

## GIS and Habitat Management (ACBA 7005)

### Introduction to QGIS

#### Aim

In this lab we will be beginning to explore QGIS to make a basic map. We explored principles of GIS and a brief introduction to cartography. In the practical exercises this week we will be exploring QGIS and familiarising ourselves with the interface.

#### Goals

- Become familiar with the GIS interface, learn how to add data and explore data types & attributes.

#### Activity 1:

Click on: Magic Map Application ([defra.gov.uk](http://defra.gov.uk)). Explore the interactive map content. Questions: *What sort of layers can you see? How have they presented the information? What have you found out?*

#### Activity 2:

Click on: Wales Environmental Information Portal ([arcgis.com](http://arcgis.com)). Choose a topic. Explore the interactive map content. Questions: *What sort of layers can you see? How have they presented the information? What have you found out?*

#### Activity 3:

**Brief:** Carmarthen Together have asked you to create a map of sampling locations for their citizen science water quality testing project. They have provided you with a primitive Padlet page, but relevant LAT/LONG points are provided. [Citizen Science Sign up for River Towy/ Afon Tywi. \(padlet.com\)](#)

Please create a new improved map in QGIS to show where citizen scientists are collecting water samples from. You can also introduce other relevant datasets to produce a useable map. Other relevant data can be obtained from DataMapWales ([gov.wales](http://gov.wales)).

## Instructions:

- 1) **Open QGIS** and set your projection to WGS1984. This should be the standard projection as you start a new project.
- 2) To access other shapefile data from DataMapWales, click on data catalogue. You will want to filter by spatial data (see below).

The screenshot shows the DataMapWales website's 'Data catalogue' page. At the top, there's a 'Sign in' button. Below the header, it says '441 items found'. The first item is 'Active Travel Approved Routes 2016', with a description about the Active Travel (Wales) Act 2013 and its date '31/12/2016'. The second item is 'Active Travel Designated Localities (Wales)', with a description about the Welsh Ministers' powers and its date '28/7/2016'. On the right, there's a 'Filter by' section with a search box and a 'Clear all' button. Under 'TYPE', 'Spatial Data (441)' is selected. Under 'CATEGORY', 'Biota (25)' and 'Boundaries (16)' are listed. A green box highlights the 'CATEGORY' section.

- 3) Select one or two related layers (e.g. waterbodies, catchments, designated sites, lithology) from the 441 filtered items. We will be downloading the data to open in QGIS. You can also type in 'Catchment' in the search box to find relevant catchment content.
- 4) Remember to download your data you need to click on the dataset and scroll down to find the spatial data download. Hover over the dropdown box and select Zipped Shapefile. This will download a zipped package with relevant files to put into QGIS.

Find out [how to use OWS \(WMS and WFS\) endpoints](#)

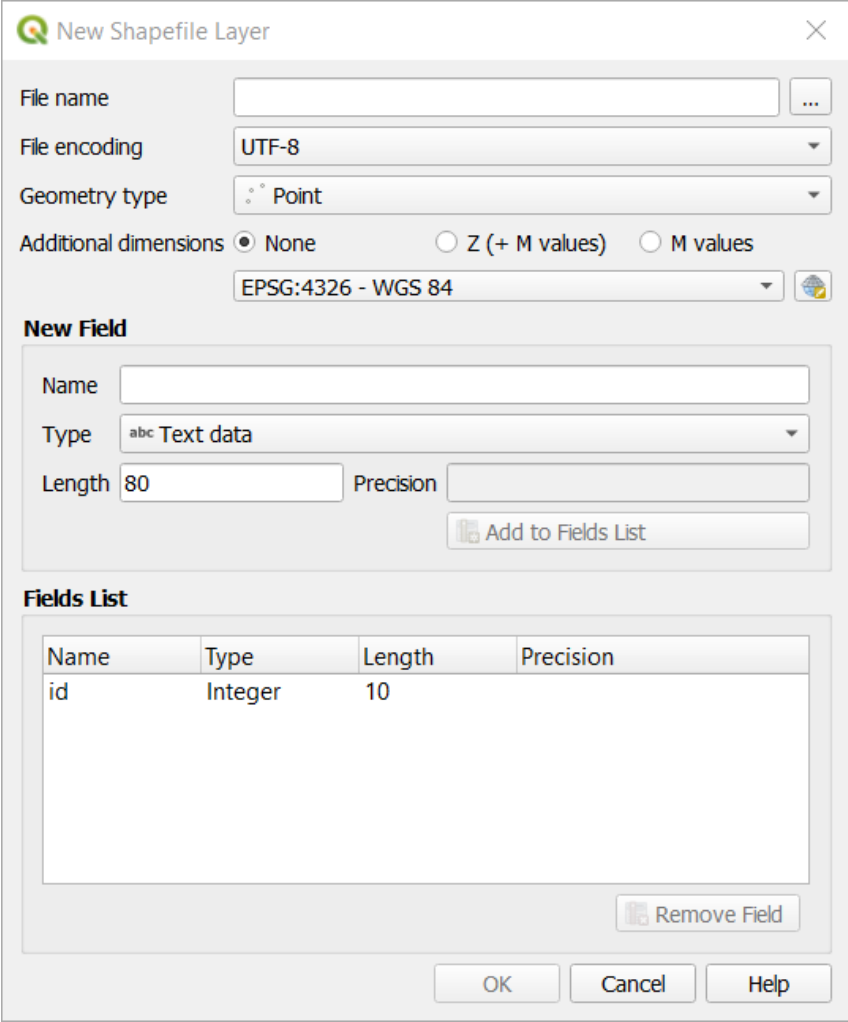
### Spatial data download

The screenshot shows a dropdown menu for 'Select spatial data format'. The options are: CSV, DXF, Excel, GeoJSON, GML 2.0, GML 3.1.1, OGC Geopackage, and Zipped Shapefile. A 'Download' button with a download icon is visible next to the dropdown. Below the dropdown, there's another 'Download' button with a download icon.

No maps are using this data.

- 5) Save the file to your OneDrive. You will then need to unzip the folder to use the contents inside. Once the folder has been unzipped, highlight all of the files and drag them over the QGIS screen. The files will then populate as vector shapefiles. A map of catchments will be displayed.
- 6) **Adding a basemap in QGIS.** Next in the Browser column of QGIS, select the dropdown for XYZ tiles. Click on Open StreetMap to add a simple basemap.
- 7) Now your basemap is shown, you will create a new layer.

Navigate to and click on the menu entry **Layer ► Create Layer ► New Shapefile Layer**. You'll be presented with the **New Shapefile Layer** dialog (shown below), which will allow you to define a new layer.



The 'New Shapefile Layer' dialog box contains the following fields and sections:

- File name:** A text input field with a browse button (...).
- File encoding:** A dropdown menu set to 'UTF-8'.
- Geometry type:** A dropdown menu set to 'Point'.
- Additional dimensions:** Radio buttons for 'None' (selected), 'Z (+ M values)', and 'M values'. Below is a dropdown menu set to 'EPSG:4326 - WGS 84'.
- New Field:** A section with fields for 'Name' (empty), 'Type' (set to 'Text data'), 'Length' (set to '80'), and 'Precision' (empty). An 'Add to Fields List' button is at the bottom right.
- Fields List:** A table with columns 'Name', 'Type', 'Length', and 'Precision'. It contains one entry: 'id' (Integer, 10). A 'Remove Field' button is at the bottom right.
- Buttons:** 'OK', 'Cancel', and 'Help' at the bottom.

- 8) Click ... for the **File name** field. A save dialog will appear. Navigate to your OneDrive and save the shapefile into your project folder. Save your new layer as survey\_points.shp.

It's important to decide which kind of dataset you want at this stage. Each different vector layer type is "built differently" in the background, so once you've created the layer, you can't change its type.

For the next exercise, we're going to create new features which describe multiple points. For such features, you'll need to create a 'multipoint' dataset.

For **Geometry Type**, select **Multipoint** from the drop down menu.

Then, check your projection matches and click 'OK'. A new shapefile layer will appear on the QGIS project and can be seen in the layers screen.

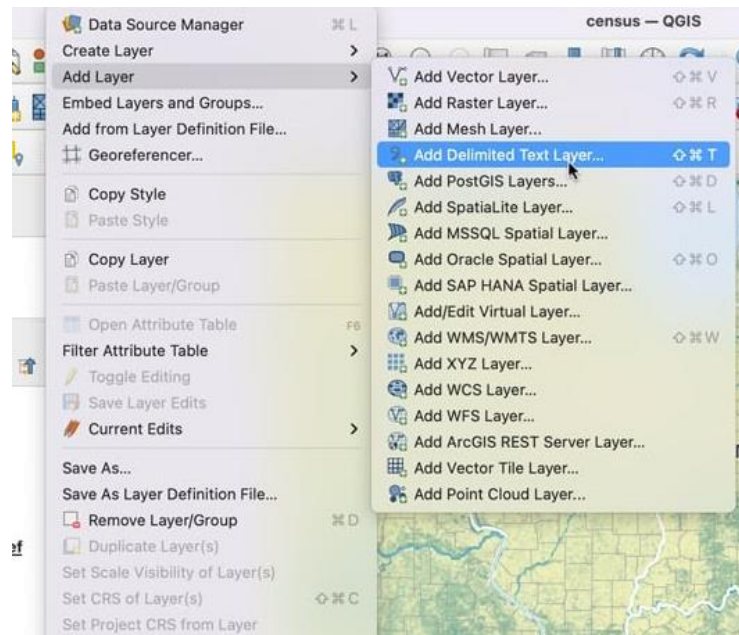
- 9) Next we will be adding point data to the multipoint layer. The following instructions are relevant if you do not import the LAT/LONG of the survey points, and are just adding points by eye.

In order to begin digitizing, you'll need to enter edit mode. GIS software commonly requires this to prevent you from accidentally editing or deleting important data. Edit mode is switched on or off individually for each layer. To do this you will need to right click on the new multipoint layer and press '  Toggle editing'. This will then activate a 'pencil' icon which shows that the layer is able to be edited.

- 10) Next click on the Add Feature  icon displayed on the main homescreen. This will then enable you to add your data points. After you have finished editing, remember to unselect Toggle Editing. At this point you will be prompted to save your work.

- 11) If you are adding multipoints based on their LAT/LONG, you will have needed to create a simple .csv file. You can do this in Excel and save the file to .csv format. The .csv file will document the LAT and LONG provided for each point and will have three columns: [Point ID], [LAT] and [LONG]. The Point ID will just be a continuous list 1-n (e.g. 1, 2, 3, 4, 5).

- 12) To add points based on LAT and LONG, you will need to go to Layer → Add Layer → Add Delimited Text Layer from the menu.



In the Data Source Manager interface that pops up, select the three vertical dots to right of the white box for the File name and navigate to the folder on the computer to where the CSV file is stored.

Once the file is elected, the Sample Data box at the bottom of the interface will populate with some of the data from the CSV file. If your column names for the latitude and longitude coordinates are labelled as such, QGIS will automatically assign them to the X field and Y field parameters. If not, select fields for the longitude values (X) and the latitude values (Y). So, a common mistake can be switching the columns so that X is assigned for the latitude coordinates and Y is assigned to the longitude coordinates. So, double check to make sure that you have assigned longitude as the X coordinates and latitude as the Y coordinates.

Check your projection.

Now that the parameters have been set for the CSV file, it's time to click the "add" button. A new point layer containing the attribute information found in the CSV file will be added to the QGIS project layers.

- 13) You are now welcome to edit and customise your points and existing data. If you feel comfortable you can add additional layers from the DataMapWales website and further customise your map output. Remember to save your work!