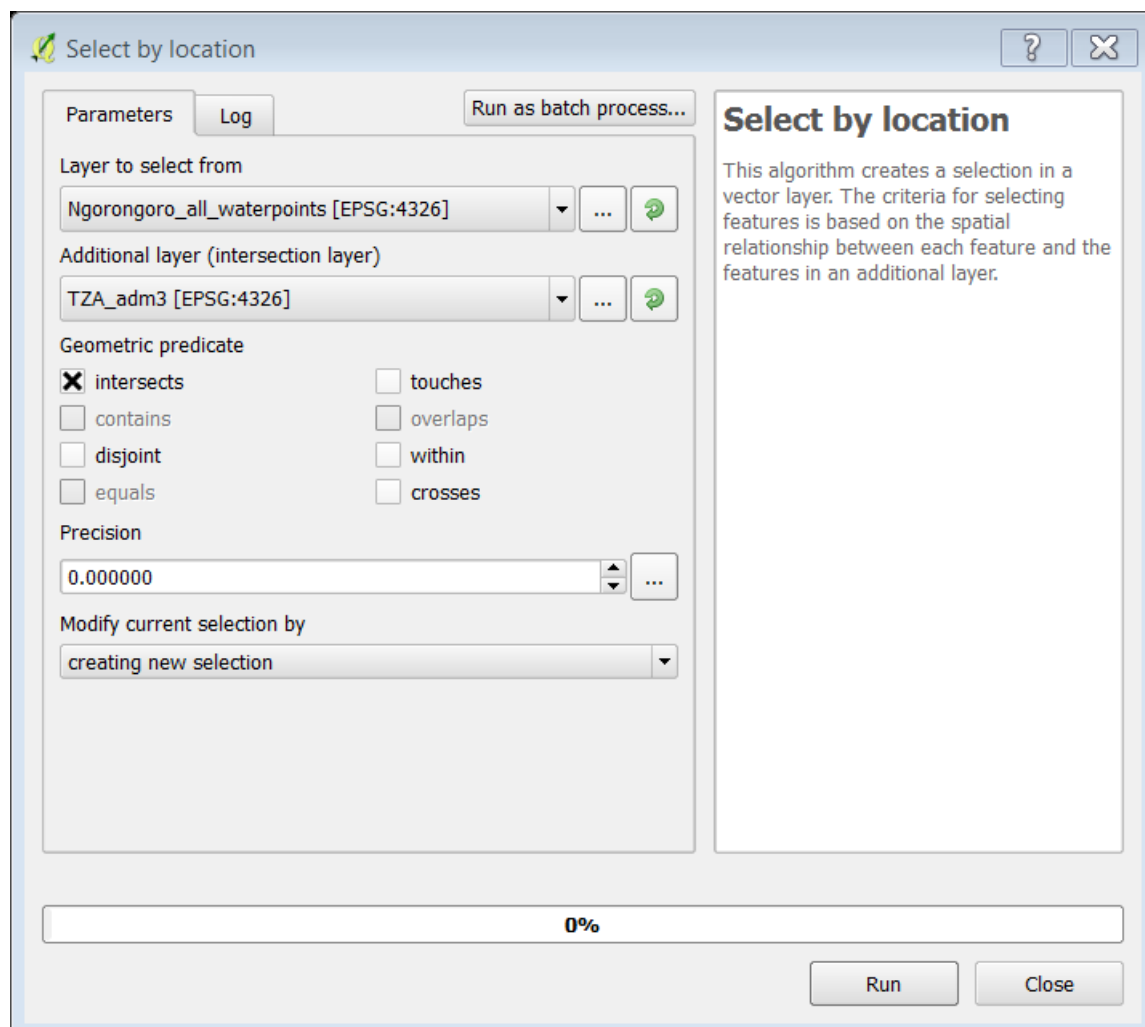
1. Switch the *TZA\_adm3* layer on to display the Admin level 3 areas. We are interested in Endulen. In this part of the exercise we are going to select all waterpoints within Endulen. This could be done manually but is much quicker to do using a select by location tool.
2. Firstly you need to identify and select the Endulen admin area.
  - Open the attribute table for *TZA\_adm3*
  - Locate the *NAME\_3* field and click the field header to order the table by name adm 3
  - Locate *Endulen* and select the row
3. The Endulen admin area should now be selected (highlighted yellow) as shown below:



4. The next step is to use this selected admin area to select waterpoints that sit within it. Navigate to Vector → Research tools → Select by location:



5. A pop up dialog box should appear. Complete this as shown below to select the waterpoints within the Admin 3 boundary. The tool will take into account the selection of Endulen:



6. Click Run
7. The output should select 22 features from the total 118.

Ngorongoro\_waterpoints : Features total: 118, filtered: 22, selected: 22

	access	landuse	man_made	name	natural	operator	water	waterway	notes	salt	id	fenced
13				Nasusulu				dam			605452	
14				Esere	spring						605461	
15			borehole	Endulen Hospital							605469	
16				Noomsigyo				dam			605470	
17				Lemakat	spring						605472	
18				Mbitin				dam			605474	
19				Mutanik B	spring						605475	
20			borehole	Endulen							605483	
21				Endulen	spring						605488	
22			well	Nidudu Lodge							605491	


Show Selected Features

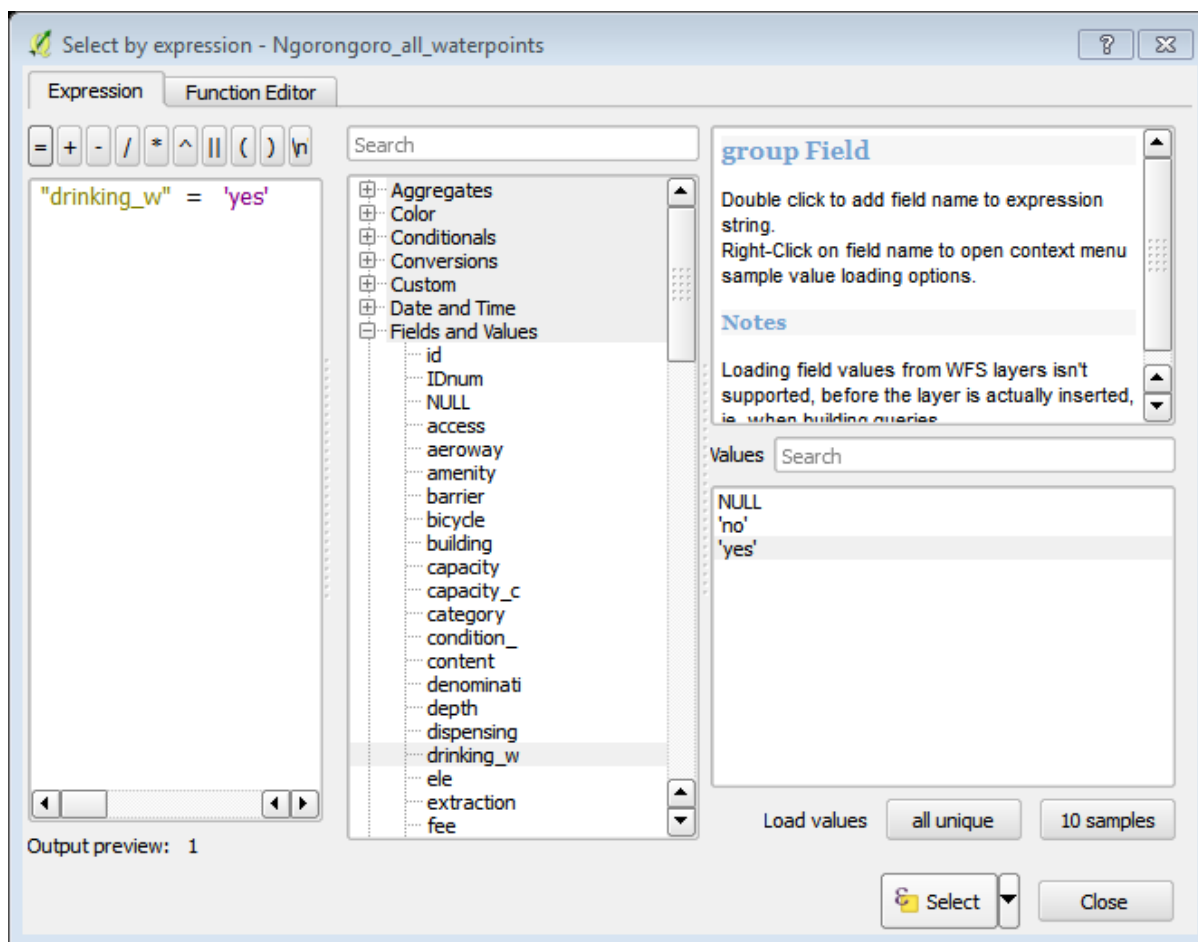
8. Clear the selections using the clear selections button
9. Switch off the TZA\_adm3 from view.




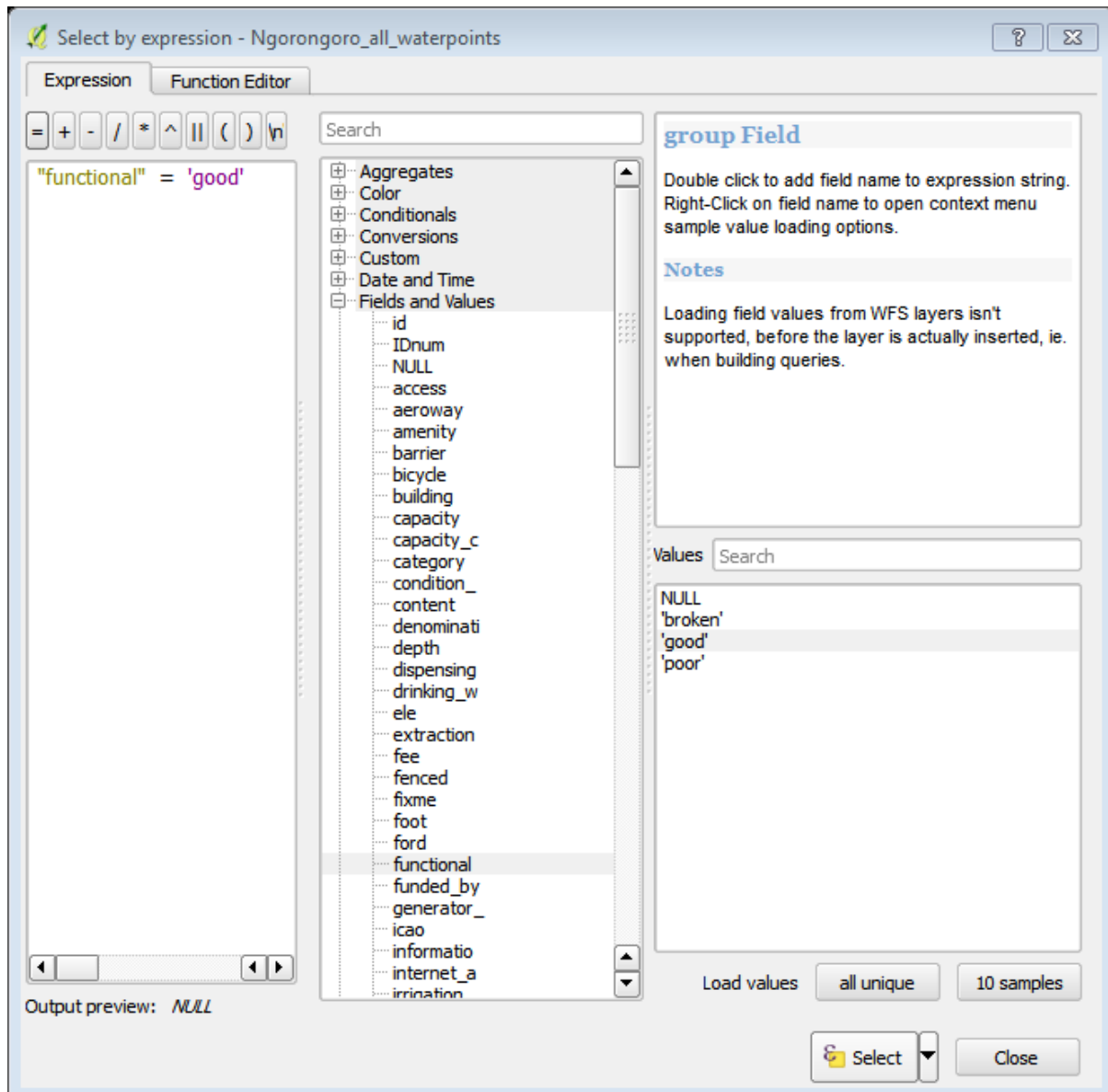
## Part 4 – Attribute queries

An **attribute query** chooses particular records based on the value stored in one of the table's fields. For example, you could select all waterpoints that supply drinking water with good water quality.

1. Select all the waterpoints with the drinking\_water attribute as yes.
  - Open the attribute table for the *all\_waterpoints* dataset.
  - Click **Select Features Using an Expression**  from the option at the top of the Attribute table
  - This brings up the **Select by Expression** window; you can now build a query to select all the waterpoints with drinking\_water as 'yes'
  - In the function list expand **Fields and Values**
  - Single click on *drinking\_w* (this is abbreviated from the OSM field name *drinking\_water* – a quirk when converting OSM to shapefiles), it should now be highlighted in blue.
  - In the **Field Values** window, click **all unique**. This will list all the unique values in the drinking\_water field
  - You now have all the components to build your expression.
  - First double-click *drinking\_w*.
  - Click '='
  - Double-click 'yes'
  - You will see that the expression has been built in the box at the bottom of the window. Your window should look like this, overleaf:



- Click Select, in the bottom right of the window
  - You will see that all the records with a drinking\_water attribute as 'yes' have been selected both on your table and on the map canvas.
  - How many records are selected? \_\_\_\_\_ Answer: 9
2. Build a query to select all the waterpoints where the functional\_status is known to be good
- Clear the previous selection 
  - Now see if you can build the following expression:



- How many waterpoints satisfy the expression? \_\_\_\_\_

Answer: 57