

## Exercise 6 – Vector analysis, buffers and joining of attribute data

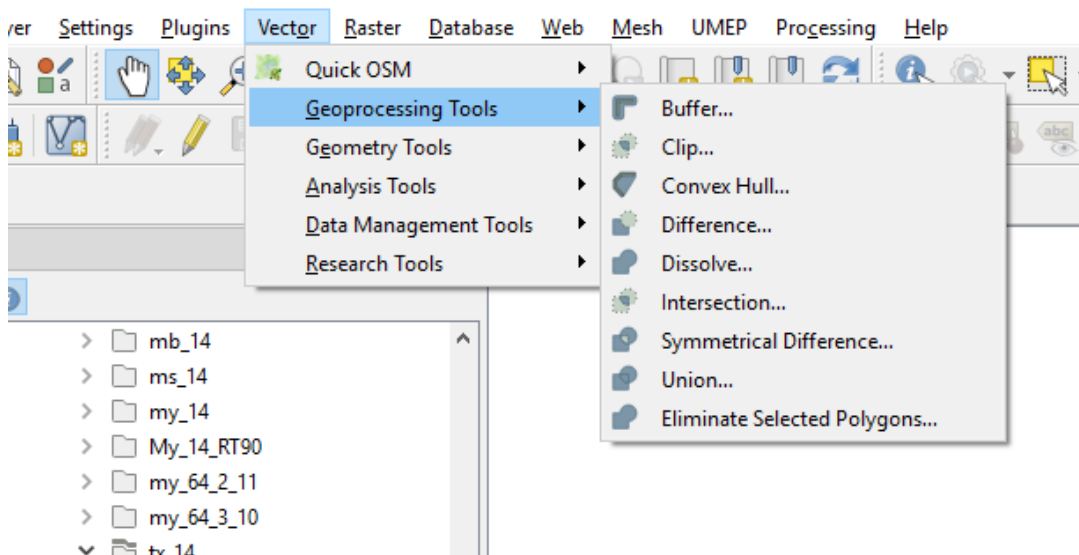
In this exercise we will learn to analyze and join data. You will have the opportunity to create **buffers** around vector features and try tools such as **Clip**, **Union** and **Dissolve**. You will also learn how to use the “**join and relate**”- function.

**Assignment:** A simple choropleth map showing the population statistics of Västra Götaland region with all the essential map elements included. The map shall be the size of an A4-paper and be handed in as a **PDF document**. See the example on the last page.

### 1. Preparations

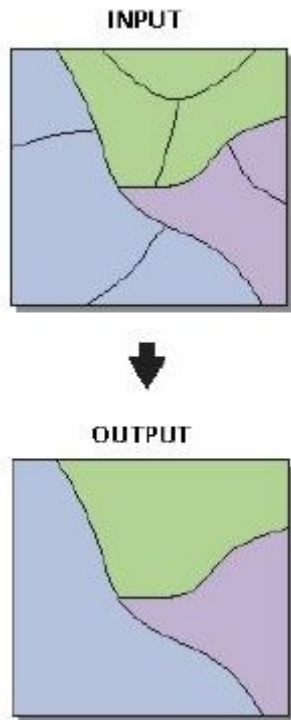
As in previous exercises you need to create an empty project. Add the shape files **af\_14.shp**, **my\_14.shp** and **ak\_14.shp**.

Under **Vector** (on the main menu) you will find the functions that you will use. They are organized under **Geoprocessing Tools**. See the image below.

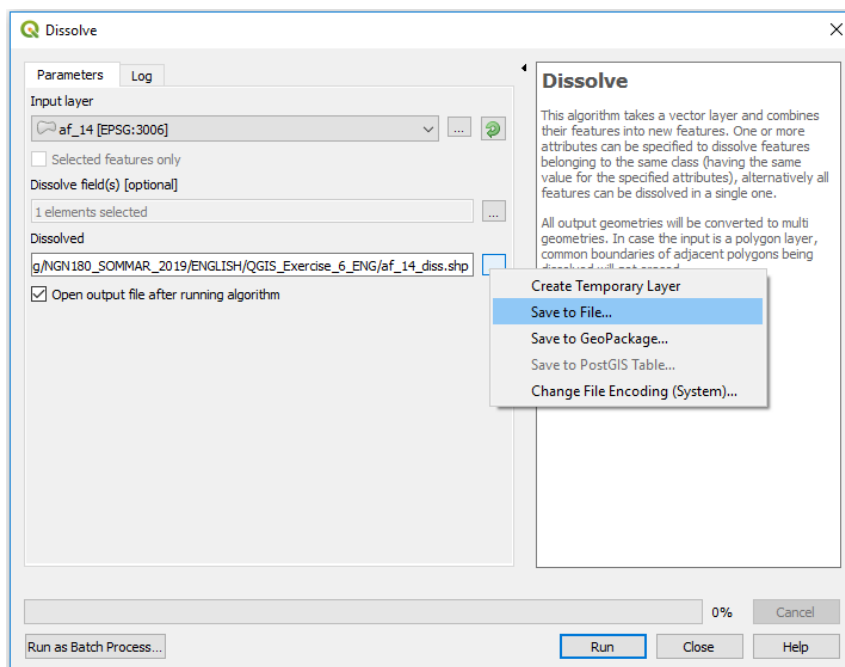


### 2. Dissolve

The function **Dissolve** aggregates vector features with the same value. For example if one chooses all the objects with the same code. If areas with the code 1, 2 and 3 all have the same municipality code as area 4 they will, after Dissolve, all be one and the same area (4). See the image below.



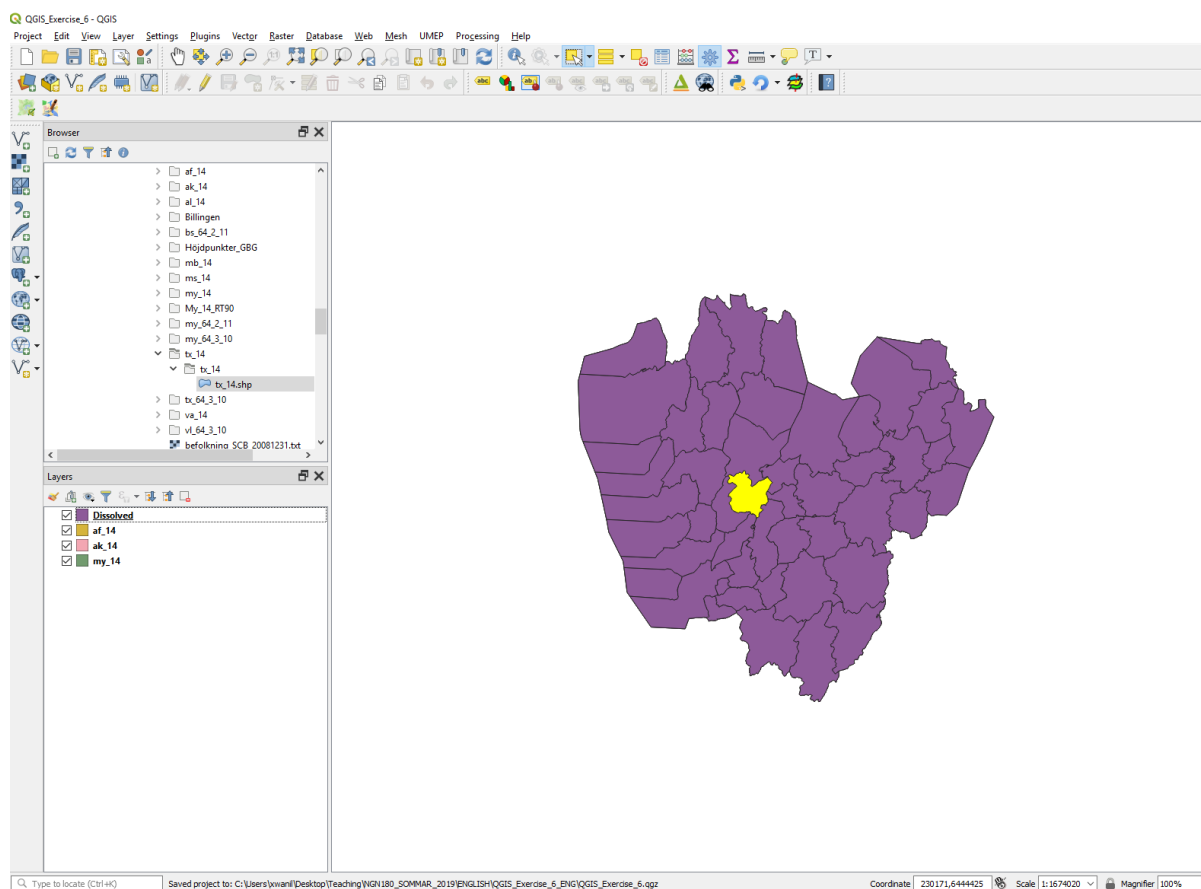
Click **Dissolve**. Under *Input vector layer* choose the shape file **af\_14.shp**. This is the shape file that will be dissolved. Under *Output shapefile* the name and location of the shapefile that is to be created shall be filled in. Under *Dissolve field* choose KOMMUNKOD as the value that will be used and compared in the function. Make sure that option "Dissolve all" is **not selected**.



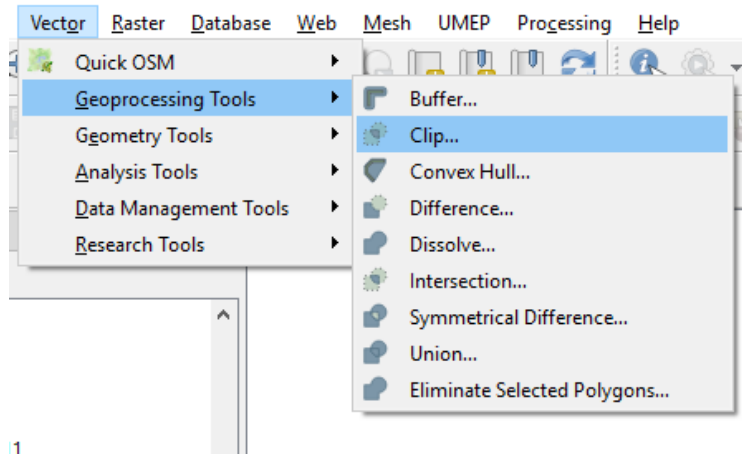
When all the settings are done press **OK** and let QGIS work. If the output shapefile is not added automatically to the project, do it manually. Compare the new shapefile with the original, for example by opening the attribute table or by choosing Categorized style (color based on KOMMUNKOD).

### 3. The function Clip

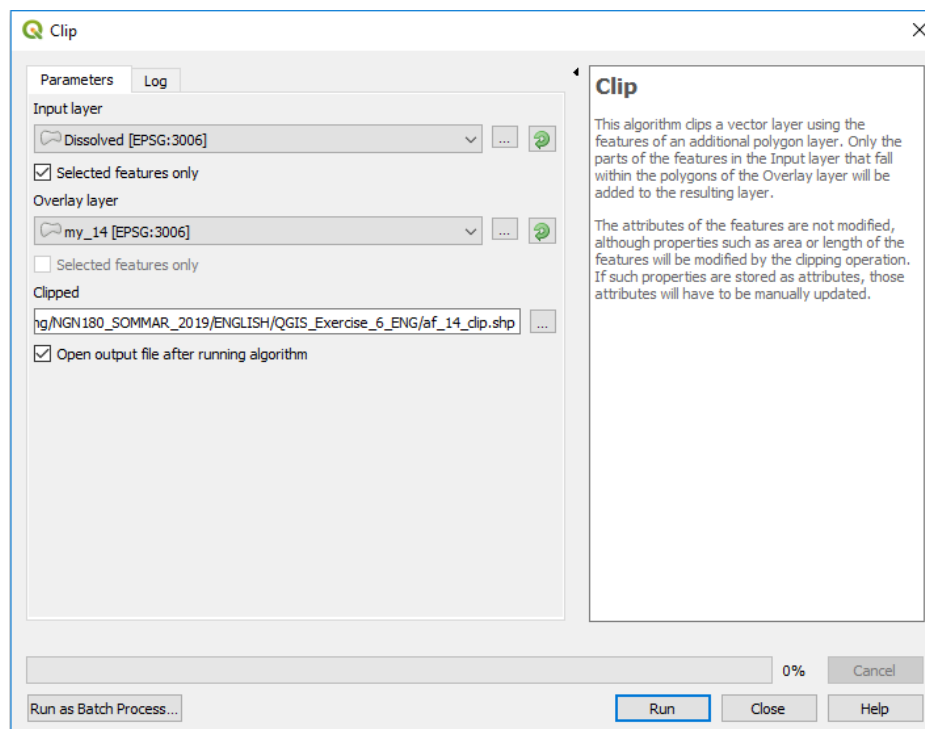
Start by selecting one of the posts (in this case municipalities) in your Dissolve layer. This is done either by the **select feature(s)** tool or by highlighting a row in the attribute table.



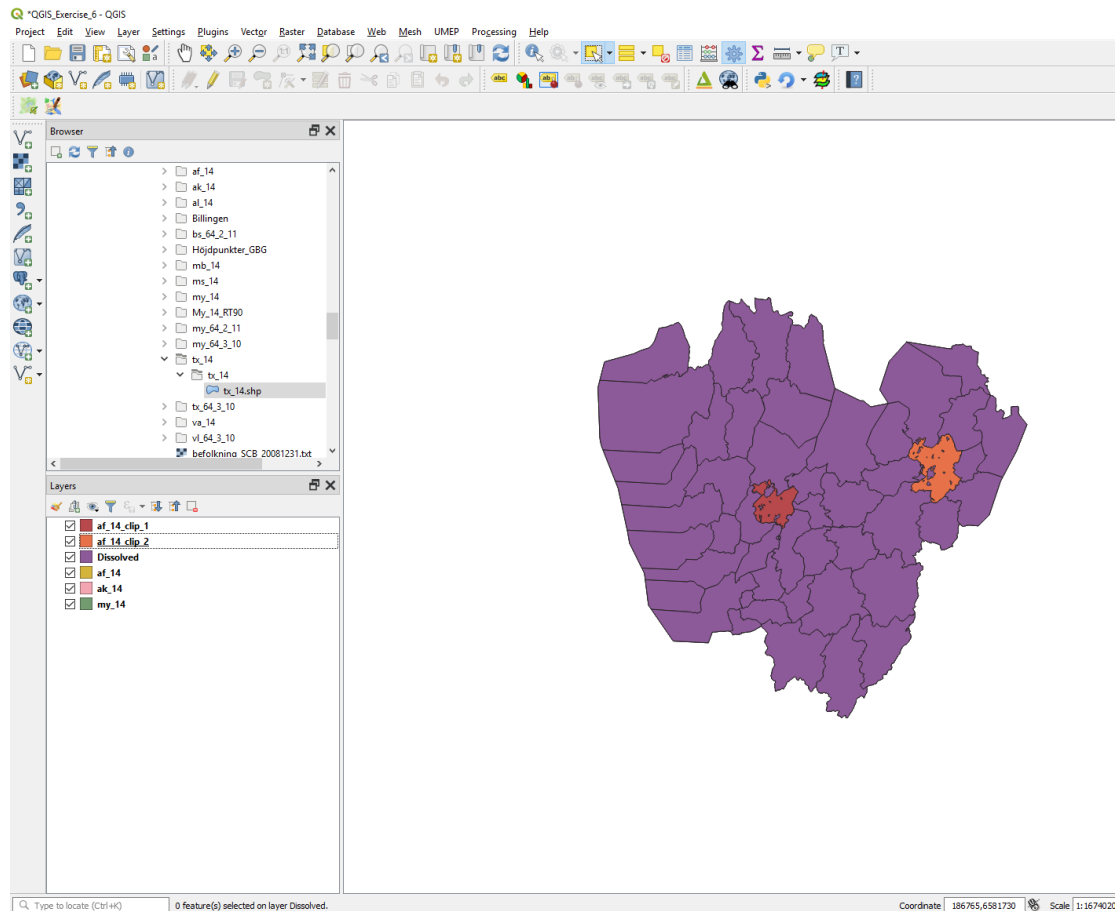
You then click **Clip..** (located under **Vector** → **Geoprocessing tools**) in the top menu.



The Clip function works like taking a cookie cutter and pressing it against the dough. That which remains is the result of the function. *Input layer* is the data that are to be used in the function and thereby the feature that will be cut out. Choose your Dissolved shapefile with one highlighted (selected) feature - this way only the selected feature will be clipped. *Overlay layer* is the cookie cutter where you add **my\_14**. Lastly choose output name and location under *Output shapefile*. Press **OK** and add the new shapefile to the project (if it does not happen automatically).

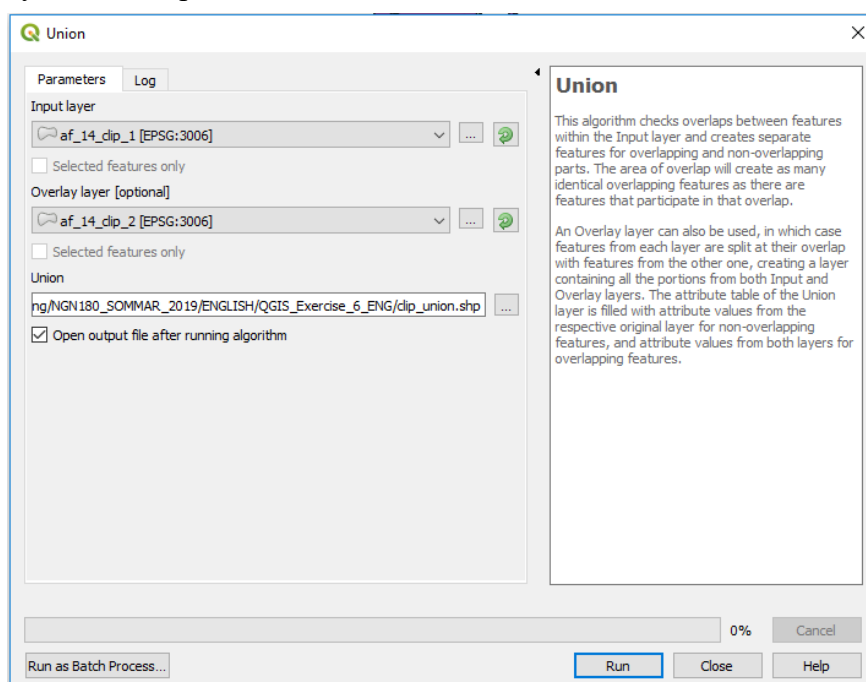


Now redo section 3, but highlight a new feature (polygon) from your Dissolve layer. If you want, you can rename the created layers by right-clicking on their names in the Layers list and choosing 'Rename'.



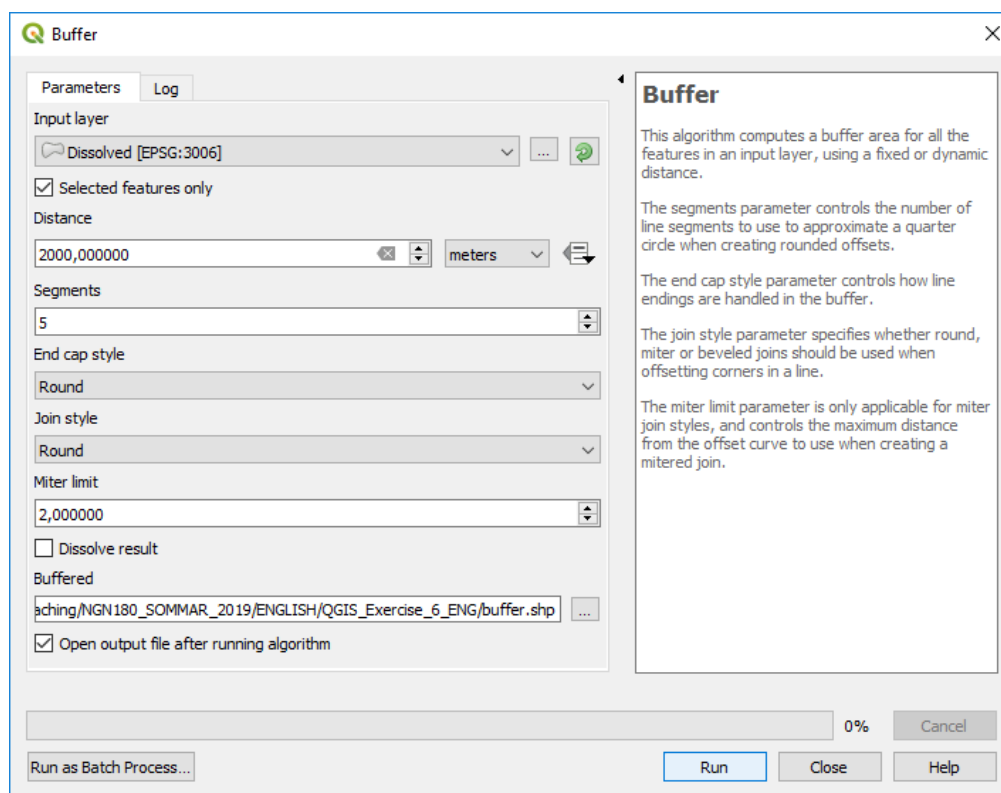
#### 4. Create a union of the two clippings

To create the union you will need the two clip features created in the previous section. A union is a merge of two parts. The result of a union of two parts is thereby everything that the both parts contain. Click **Union** in **Vector** → **Geoprocessing tools**. At *Input vector layer* choose your first clip file and at Union v



## 5. Creating a buffer zone

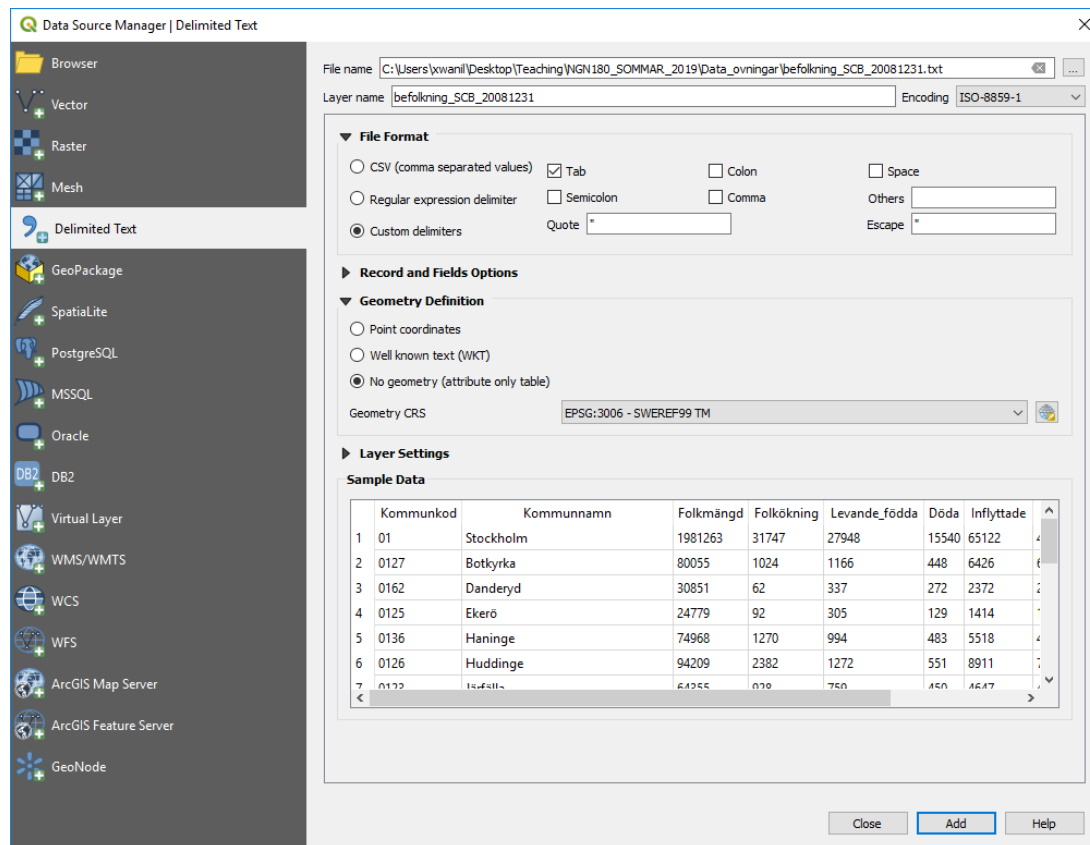
If you want to analyze a zone around a layer (a lake or road for example) a good first step is to create a buffer. The buffer is then separated into an own shapefile which can be used to cut relevant data from other shapefiles. Start by highlighting a feature (a municipality for example) in your **Dissolved** shapefile. Creating a buffer is done in a similar way as the previous functions used in this exercise. Click **Geoprocessing tools** → **Fixed distance buffer**. Under *Input layer* choose the dissolved shapefile. Since one feature is selected, the buffer will be based on that selected feature. Under *Distance* choose the size of the buffer (e.g. 2000). Since the layers length unit is meters the buffer will also be in meters. The *Segments* can be left as default - the higher the number, the smoother the buffer edges are. Determine name and location under *Buffer*, press **OK** and make sure that the buffer-shapefile is added to the project.



## 6. Merge statistics and spatial data using Joins

Spatial data (i.e. shapefiles) usually contain basic attribute data such as municipality name and code. In this exercise you will add population statistics to the shapefile **ak\_14.shp** which is a polygon layer containing some municipalities in Västra Götaland. The population statistics are provided by Statistiska centralbyrån (SCB) and are from 2008.

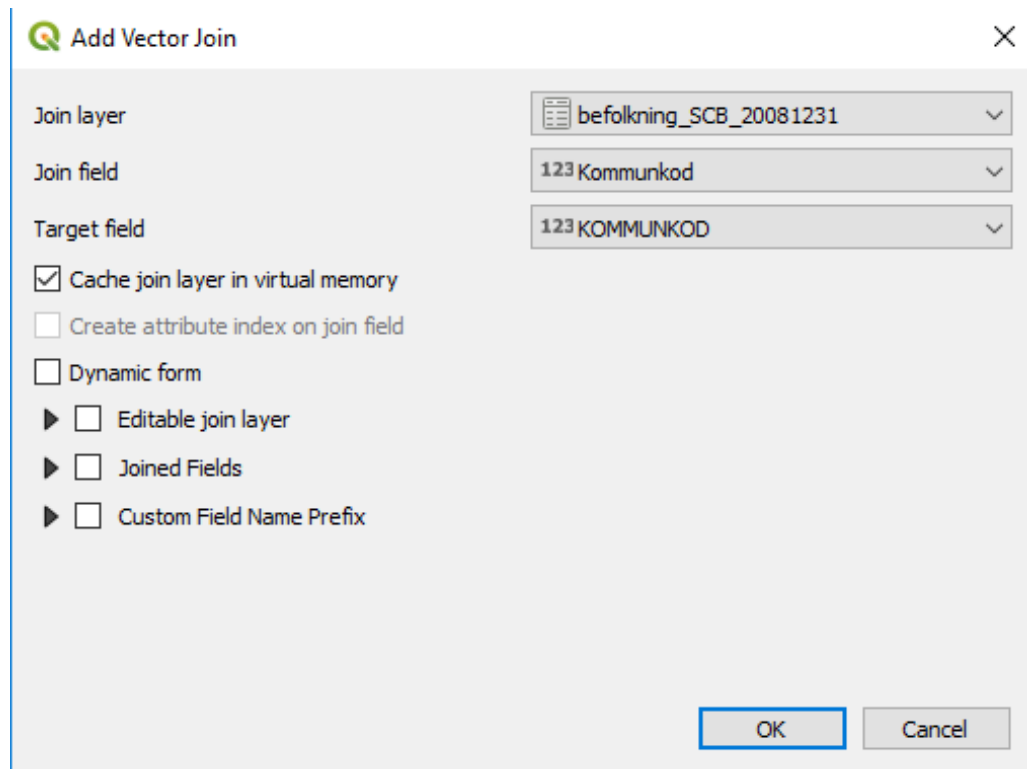
Add the text file **befolkning\_SCB\_20081231.txt** into your project. This is done by clicking **Add Delimited Text Layer** and filling it out as below. If it does not read ääö try and change encoding to ISO-8859-1 instead of UTF-8.



Open the newly added table and investigate its content. Here you will find different types of population statistics divided by municipality and county. We will now add this statistics to our shapefile ak\_14.shp.

To be able to merge different tables you will need to find a unique attribute that is present in both data sources. Examine the two tables (ak\_14 and befolkning\_SCB\_20081231) and see if you can find any attribute that fits this description. You will find two columns in each table, “Kommunnamn” and “kommunkod”. Right click ak\_14 and press **Properties** and then press **Joins**.

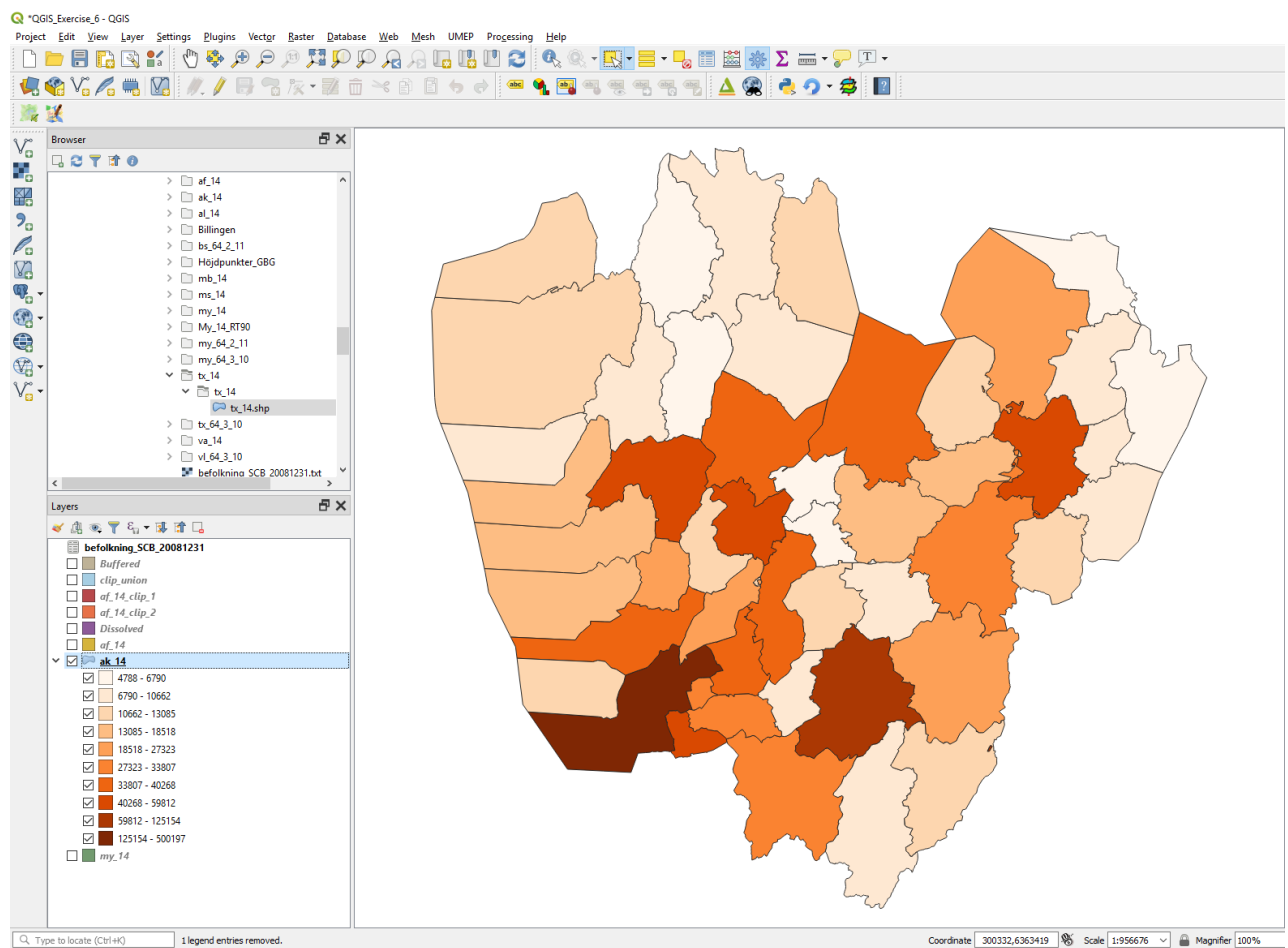
You will now choose to join the two tables based upon the kommunkod of the two data tables. Press the green plus sign to open the window **Add vector join** and fill it out as shown below.



Press **OK** and open the attribute table for ak\_14.shp once more. Now you will see that the population statistics have been added as extra columns further to the right in the table.

Now you can create a population map. Highlight the layer ak\_14, right click and press **Properties**. Press the tab **Symbol** and choose **Graduated**. Under **Column** choose befolkning\_SCB\_20081231\_Folkmängd (population). Choose an appropriate **Color ramp** and a suitable number of **Classes**. Try out the different **Modes** and choose one. A tip is to go for the **Natural breaks (Jenks)**. Press **Apply** and then **OK**. The result should look like the example below.





The joining of the two tables is not permanent and can thereby be easily separated in **Properties** → **Joins** by pressing the red minus sign.

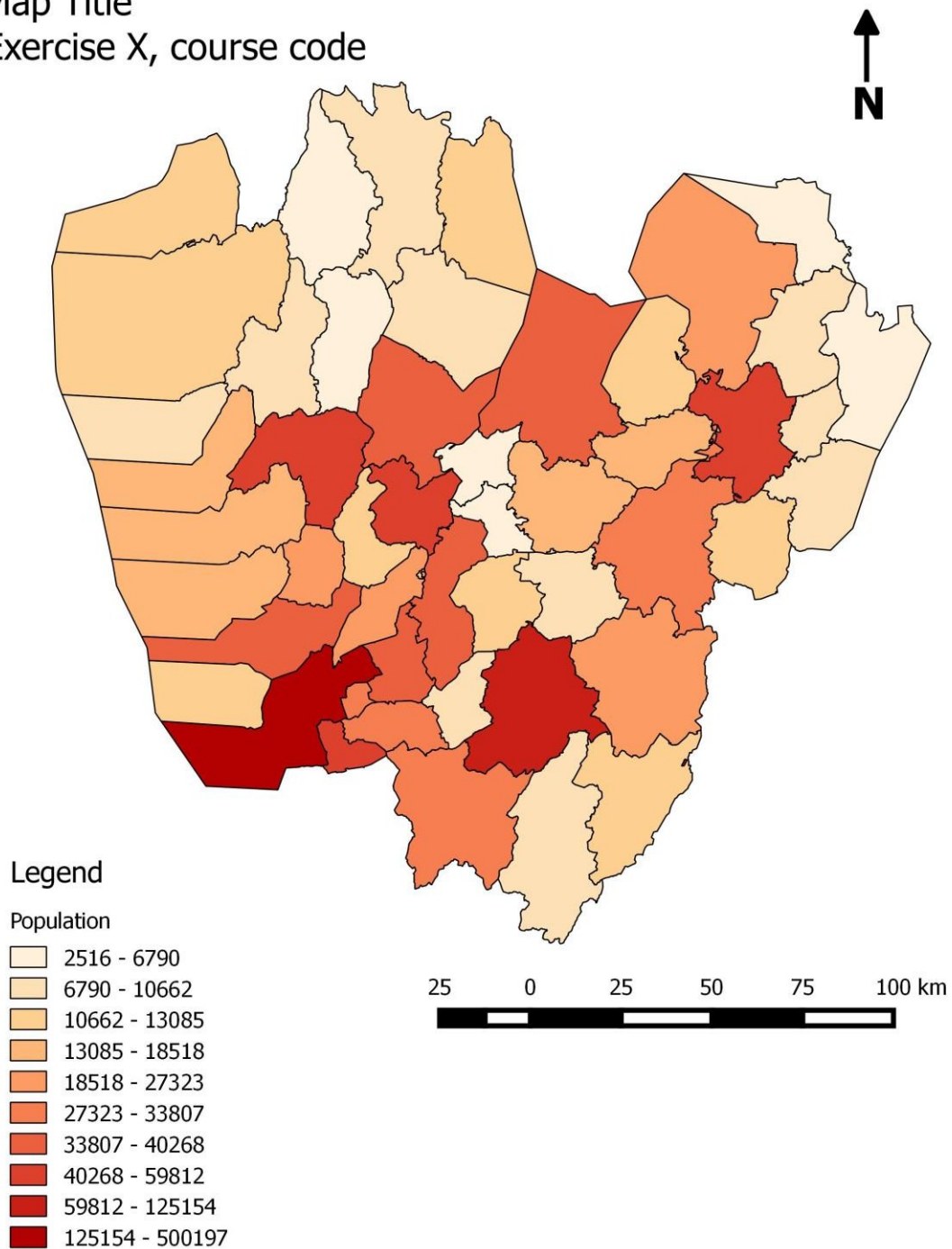


If you want to create a layer with these attributes permanent, right-click the layer and choose **Export** → **Save object as...**

Finally, make a map of population per municipality with a title, your name, a legend, a north arrow and a scale, as in the example below. To start with, open a new **Print Composer** (under **Project**) and add all necessary items. If you cannot remember how it is done, check the instruction for exercise 3. Once the map is ready, export it as a PDF by clicking **Composer** → **Export as PDF**.

Do not forget to upload your map on GUL! :)

Map Title  
Exercise X, course code



End of Exercise 6