

Creating a Campus Map and displaying it in a Browser

Creating a Campus Map and displaying it in a Browser	1
Introduction	2
Part 1: Open QGIS and Start a new project	4
Part 2: Add in OpenStream Web Mapping Service (WMS) as backdrop	6
Part 3: Create an Empty Shapefile in QGIS	9
Part 4: Digitise new buildings in the <i>UniBuildings</i> Feature Class (that you just created)	11
Part 5: Export Map to Web File.....	13
Part 6: Display map in OpenLayers	14

Introduction

This exercise will show you how to create a basic campus web map using a Web Mapping Service (WMS) containing Ordnance Survey (OS) OpenData plus some data you have created yourself and displaying that in a web browser.

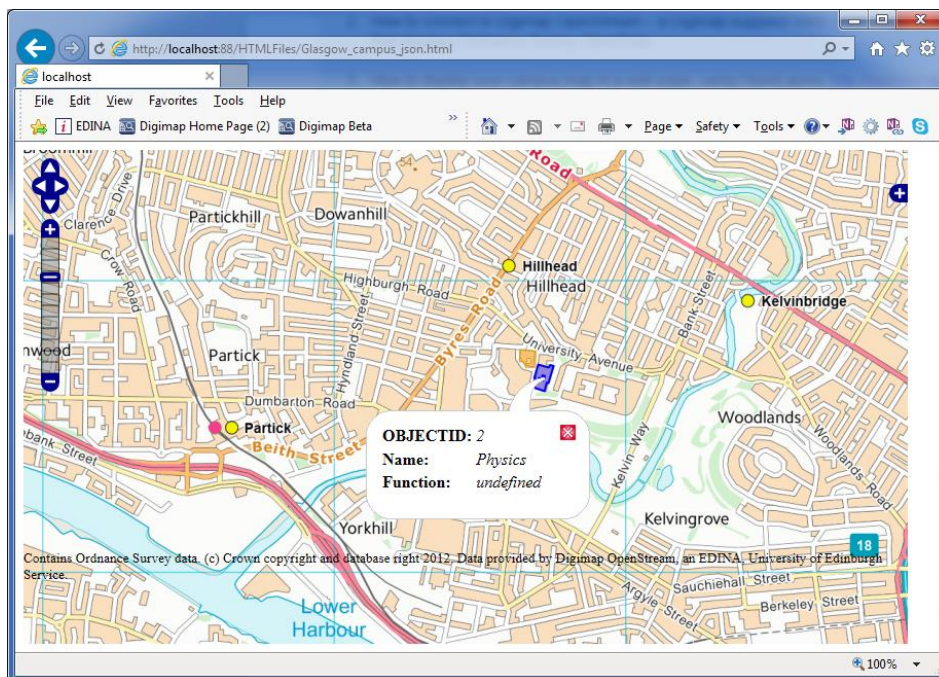
The screenshots and instructions use QGIS Version 2.8 (Wien) and OpenLayers 2.12

Both of these packages are open source and are freely available.

All of the data we will use today is covered by the OS Open Data licence so can be freely used (with attribution)

To begin with we will load the OpenStream WMS into QGIS (an Open Source GIS similar to ArcGIS) and use that as our background map. We will then digitise some University buildings showing the Glasgow University campus. We will then display this data in a basic web map that you will serve from a local Apache webserver.

The final result will be similar to:



Before You Start

1. You will need access to QGIS. If you do not see QGIS on your computer let the instructor know as it can also be run from the USB stick.
2. You will need to register with OpenStream and note your API key. Register at this link and copy and paste the API key to a text editor (for example, Notepad or WordPad – often found in the Accessories folder on Windows computers): <http://openstream.edina.ac.uk/registration/>
3. You should all have a USB stick provided by the instructor and have some disk space that you can access.
4. On the USB stick you will find a **Campus Map Exercise** folder. We recommend that you copy and paste the Campus maps exercise folder from your memory stick to your personal area, as we need you to return the memory stick after the workshop. The USB contains a copy of these instructions.

What steps are involved?

1. Create your campus map:
 - a. Display the Digimap OpenStream web mapping service as a backdrop in QGIS.
 - b. Digitise new buildings, using Streetview data from OpenStream as a guide.
2. Export the campus map from QGIS:
 - a. as a Geojson vector file.
3. Display the campus map in a web browser - edit example HTML file(s) to display campus map in webpage using OpenLayers.

Part 1: Open QGIS and Start a new project

We will use QGIS for this part of the exercise. QGIS is an Open Source GIS similar in functionality to ArcMap. Full instructions for using it for the task are provided below, however if you have any questions please ask the instructor.

More information about QGIS can be found at: <http://www.qgis.org/en/site/>

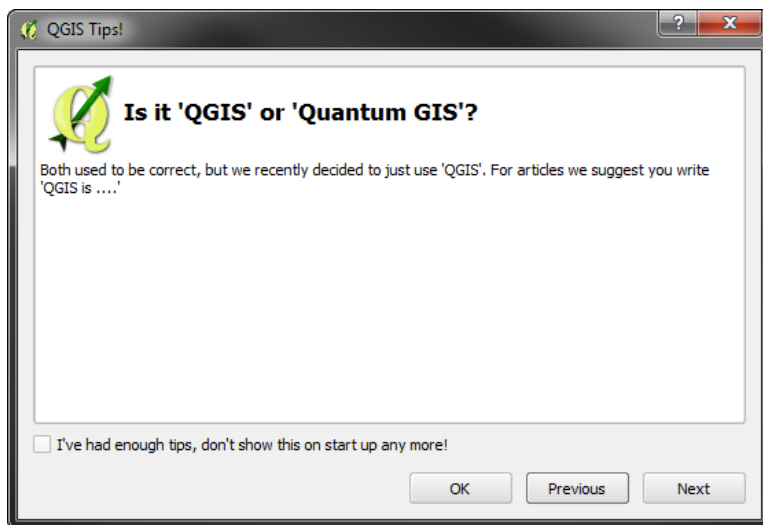
1. If you don't already have QGIS open, start the application.


Start → All Programs → QGIS Wein → QGIS Desktop 2.8.1

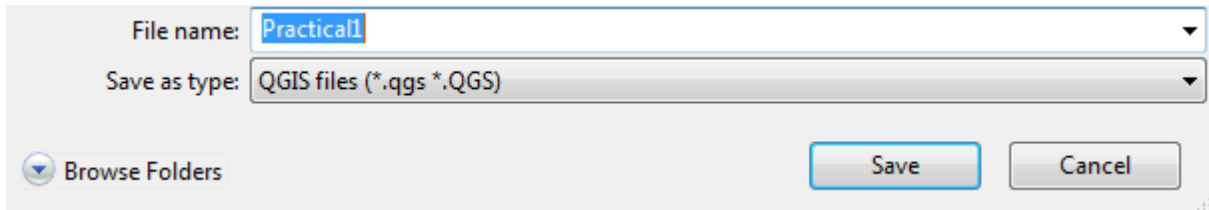


Or click on the desktop icon:

2. The following tips box may pop up in front of the application window.



3. Click **OK** to close it.
4. Click the **Maximize Window** icon  in the top right corner.
5. At this point it is also a good idea to **save** our map; you do this in the usual way for a Windows program.
 1. Click **Project** then **Save as...**
 2. Save the file in a location that you have access to
 3. Give the file a suitable name such as **Practical1**



IMPORTANT: You are saving your document as a **.qgs** file. This is a list of instructions or behaviours for the data and any customisations to the interface. It will remember any symbology changes and selections you make to data and which tool bars are shown. It will **NOT** save any changes to the data files themselves and does **NOT** contain any data. The **.qgs** file won't work without the data files, so these need to be kept with it.

Now you can begin to bring in data to QGIS.

Part 2: Add in OpenStream Web Mapping Service (WMS) as backdrop

Using Digimap OpenStream as a base map means you have access to an open data stack without needing to download any data. The following exercise will show you how to add Digimap OpenStream as a Web Mapping Service (WMS) in QGIS.

OpenStream contains a 'stack' of OS Open Data ranging from large scale to small scale data so can be used as a web mapping background. As you zoom in and out of the map the appropriate scale data will be chosen for display.

5 different maps are provided, GB Overview being the least detailed and Streetview the most detailed (1:10000 scale). These maps are available to download from the Digimap Ordnance Survey Collection, or OS OpenData website:

If you have not registered for OpenStream you can do that by going to:

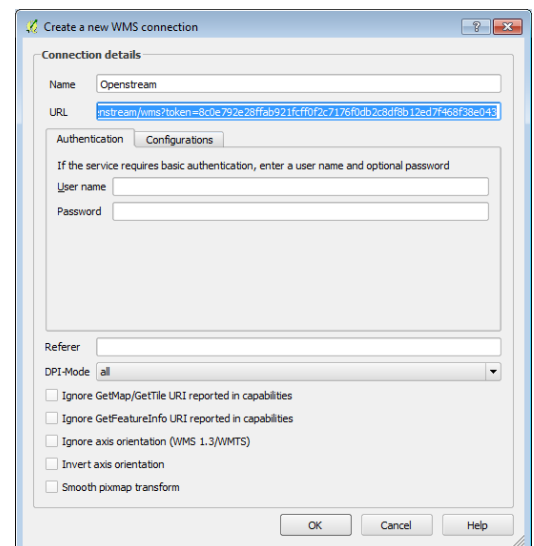
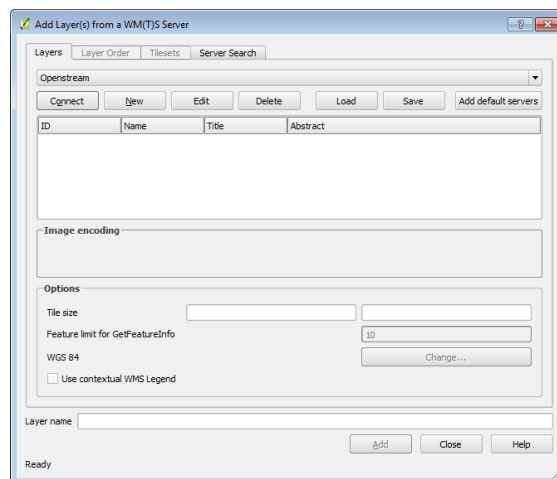
<http://openstream.edina.ac.uk/registration/>

You will be given an API key once you have registered.

1) Click on the **Layer** → **Add Layer** → **Add WMS/WMTS** layer and click on **New**

2) Fill in the Name of the service – call it **OpenStream**

3) Fill in the URL of the service

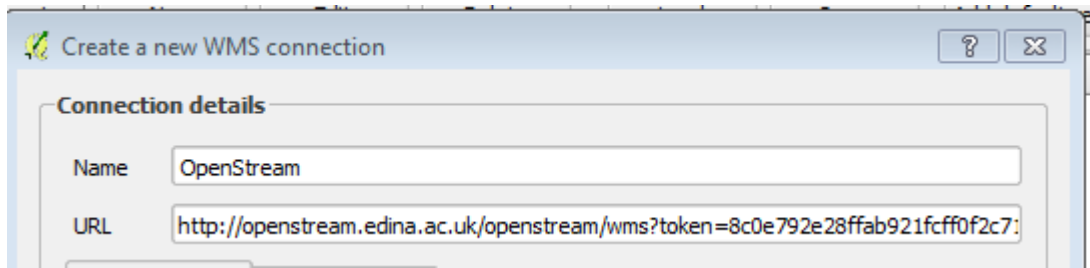


In **URL**, change the URL to the following, replacing [YOUR_API_KEY] with your own API key obtained after registering for OpenStream:

[http://openstream.edina.ac.uk/openstream/wms?token=\[YOUR_API_KEY\]](http://openstream.edina.ac.uk/openstream/wms?token=[YOUR_API_KEY])

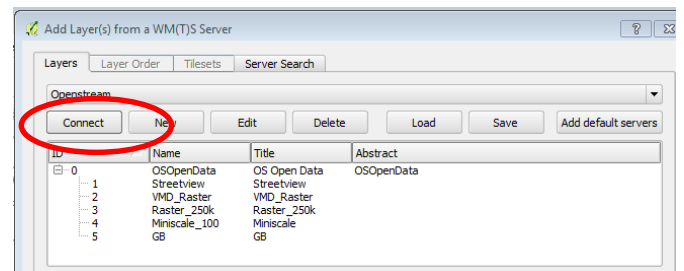
It should look similar to the following (note if you haven't registered for OpenStream, or are having problems, just copy and paste the following URL)

http://openstream.edina.ac.uk/openstream/wms?token=8c0e792e28ffab921fcff0f2c7176f0db2c8df8b12ed7f468f38e043

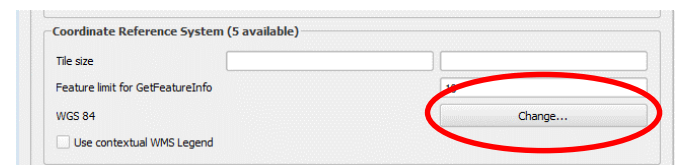


4) Click **OK** to close the 'Create a new WMS connection' window.

5) Click **Connect**. The new WMS service appears in the drop down list window



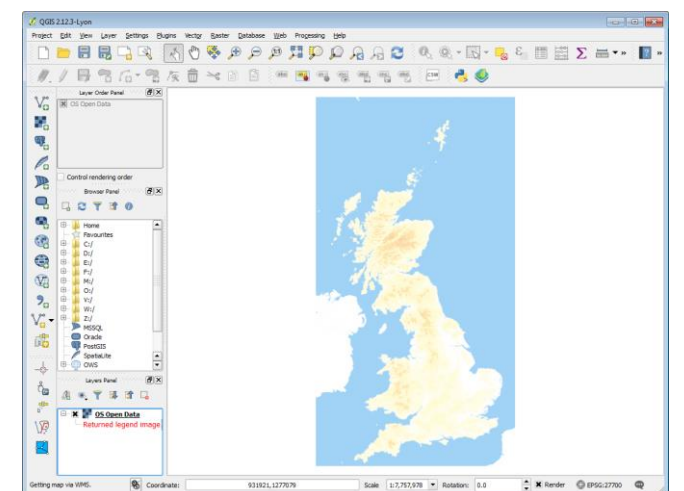
6) Select the **OSOpenData** entry at the top (with a 0 next to it)



7) Change the **Coordinate Reference System**. It says there are 5 available for this service but we want to display the map in British National Grid.

Click on **Change...** and select OSGB 1936 / British National Grid

(if it is not visible then Filter for 27700)



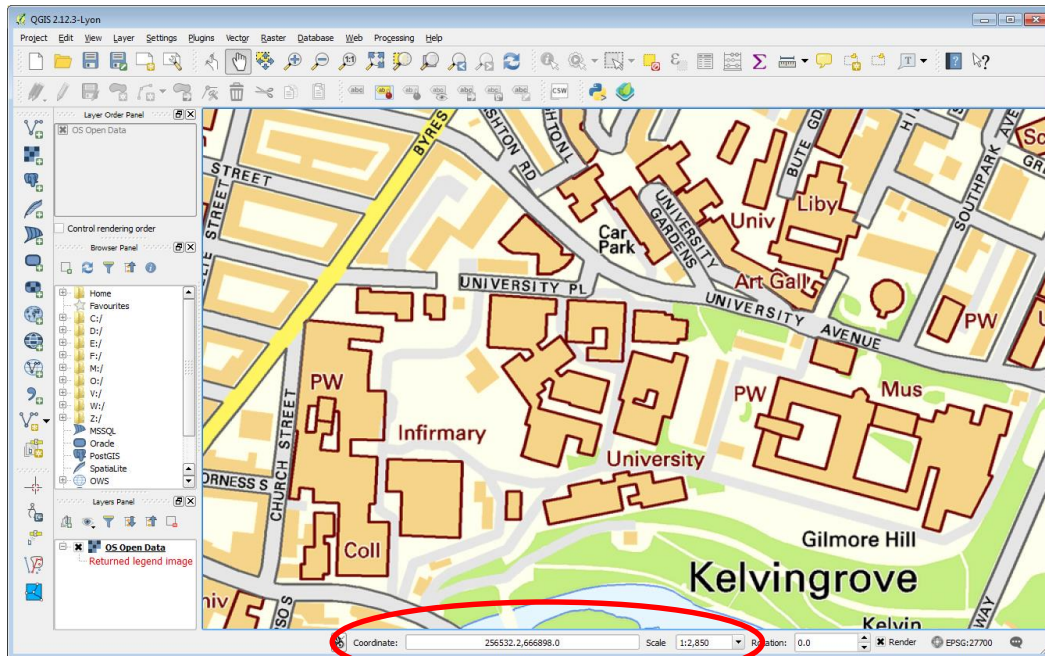
8) Click on **Add**. This will add the Digimap OpenStream WMS as a layer to your map and then click **Close**.

Note: Ignore the warning about "Returned legend image is flawed"

Zoom in to the Glasgow University area



Use these tools or the mouse wheel to pan and zoom to area shown below. Note that map content should automatically change as you zoom in.



You may need to change the scale using the dropdown on the footer to start with to 1:1,000,000 if you can't see the map.

You can also type in the coordinates in the bottom bar: 256871, 666629 and then press return.

Select 1:5,000 from the scale drop down to zoom to the campus area.

Part 3: Create an Empty Shapefile in QGIS

We will now digitise a few University buildings so that we have some data to show on our web map. We just need to digitise a few, together with the name of the building. First we create a new empty Shapefile.

For reference you can use the University campus maps available at:

<http://www.gla.ac.uk/about/maps/>

We can use the StreetView data (most zoomed in level) in the Digimap OpenStream WMS to digitise our map data.

If we digitise vector features of buildings we can create better representation and add additional attribute information to them.

a) Create a New Vector Layer from the top menu bar by going to:

Layer → Create Layer → New Shapefile Layer

b) Set Type: **Polygon**

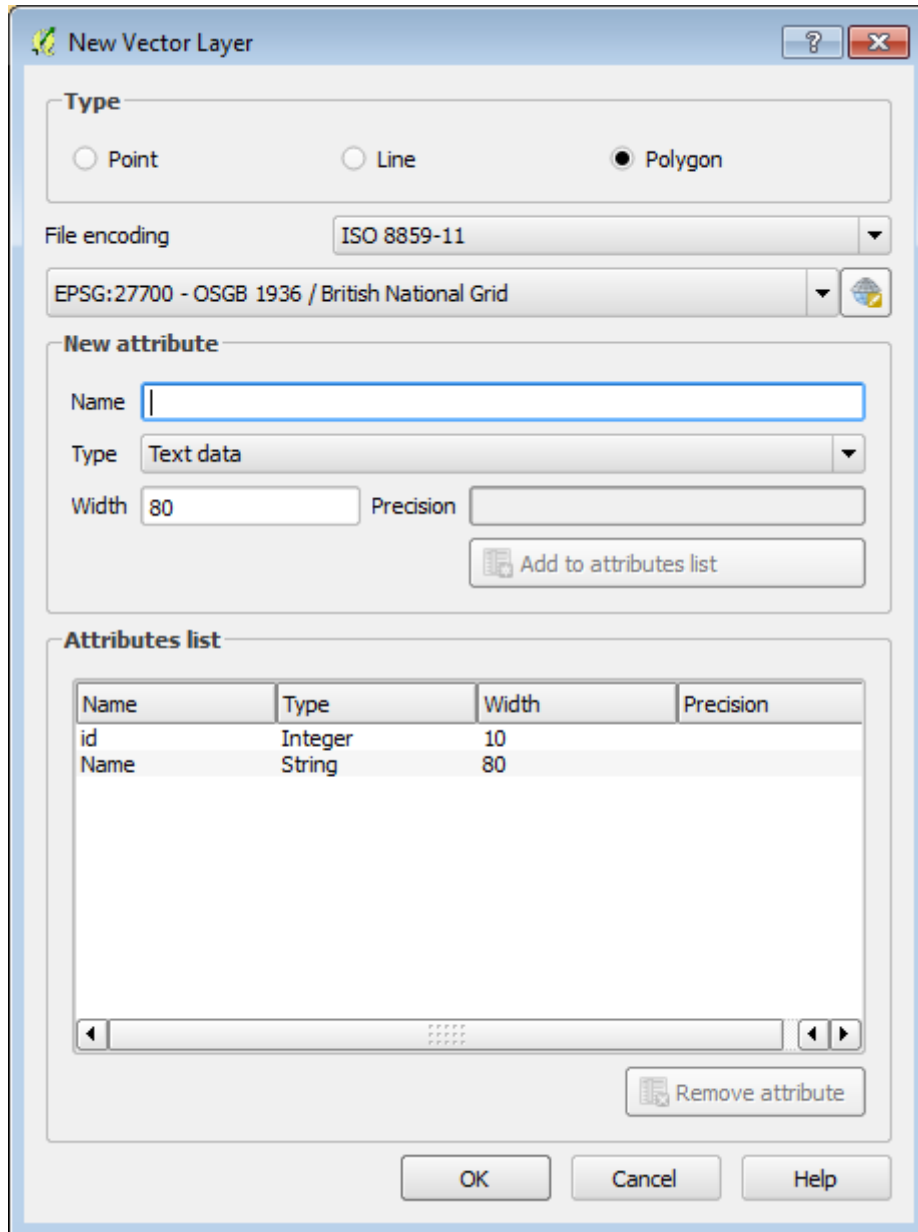
c) Change Selected CRS to be: **EPSG:27700 / British National Grid**

d) Add New Attributes: **Name**, Type: Text data, Width: 80

Then click on **Add to attribute list**

e) When you click on **OK** you will be asked to **Save Layer As...**

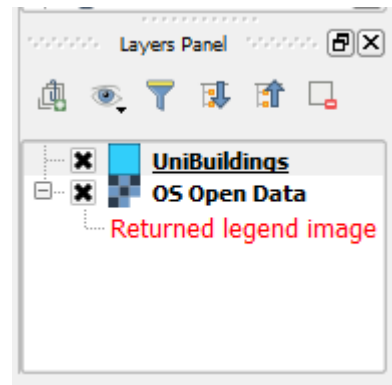
Save layer to a folder you have access to and give it the name “UniBuildings” and Save as type ESRI Shapefile.



Part 4: Digitise new buildings in the *UniBuildings* Feature Class (that you just created)

Now we will digitise some buildings, using the StreetView data as a guide.

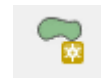
- 1) Select **UniBuildings** layer in the Layers Panel



- 2) Click on the **Toggle Editing** icon or right click the Layer and select Toggle Editing

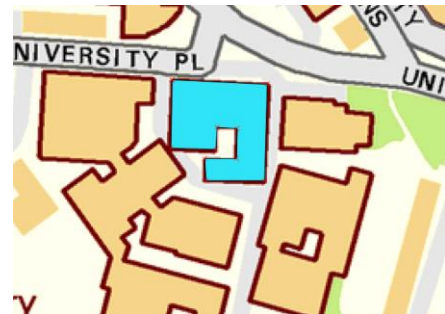


- 3) Select **Add Feature** in the editing toolbar

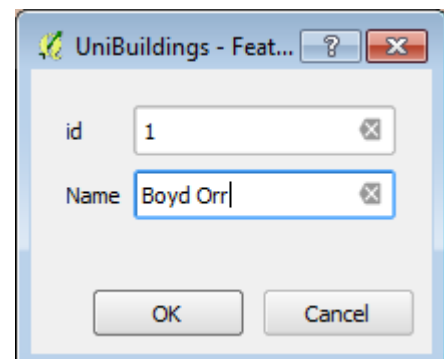


- 4) Digitise round the edge of university owned buildings by left clicking the mouse

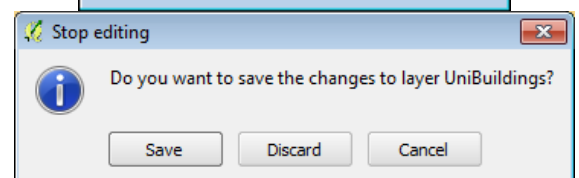
(Note: you can still pan around the map by using the middle mouse button)



- 5) When you've finished digitising, **right click** and add appropriate attributes and click OK

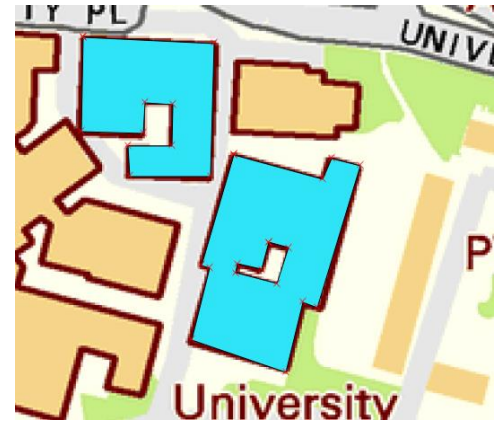


- 6) When you have finished editing click on Toggle Editing and click **Save** on the popup that appears.

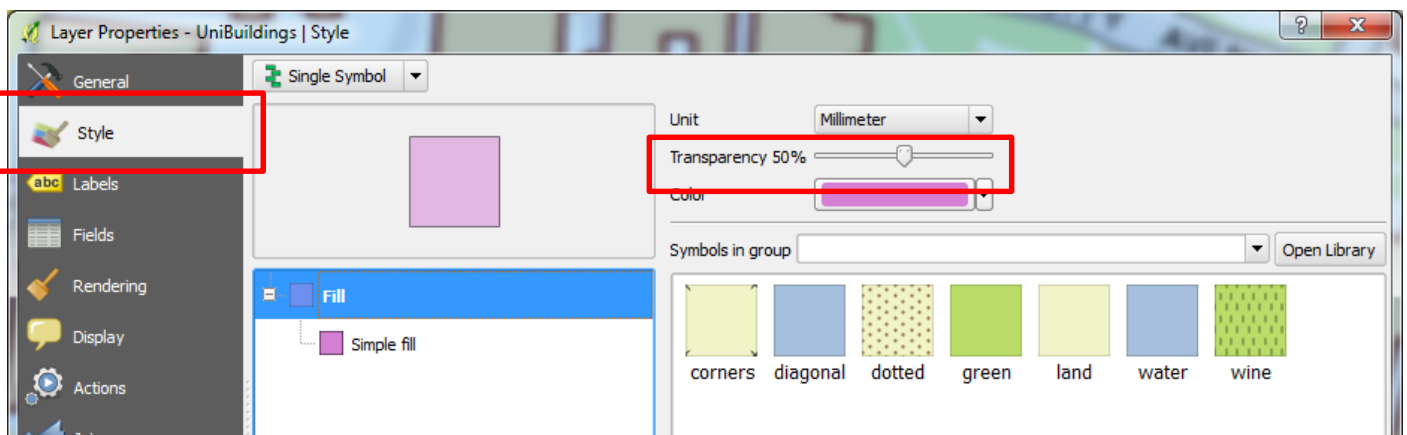


- 7) To make a 'hole' in a building use the **Add Ring** feature from the Edit dropdown menu on the top bar.

See Tip below to digitise holes



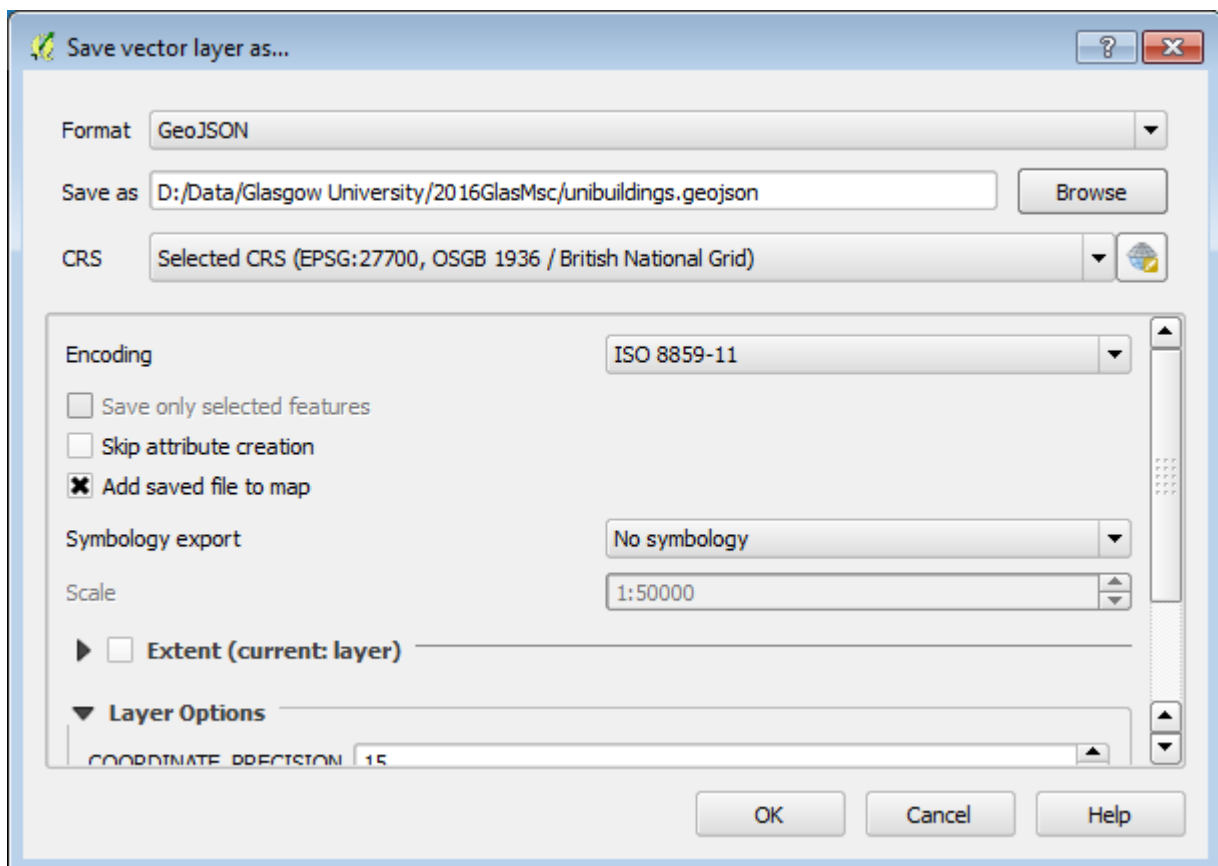
Tip: set your UniBuildings layer to be partially transparent so that you can see through the features you are digitising and see where you need to digitise holes. This is done by double clicking on the UniBuildings layer in the Layers Panel and selecting the Style tab, where you can use the Transparency slider to select an appropriate value:



Part 5: Export Map to Web File

This part of the exercise will show you how to get your map into an interactive map on a website. We will export the vector layer so that users can click on the map to query features. Save the file to your USB stick in the folder indicated:

- Right click on **UniBuildings** in the Layers panel and click **Save As...**
- Select format: **GeoJSON**
- Select the **Browse** button and save your file on the memory stick in the following folder:
"usbgis\apps\ms4w\Apache\htdocs\HTMLFiles\"
- Call your file **UniBuildings.geojson**
- CRS: **EPSG:27700, OSGB 1936 /British National Grid**
- Click **OK**



Part 6: Display map in OpenLayers

Openlayers is a javascript library that is used to display map data in a web interface. We will do this by using a portable version of Apache that is on the memory sticks.

“OpenLayers makes it easy to put a dynamic map in any web page. It can display map tiles and markers loaded from any source. OpenLayers has been developed to further the use of geographic information of all kinds. OpenLayers is completely free, Open Source JavaScript, released under the [2-clause BSD License](#) (also known as the FreeBSD).”

<http://openlayers.org/>

Please contact your course instructor to start the Apache web server on your PC.

There are a number of example HTML files provided that contain templates for displaying Openstream and vector data using OpenLayers.

These templates should be edited to include your own information.

You can use any plain text editor to edit these HTML files such as Notepad.

Instructions for editing HTML files:

All files are in the folder called **HTML Files in the htdocs folder**. Use a text editor such as Textpad or Notepad to edit the files.

The files are in the webserver folder on the USB stick (note your drive letter may be different):

"TOSHIBA G:\usbgi\apps\ms4w\Apache\htdocs\HTMLFiles"

The web pages can be displayed in a web browser by typing the following in to a web browser and clicking on the links:

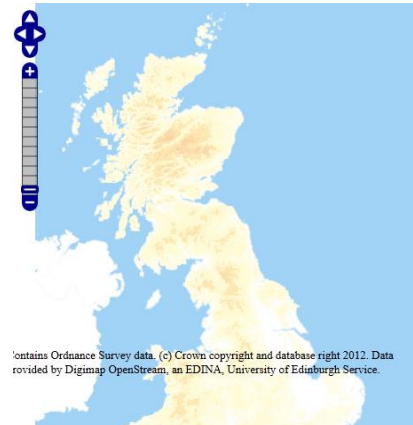
<http://localhost:88/>

1) Display OpenStream Only

Check that you have a working OpenStream API key, if not use:

8c0e792e28ffab921fcff0f2c7176f0db2c8df8b12ed7f468f38e043

- Open `1_OpenStream_orig.html` in web browser:
http://localhost:88/HTMLFiles/1_OpenStream_orig.html
 You should see a map similar to the one shown on the right.
- Open `1_OpenStream_orig.html` in a text editor.
- **Change the API key** to match the API key you obtained during the exercises above.



```
var apikey = "INSERT_YOUR_KEY_HERE";
```

- **Change width and height of map (e.g. to 1200px by 800px)**

```
<div id="map" style="width:600px; height:400px;"></div>
```

- Save your changes.
- Refresh the browser showing the HTML file. You should see the image above.
- Zoom in and out to see the different mapping products

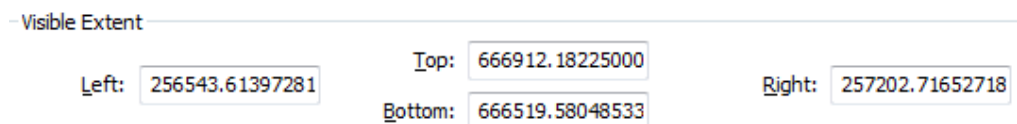
2) Display OpenStream zoomed to Glasgow Uni

This step shows you how to make the OpenLayer map load on the extent you require. To do this, we will edit `2_Glasgow_campus_openstream.html`.

- **Replace the API key with your own.**

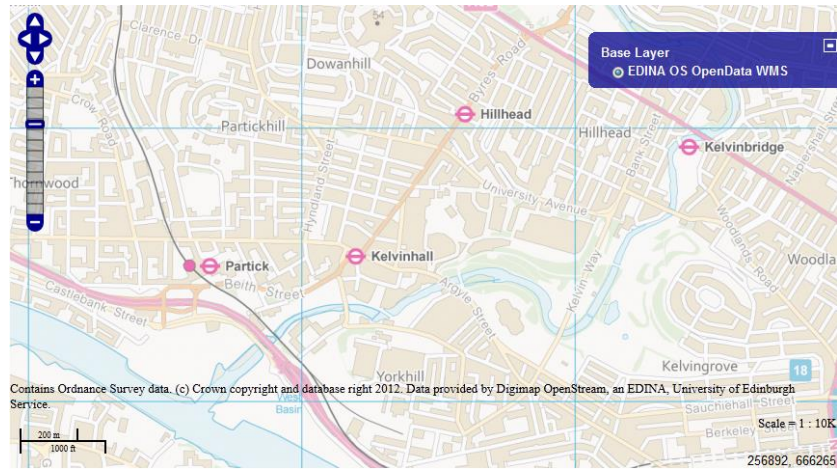
```
var apikey = "INSERT_YOUR_KEY_HERE";
```

- **Edit the Bounds2 variable** so that they are the same as your saved campus map. You can find these



```
var bounds2 = new OpenLayers.Bounds (256543, 666519, 257202, 666912);
```

from QGIS. You need the Lower Left and Upper Right cords (SW, NE)



- **Save** your changes and **view** the file in a web browser.

3) Display the GeoJSON vector data over the top of the campus

To do this, we will edit `3_Glasgow_campus_json.html`

1) Replace the **API key** with your own.

```
var apikey = "INSERT_YOUR_KEY_HERE";
```

2) Edit the **Bounds2** variable so that they are campus.

Visible Extent

Left:	<input type="text" value="256543.61397281"/>	Top:	<input type="text" value="666912.18225000"/>	Right:	<input type="text" value="257202.71652718"/>
		Bottom:	<input type="text" value="666519.58048533"/>		

```
var bounds2 = new OpenLayers.Bounds (256543, 666519, 257202, 666912);
```

3) Check the **attributes** to display are correct.

Edit the list of attributes to show, by default it shows the "Name" attribute:

```
+feature.attributes.Name+
```

4) Edit the **name** of you Geojson file

Edit the name of the Geojson file if necessary

```
url: "UniBuildings.geojson",
```