**Tutorial: Querying with Geographic Data**

**Part One: Querying on Attribute Values**

One of the ways that we can querying geographic data is through attribute values. This is similar to a standard database querying in which we would use ‘SELECT … FROM … WHERE <attribute> = some value’. We can do this through QGIS, and create a map of the result.

1. Open the QGIS Project you created during the Map Projections tutorial.
2. You should have a layer called ‘gis.osm\_landuse\_a\_free\_1’ in your project from last week. If not, you can add the OSM data from Topic 3 (on stream), and you will find it.
3. Right click on the layer in the Layers window and select ‘Open Attribute Table’. You can see the attributes that the landuse layer has. Note the attribute fclass. This indicates the land use for the geometries in that layer.
4. You can also have a look at the attributes and their values for a specific geometry, by going back to the map view, selecting the ‘Identify Features’ tool, and clicking on a geometry. A box in the bottom right will tell you the attributes and their values.
5. Have a look at the neighbourhood where you live – what is the land use around your house. Is it what you would expect?
6. Create a map showing only land with a retail land use, by:
	1. In the attribute table, selecting the ‘Select features using an expression’ tool.
	2. Selecting features with a retail land use.
	3. Making a new layer from the selected features.
	4. Save your new layer as a shape file.

(see <https://www.qgistutorials.com/en/docs/3/working_with_attributes.html> for tips on how to do this).

**Part Two:**

Challenge: Combine the methods you used in Part one with those in the Choropleth mapping activity (Topic 2) to find the largest building in New Zealand (hint: use the osm buildings layer). Email me your answer, and there will be a chocolate bar for everyone who gives the correct answer (but no sharing of answers!).

**Part Three: Spatial Querying**

Any database can do attribute querying, but geographic databases also enable spatial querying. This is where we are trying to find objects that have a particular spatial relationship with each other.

1. In the Processing Toolbox (right hand side of the screen), type in Select by Location, and you will see the Select by Location tool listed.
2. Once you have selected the tool, you can experiment with different kinds of spatial queries between different layers. For example, find all the waterways that are in a park as follows:
	1. Make a layer that contains only parks, from the land use layer (as in Part One above).
	2. Use the Select by Location tool to find waterways that go through parks. Experiment with the use of different spatial operators (intersect, contains, touch, overlap) to see how they work, and work out which is most appropriate.
	3. Save the new layer.

**Part Four: Test your Knowledge**

Use attribute and/or spatial queries to create the following layers (these can all be done with the layers added during the Topic 3 map projection tutorial (OSM + parcels + roads + place names).

1. Buildings in Canterbury.
2. Unnamed islands (do you notice anything strange about this data set?).
3. Roads that touch rivers.
4. Residential buildings near railways.