



Orchard Link Mapping Workshop (QGIS Training)



Contact

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1: Introduction to QGIS

What is QGIS?

QGIS is a user friendly Open Source Geographic Information System (GIS) licensed under the GNU General Public License. QGIS is an official project of the Open Source Geospatial Foundation (OSGeo). It runs on Linux, Unix, Mac OSX, Windows and Android and supports numerous vector, raster, and database formats and functionalities.

Source: <http://www.qgis.org/en/site/about/index.html>

QGIS will only develop further if it supported by **you** and the **user community** so remember to **please donate** to the project if you are able.

<http://qgis.org/en/site/getinvolved/governance/sponsorship/sponsorship.html>

In short, QGIS is great software to view, create, query and print geographic information – so let's make a start!

2: Installing QGIS

Make sure you have installed the latest version of QGIS on your computer from

<http://www.qgis.org/en/site/forusers/download.html>



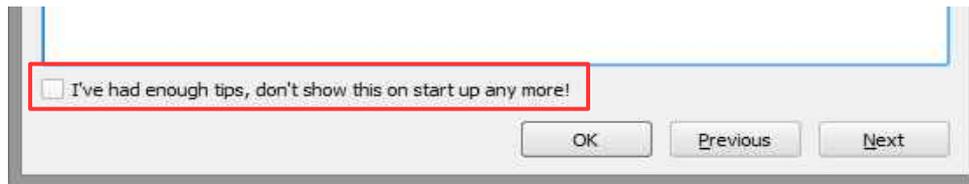
Select the appropriate operating system (Windows / Linux etc.) and click the relevant link. The QGIS Icon has recently changed to the one shown above. (These notes will continue to use the logo used in 2.18.6 and lower)

Once downloaded you should see a file similar to the one below. Double click the file to install.

Name	Date modified	Type	Size
 QGIS-OSGeo4W-2.14.2-1-Setup-x86_64.exe	04/05/16 10:46	Application	356,257 KB

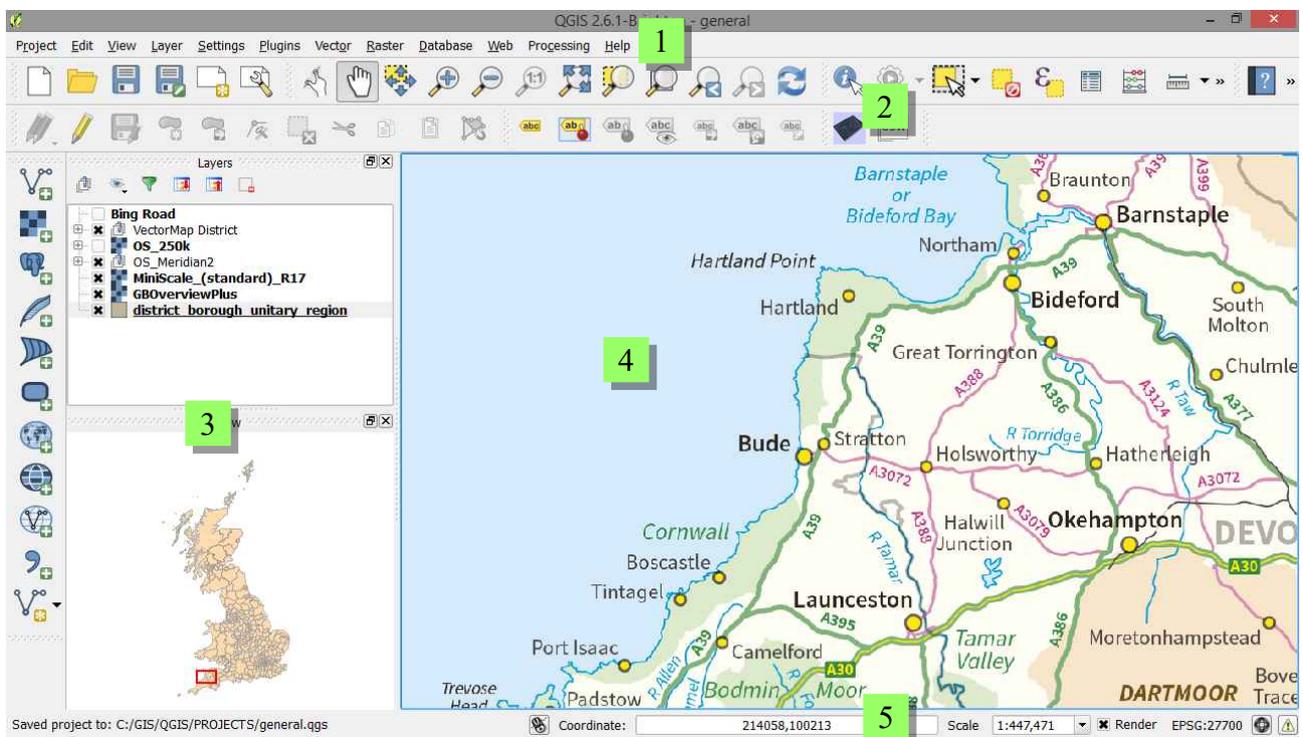
Once installed you can start QGIS by clicking the icon on your desktop.





When you click on the QGIS icon the default “**project**” is loaded and the **QGIS Tips** appear. You can stop these appearing by clicking on the checkbox “*I've had enough tips, don't show this on start up any more!*”

3: The QGIS user interface



- (1) MENU BAR – provides access to all the functions and plugins
- (2) TOOLBARS – provides a single click to common functions
- (3) PANELS – includes layer and overview panel plus others
- (4) MAP CANVAS – provides a dynamic visualization of the active data layers
- (5) STATUS BAR – provides information about the current project settings
(Coordinates, Map Scale and Projection)

4: QGIS Configuration

QGIS is highly configurable through the **Settings** menu. This is a quick-start version!

Options

Some basic options for QGIS can be selected using the Options menu. These can be set under the **Settings > Options** menu.

General



There are many settings in here but some of the more immediately useful ones are

Icon Size sets the icon size. 32 point is good as it makes the icons very easy to read which is perfect for getting used to the interface.

Font changes the font family used and size of the text used for menus. 10 is a good size.

Hide splash screen at startup – does what it says on the tin!

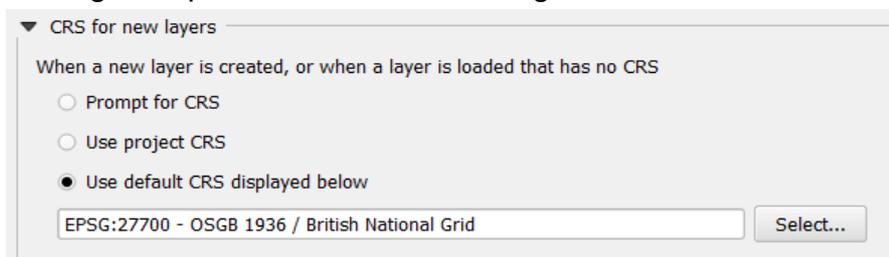
CRS



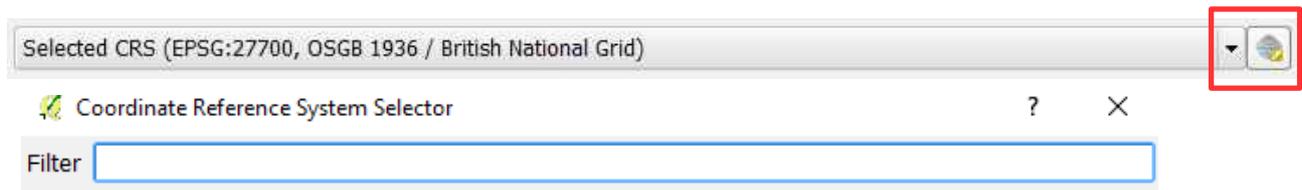
All maps (both digital and paper) are based on a coordinate reference system (CRS). The CRS affects how layers are displayed on screen and different CRSs work in different parts of the globe.

If two layers use a different CRS then map objects may not line up properly and measurements may be incorrect. You can check the CRS of a layer at any time by double clicking on it and checking the settings under the **General** options.

The most common CRS we will use today is **British National Grid**. This can be set as a default by choosing the option below and choosing **Select...**



The easiest way to search for a specific CRS is using its unique **EPSG code**. The EPSG code for British National Grid is **27700**.



5: Loading and Viewing Map Information

In this section we will look at loading different types of mapping, how to navigate around the map view and how to manage our map layers through zoom layering. We will save our work in a qgis project. This section is best understood through exercises with which you can follow along.

Loading Map Layers

QGIS recognizes vector and raster layers as well as some custom layer types.

Base maps such as aerial photos are **raster** whereas point, line and polygon data is **vector**.

Let's make a start by loading some data into QGIS.....

Data can be added in 2 ways, either via the **Manage Layers toolbar** shown below or by simply dragging and dropping into the Map View if you know what file types you want to show.



Exercise 5.1 Loading Raster Data

In the next example we are going to load some **OS VectorMap District** background mapping which has been downloaded from Ordnance Survey website.

OS VectorMap District is one of currently 12 different mapping products available as a download as **OS OpenData** which are free for public use under the terms of an OS OpenData licence.

You must always use the following attribution statement to acknowledge the source of the information:
Contains Ordnance Survey data © Crown copyright and database right [year]

For more information on OS OpenData visit

<http://www.ordnancesurvey.co.uk/business-and-government/licensing/using-creating-data-with-os-products/os-opendata.html>

or just "Google" OS OpenData!

Press the  **Add Raster Layer** button on the Manage Layers toolbar and browse to the files you want to open.

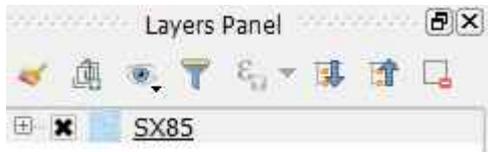
The files are in the "**Training\MAPS\OS VMD Raster**" folder.

We will load the tile SX85 which covers the Stoke Gabriel / Sharpham area

The file is in **GeoTiff** format which means that it has coordinates embedded in the file telling QGIS where to place it in the world.

Dependent on how your copy of QGIS has been set-up you may be prompted for the CRS that you want to use. Remember that we want to see the mapping in **British National Grid** (EPSG code 27700).

Another way to achieve the same result would have been to **drag-and-drop** the file into the map canvas. Your layer panel should now look like this:



The **layer panel** allows you to rename, turn on and off map layers as well as group layers together and change the style and projection.

If your map view is not showing any of the mapping then simply right-click on the layer above and choose **Zoom to Layer**

You should now see some mapping on your screen – albeit a bit grainy at the moment but we will improve this later.

Moving around the map

Before we go any further it is worth introducing the **Map Navigation** controls. These are defined as follows:

	Pan Map		Zoom to extents of selected layer
	Zoom in		Zoom to selection
	Zoom out		Go back to a previous view
	Zoom to full extents (all layers)		Move forward to a previous view
	Touch Zoom and Pan (touchscreens only)		

Spend some time moving around the map using the tools above. Remember to use the mouse wheel as well to zoom in or out.

Exercise 5.2 Adding some further Raster Data

In the next example we are going to load some OS OpenMap Local data has been downloaded from Ordnance Survey website. The mapping is produced at a larger scale than the VectorMap District as you will see.



Press the **Add Raster Layer** button on the Manage Layers toolbar and browse to the files you want to open.

The file is in the “**Training\MAPS\OS OpenMapLocal**” folder.

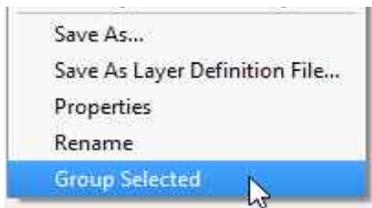
Again, the files are in **GeoTiff** format so they should fit straight into the correct geographic place. (Remember Drag and Drop which is easier!)

Exercise 5.3 Creating a layer group

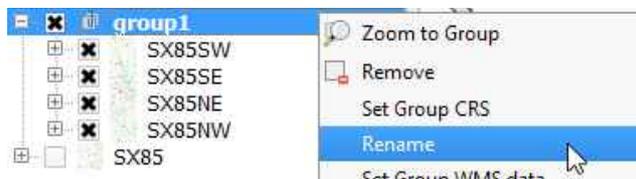
We will use the four OS Open Map Local tiles you have just loaded in this example.

You will notice that the layer control is starting to fill up with map layers. The four OS OpenMap Local layers can be made more manageable by grouping them in a layer tree / folder as follows.

Highlight the four maps SX85SE, SX85SW, SX85NE, SX85NW, **right click** and choose **Group Selected** from the menu that appears.



The text **group1** will be shown in the layer control. Give this a sensible name by right-clicking and choosing **Rename**. Call the group **OS_Local**.

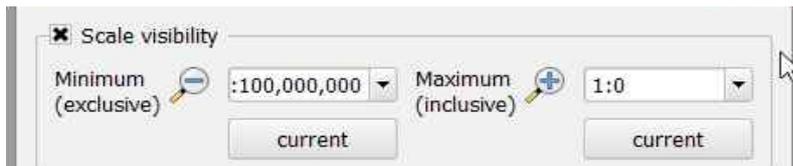


Exercise 5.4 Setting zoom scales for different map layers

Zoom scales can be used to turn map layers on or off dependent on the viewing scale.

Setting the zoom scale can be done either by **right-clicking** the layer name in the Layer control. Set the zoom scales as follows:

Layer Name	SX85	Minimum 1: 1,000,000	Maximum 1: 15,000
Layer Name	OS_Local	Minimum 1: 15,000	Maximum 1: 1



Note: Setting zoom scales for a layer group such as **OS_Local** above, requires you to double-click **into** the layer group and select all layers from inside it first.

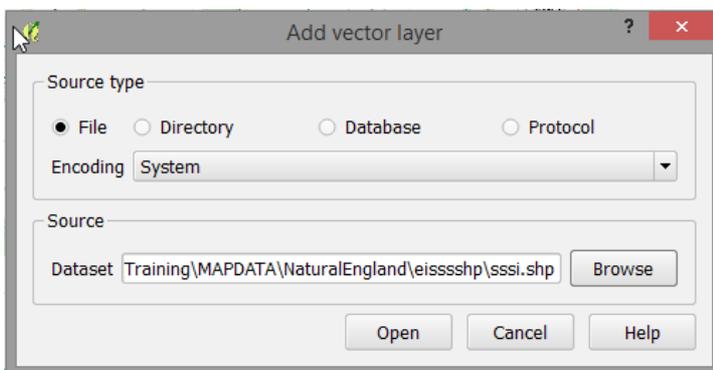
Exercise 5.5 Loading Vector data

In the next example we are going to load a vector map layer from **Natural England**.

Natural England have made some of their data available for use in a similar way to Ordnance Survey. Make sure you check the specific **terms of use** before downloading and using them as some of the licences are slightly different which may mean a different copyright or it may mean that you can not use the data for commercial gain. Data from Natural England are available in ArcGIS and MapInfo formats.

Press  the **Add Vector Layer** button on the Manage Layers toolbar and browse to the files you want to open.

Again, like Raster files you can use drag and drop here as long as you know what file type you are using. The file in this example is an ESRI shape file (*.shp) called **PHI_SX85.shp** from in the “**Training\MAPDATA\NaturalEngland**” folder.



If you choose **not** to drag and drop then you will need to complete the additional step below. Keep the Source Type as **File**, the Encoding as **System** and **Browse** to the dataset you require.

Press **Open** when ready.

Exercise 5.6 Changing map styles

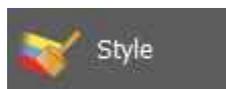
Lets have a look at our layers in the Layer panel. It should look something like this:



You will notice that QGIS applies random styling to each vector layer as it gets loaded if no styling files are supplied. You can use the layer control to change the way the maps are styled as follows:

Double click the layer **name** in the Layer Manager. This will open up the **Layer Properties** for that particular layer. Each map **layer** has its own properties section.

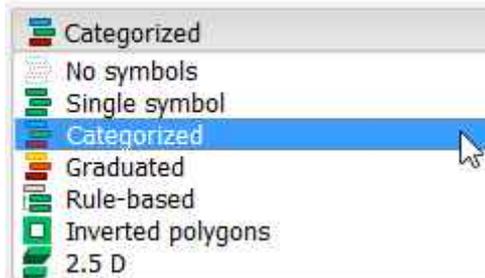
Choose the style panel....



This is where you can unleash your creativity! Its possible to set complex fill colours and

outline styles as well as **transparency** settings for each layer.

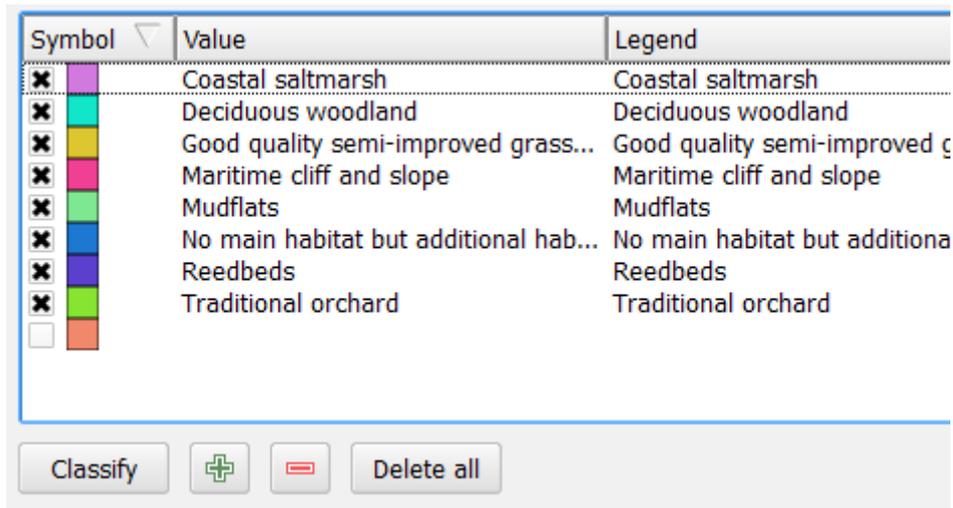
You can also choose, amongst other options, to create a **categorised** map, based on values in the data that the layer may contain.



Choose **Categorised** and then choose “Main Habit” from the drop down list.

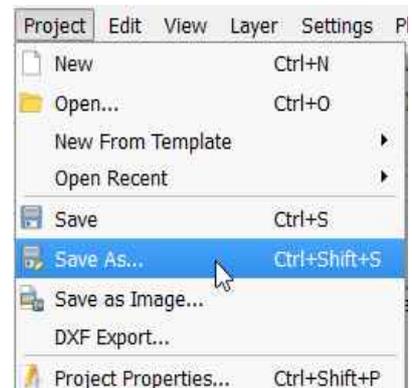


Press **Classify** and **OK**



This will create a colour coded layer based on each Priority Habitat.

Now **save** the project by choosing **Project > Save As** and give the project a name. QGIS will give the project a *.qgs file extension.



Congratulations – you have now set up your first QGIS project!

6: Plugins

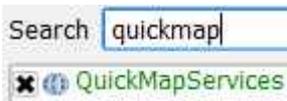
Plugins are small programs for specific tasks written by the community. Check out the website <https://plugins.qgis.org/plugins/> for further details.

Some useful plugins include:

<p>go2streetview</p>  <p>View Google Street View or Bing Bird's Eye linked to the map.</p>	<p>Mirror Map</p>  <p>Add one or more linked map windows – useful for comparing different map series.</p>
<p>QuickMapServices</p>  <p>View OpenStreetMap, Google Maps, Bing Maps, MapQuest layers</p>	<p>Qgis2web</p>  <p>generates a web map from your current QGIS project, either as OpenLayers3 or Leaflet.</p>
<p>Zoom to Coordinates</p>  <p>Type in an x,y coordinate and zoom to the location</p>	<p>Qgis2threejs</p>  <p>Qgis2threejs plugin exports terrain data, map canvas image and vector data to your web browser and displays it in 3d</p>
<p>Mask</p>  <p>quickly transform a polygon selection into a map masking layer or a region of interest</p>	<p>TomBio tools</p>  <p>Aimed mainly at biological recorders, it contains the OSGR tool for OS Map grids</p>

Exercise 6.1 Load the QuickMapServices plugin

Choose Plugins > Manage and Install Plugins and type “**quickmap**” in the search box.

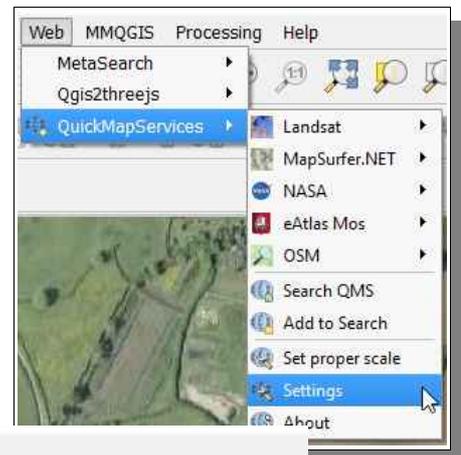


Select QuickMapServices and **Install plugin**.

A new menu under **web** will appear.

Choose Web > QuickMapServices and choose **settings**

Select the **More services** tab



Select **Get Contributed Pack** (this will show more services like Google Maps)



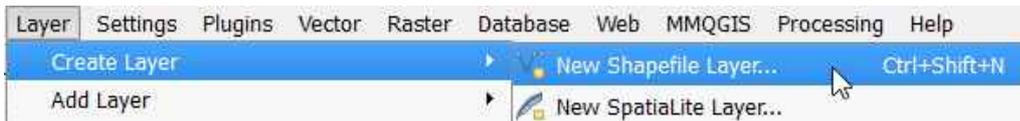
You will now be able to load imagery from the Web menu from Google or Bing Satellite from the **Web** toolbar. **Re-save your project** with some Aerial Imagery.

Section 7: Adding map features (Digitising)

The easiest way to learn about how to draw features is by doing it for yourself so lets add some layers of our own and make a start...

Exercise 7.1 Digitising points from Google Mapping (Individual Trees)

Step 1. Open up a simple project (the one you created in section 5) and create a new layer to draw onto as follows:

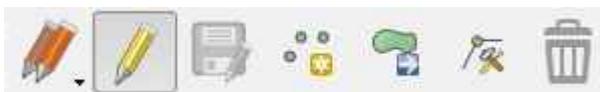


You will be prompted for a location to save the layer and a layer name.

Step 2. Type in a layer name and tell QGIS whether the layer will contain Points, Lines or Polygons (areas). Call the layer "**Points**" and make sure the Point type is selected. Make sure the projection is **British National Grid** (EPSG: 27700).

Your new map layer will appear in the layer list on the left side of the screen.

Step 3. Make sure your layer is selected as shown above and ensure that the Digitising toolbar is active as shown below.



The yellow pencil button is a toggle which turns the digitising toolbar on and off.

Step 4. Zoom over a tree on the base mapping and Select the **add feature** button and click on the canvas to add points to the map.



Once you have added points, feel free to play around with the properties of the map layer as you did in section 3.4. (Hint: either double-click the layer name or right-click and choose Properties)

Removing a feature

To remove a point choose the select button  and select the point you want to remove (it becomes highlighted) and finally press the red **Delete Selected** button 

Repositioning a feature

Features can be moved by using the **Move Feature** button.  Click on the button and then on the feature you want to move, dragging it into a  new position.

Step 5. Press the **Save Layer Edits** button  to save all your changes. If you forget to do this with a Memory Layer then QGIS will prompt you to save the changes before you exit the program.

Excellent! You have now added some features to the map.

Map attributes

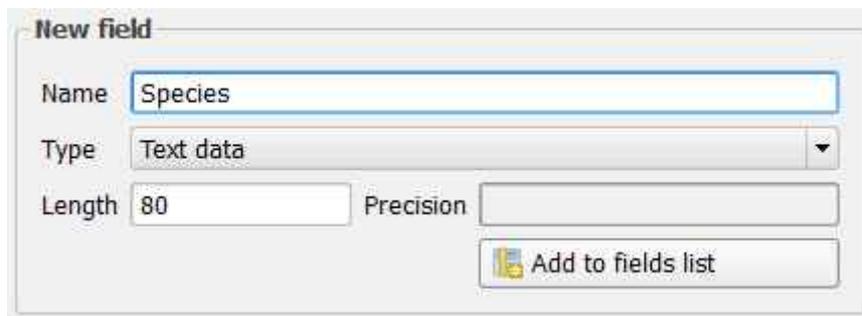
An Attribute is the name given to any data that is attached to a mapped feature.

An example of an attribute would be “Owner” in a Land Ownership layer or “TreeType” in an Orchards layer. **More than one attribute** can be recorded against a mapped feature.

You can add attributes to a layer either when you create it or by right-clicking and choosing Fields. (QGIS used *fields* and *attributes* interchangeably)

Exercise 7.2 Points with attributes

Create a new layer (using the same process as 7.1) and this time we will add a **New field**



The screenshot shows a dialog box titled "New field". It has four input fields: "Name" with the text "Species", "Type" with a dropdown menu showing "Text data", "Length" with the number "80", and "Precision" which is empty. At the bottom right, there is a button labeled "Add to fields list" with a small icon to its left.

Type “Species” and say it is a **Text data** type – the length refers to how many characters we will need to hold the values, 80 is more than enough.

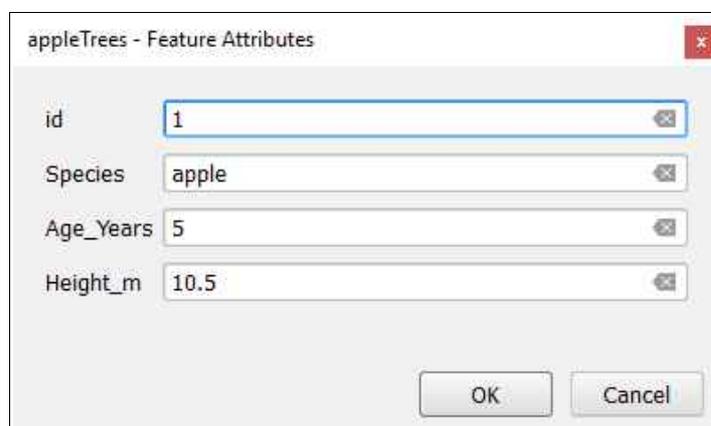
Press **Add to fields list**.

Let's add another attribute called “Age_Years” of type **Integer** and Length 4 (up to 9999!)

Press **Add to fields list**

Now add a final attribute called “Height_m” of type **Decimal** Length 10 Precision 1

Upon completion of adding a feature you will be prompted to complete the following form.



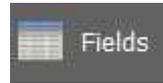
The screenshot shows a dialog box titled "appleTrees - Feature Attributes". It contains four text input fields, each with a small 'x' icon to its right. The fields are: "id" with the value "1", "Species" with the value "apple", "Age_Years" with the value "5", and "Height_m" with the value "10.5". At the bottom of the dialog, there are two buttons: "OK" and "Cancel".

Exercise 7.3 Creating a drop down list to populate attributes

If you have a large data digitising project with lots of attribute information then you can define **preset lists** to choose from which will save you typing and spelling errors– for example you may have a list of all English Apple tree varieties.

Choose either to create a New Layer (or modify the one you created in 7.2 above).

Right-Click on the layer name and choose **Fields**



Press the **Text Edit** button next to the attribute you would like the list to appear and choose Value Map from the list of available options on the left.

Id /	Name	Edit widget	Alias	Type	Type
123 0	id	Text Edit		qlonglong	Integer64
abc 1	spp	Value Map		QString	String
abc 2	age_years	Text Edit		QString	String
123 3	height_m	Text Edit		qlonglong	Integer64

Put a value in the first column (a sequential number is fine, this will get stored) and a description in the second column.

	Value	Description
1	1	Apple - Bramley
2	2	Apple - Cox
3	3	Apple - Discovery

You will see the descriptions appear when you add a new feature.



Save your edits ,  press the information  button and click on the feature to review your work.

If you have time – repeat the processes we have just covered in this section with a **Polygon** or **Polyline** data set.

Note: **Right-click** your mouse to finish drawing a polygon. Reshape a polygon by clicking on the node tool

Congratulations you have now completed your basic introduction to QGIS !