Set up; hardware and software.

I'm suggesting the use of qgis. Qgis is open source software, and is therefore free. It has a massive user database, and a community of users and programmers who work on the code without charge. This community guarantees that this software platform will be maintained and developed into the future. Annual reports from the project are available here.

This is a very powerful spatial mapping tool that also allows the creation of 3D models from a plug-in. Qgis supports the linking of text in table based information to polygons or points on the map. The linking is accomplished through the use of a locally held database is or even more simply through the use of Excel files and data can move both ways from the map to the database from the database to the map. This allows for the creation of schedules of paddock areas for example and records. Almost anything can be recorded and linked to the map. Choices will depend on the nature of your operation, but could include fertiliser application, location of water tanks, fence lengths and condition, tree ages and locations for growers, etc.

What computer do I need?

My system dates from 2014 and is an HP EliteBook 850 G1, a business grade laptop with 16gb of ram and an i7 processor. These sell on trade me for about now. Windows 10 is recommended.
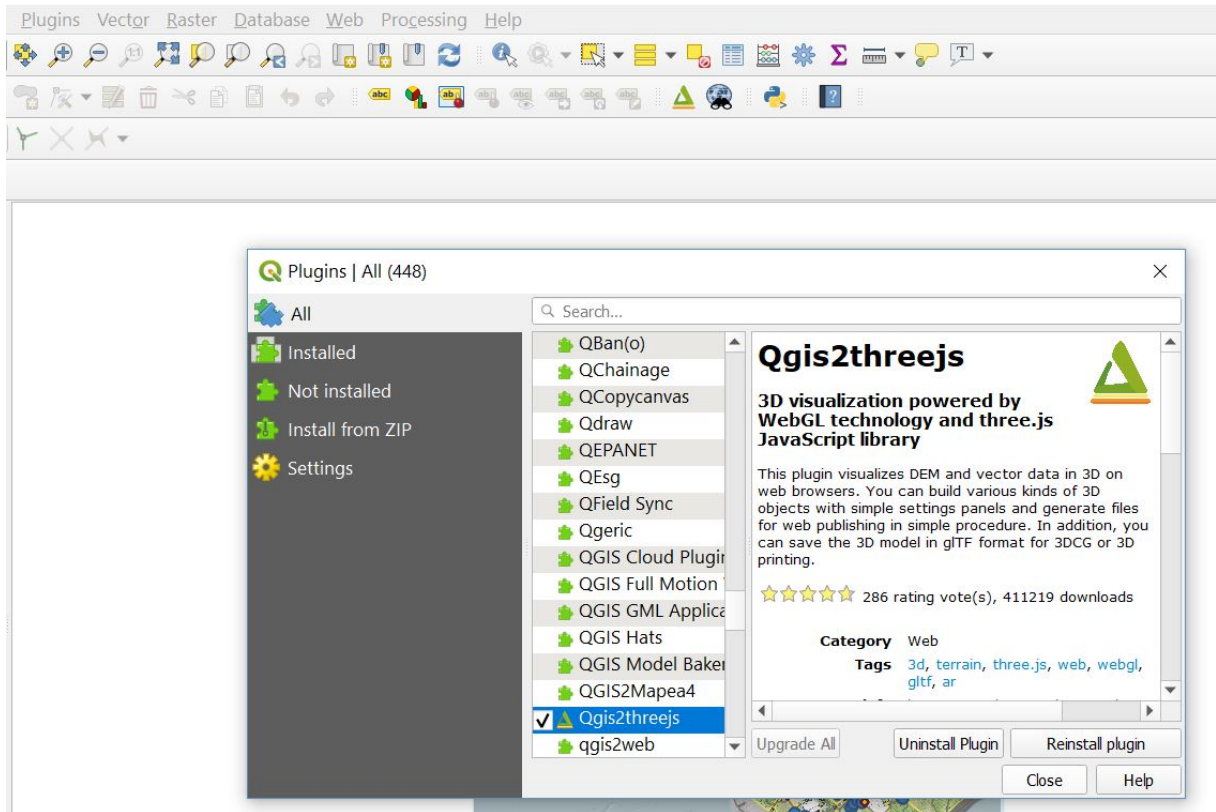
Get the software

The stable standalone 64 bit release is here. This should work for most, download and install. More options are available for apple etc.
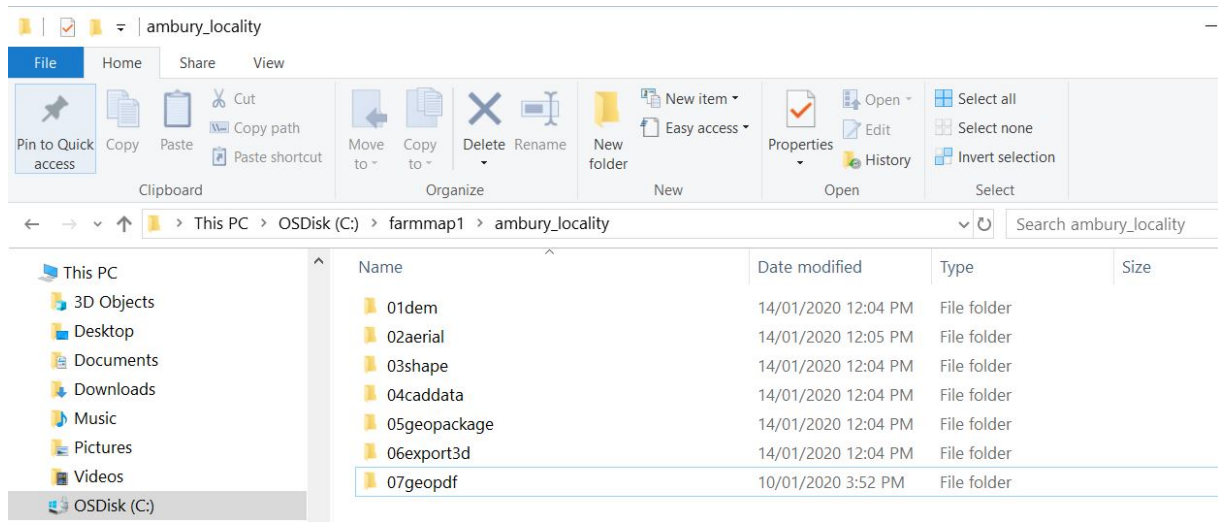
Start it up and get some plugins.
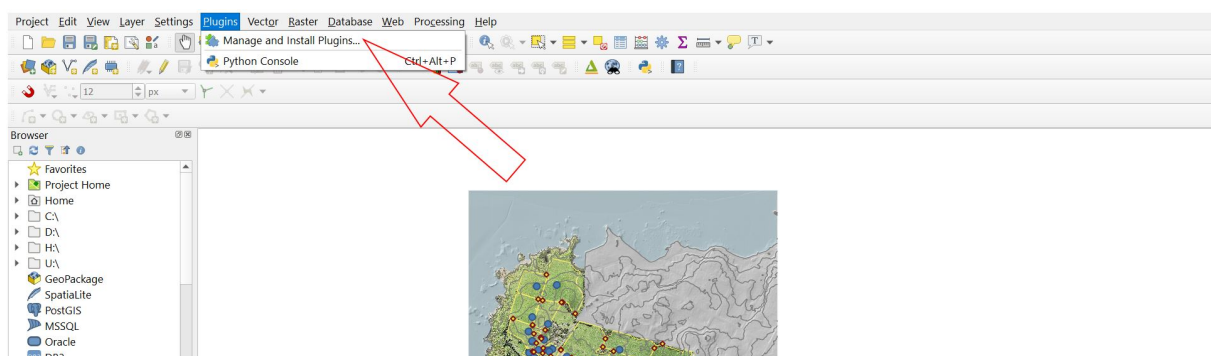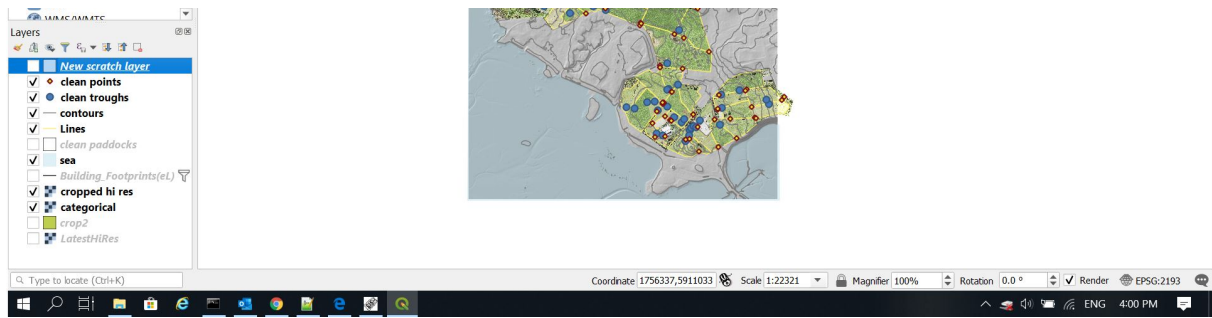
Screen grab, carry out actions in red, select plugin.

Find qgisthreejs and check the box.

Set up a directory structure

Qgis keeps its data as a collection of individual files. To keep your project orderly a systematic approach to structuring directories is recommended.

Recommended directory structure, windows explorer.

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Obtaining free and open source data for NZ

A first step is obtaining data from the land information New Zealand Data Service. This has become a very straightforward process. There is a great deal of data here, much of which is only recently available, and free and in the public domain. Quite often high-definition Lidar data will be available for your rural site, at 1 metre resolution. If it isn't then the next best option is the use of the 8 metre resolution data to create the underlying topography.

I have found it is useful to download several data sets for farm map use. One will be a shapefile that gives the property boundaries, one will be the rural aerial map at the best possible resolution and one will be the underlying digital elevation data as discussed above.

The process is to simply select an area and then go to the top corner and click download. The following screen grabs go into more detail.
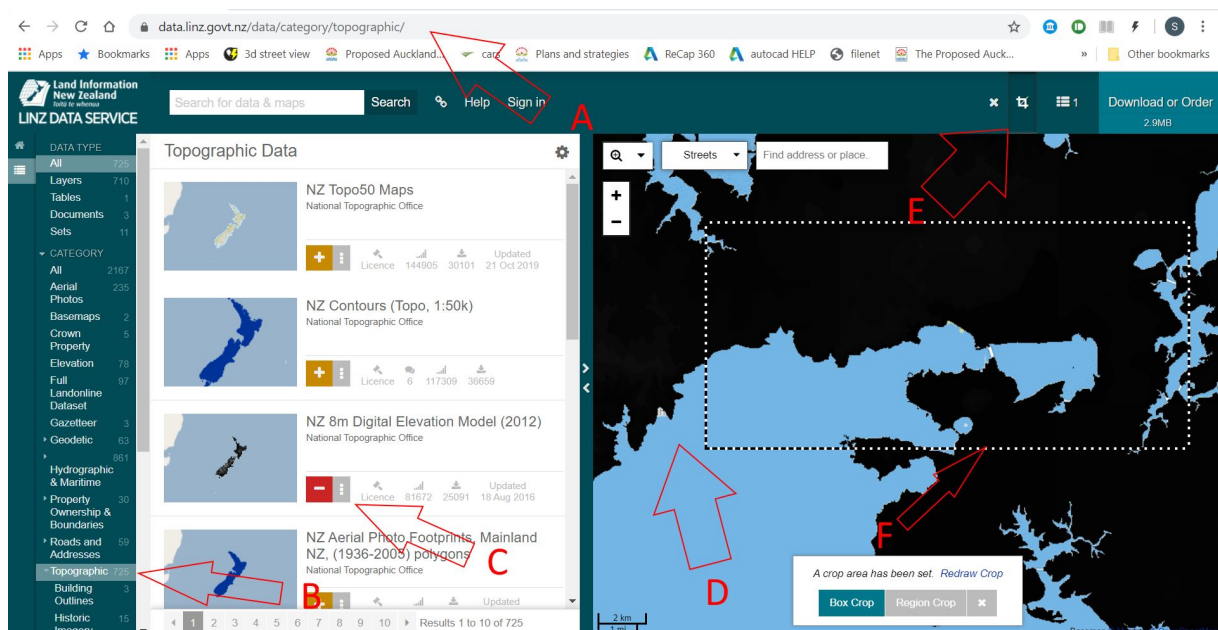

Screen grab, carry out actions in red, select data.

* A. Go to this address in your browser. * B. Filter on topographic, for 8m DEM, or elevation, for 1m DEM. * C. Hit the plus sign and make it go red like this. * D. Navigate from map of NZ to the locality you want, either pan and zoom with mouse or type address. * E. Activate area selection using this box. * F. Click diagonal opposite corners to select the area you want. Then click the download box in the top right corner, near E.

There is a limit on download size, and you have to provide an email address, but little else.
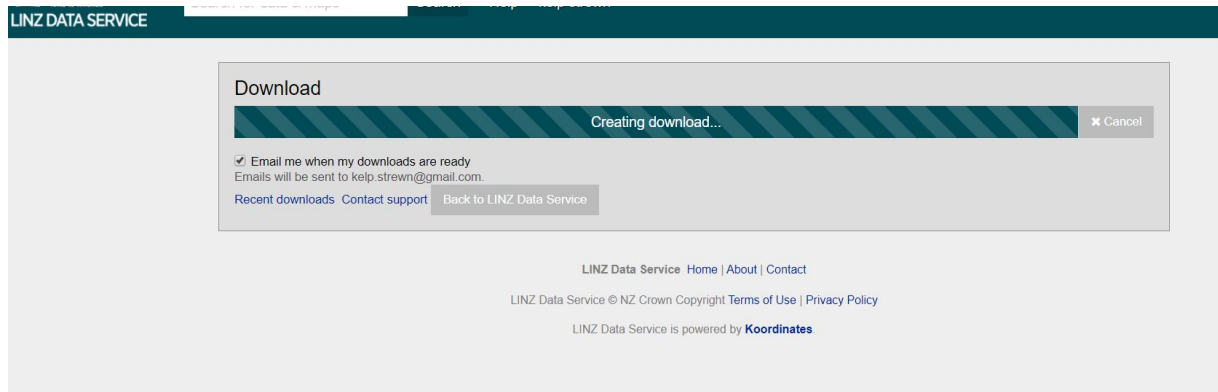
Here is the window you will see when all is a success.
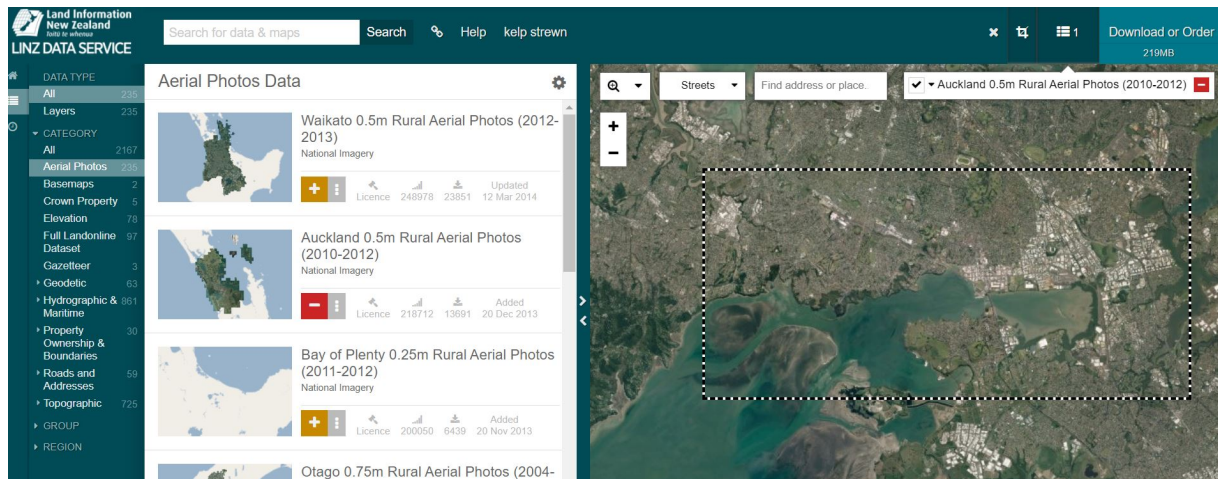
A similar process can be used to get aerial photos, (and shape files for the boundary).

The rural photos are available everywhere, but you may find more recent or higher resolution photos in your local council website.

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Loading data in Qgis

Having obtained the data it needs to be processed to be put into a form usable for farm mapping. The first step is to arrange the data into a directory structure that will allow it be used for a farm map. The structure I suggest is to arrange the main data types in seperate directories under a main project directory. This is done in windows explorer.
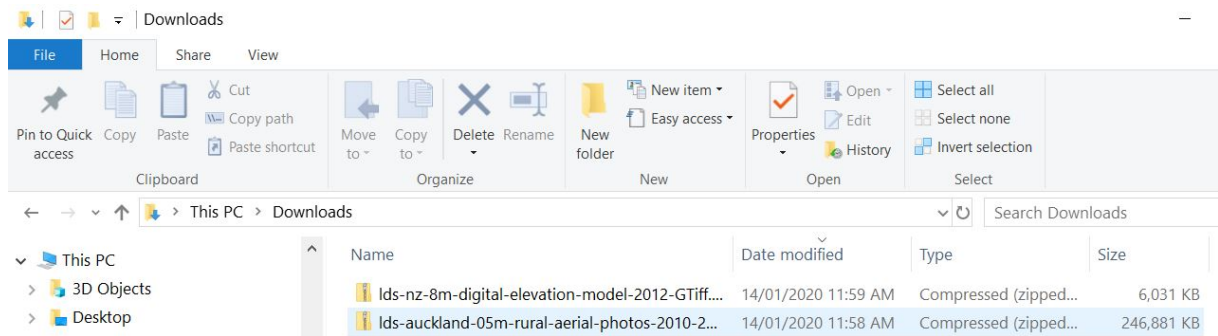
Find your downloaded data in the downloads directory.

Move the elevation data to A, the jpg to B and unzip. Do similar with the property boundary shape file.
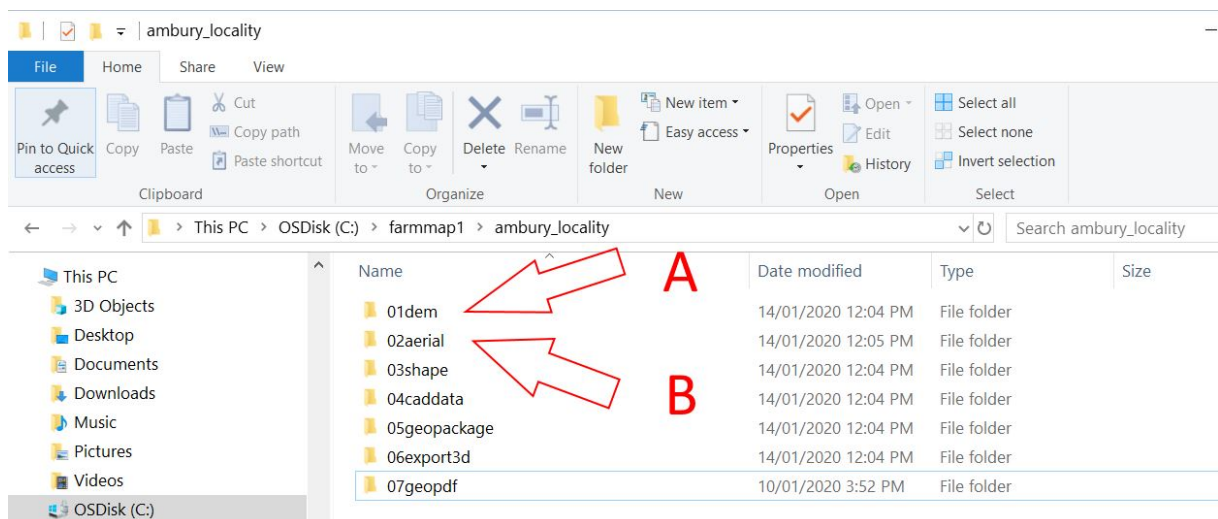

Put data in project directory.

Qgis
The creation of simple traditional farm map with the addition of some 3D will be my focus here. The locality I have chosen is broader than that found in the proceeding farm map example here, as I am planning to repurpose this using an historical chart as well.

So open qgis and save an empty project to the project directory, mine is ambury_locality.

Before you begin it is important to establish correct datum for your map so that it all the imported data ends up in the right place. LINZ data will be downloaded in New Zealand

Transverse Mercator projection, if you leave the default set on the LINZ website. Set your project to the same projection. This can be done in the box at the bottom of the screen on the right-hand side.
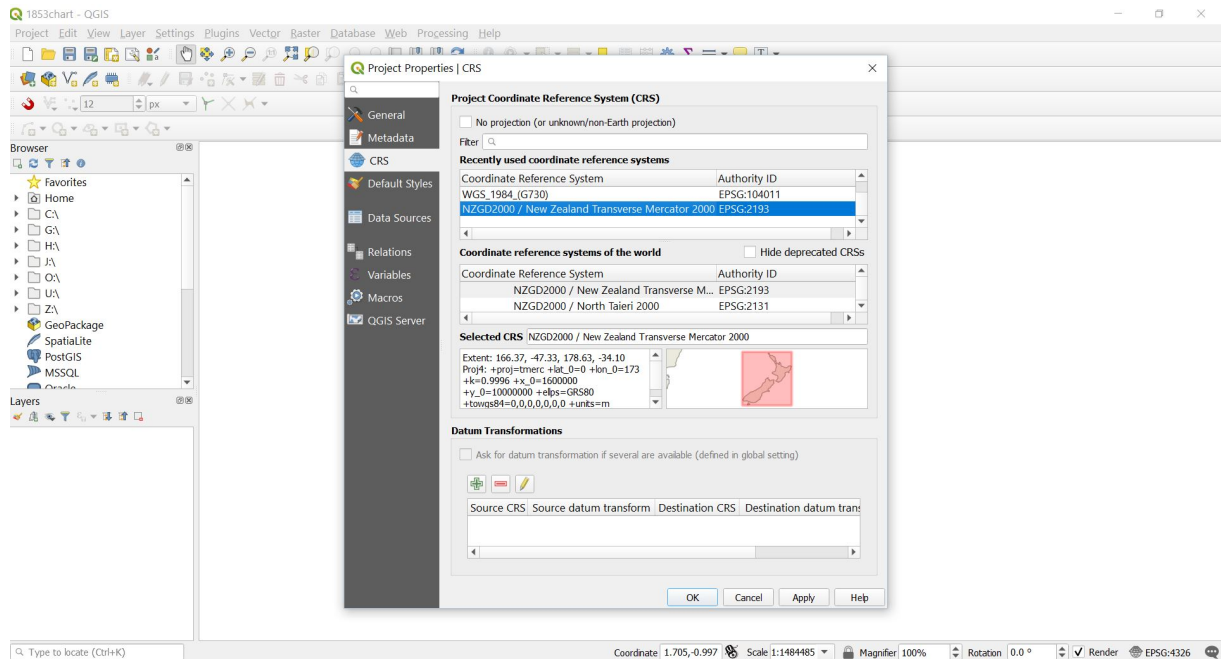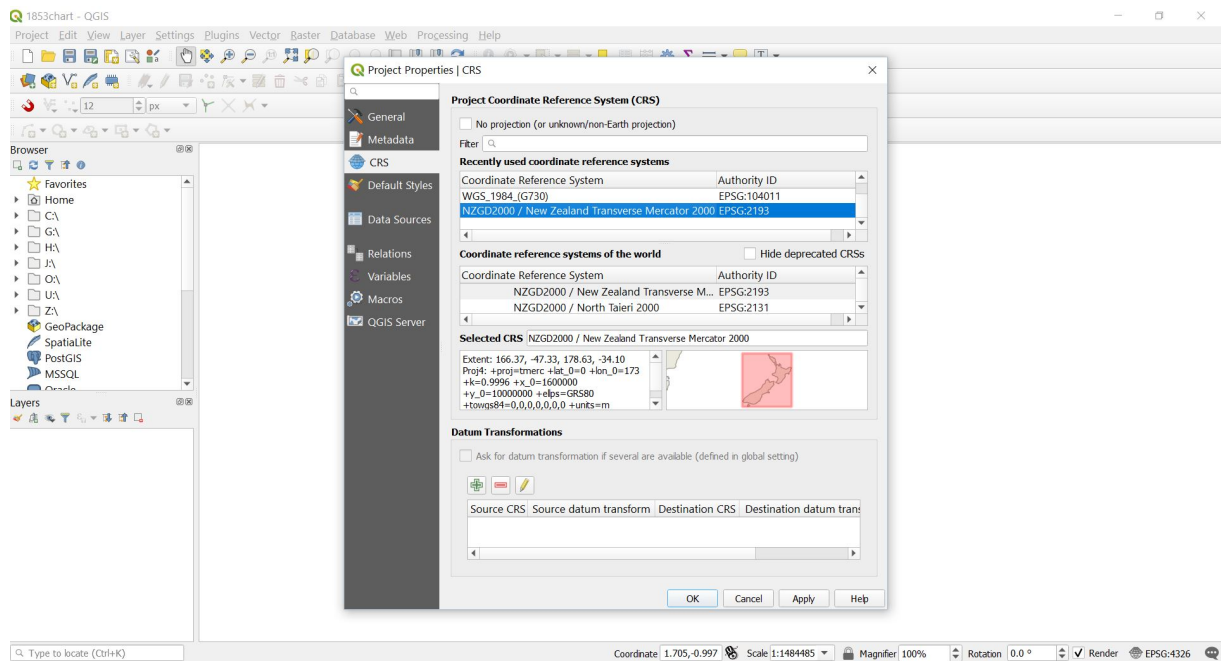

Set cordinate system.

The next step is to put the downloaded Linz data into layers. Go to the layer menu and add the shapefiles vector data as shown in the screen grab.
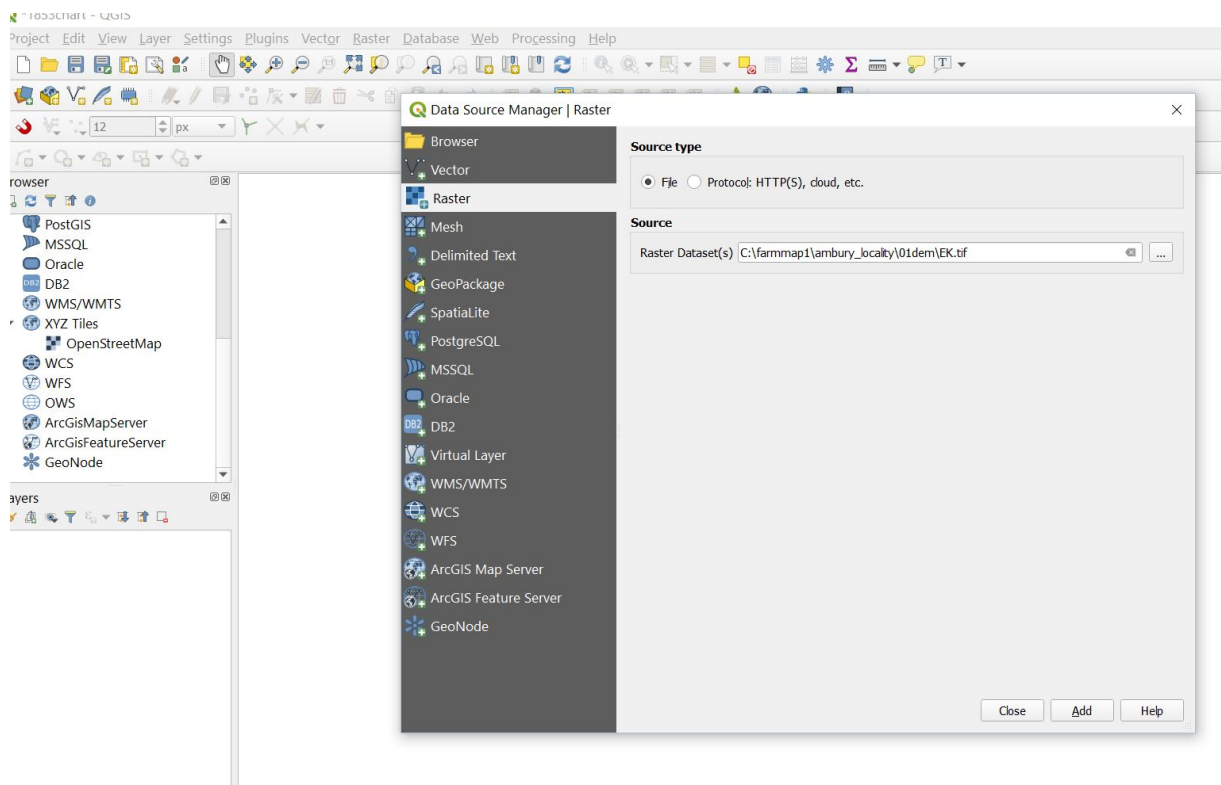
Add vector layer.

It is a similar process to add the aerial photograph data and the underlying topographic data.

Add raster layer.

Save the project, file menu. This doesn't alter the data in directories 01 to 03, but keeps their arrangement and formatting between sessions.

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Layers

The next step is to arrange and format the data in the imported layers. The layers can be moved so that they display in whatever order you want. This effects visibility and what is seen on screen.

As an example try changing the order of the boundary data. If it is at the top of the screen it will obscure the other layers. As you move it down more data from the other layers will appear.

The boundaries layer has a fill that we don't want.

Right click to open the properties box turn off the fill for this layer so you can see what is below. The next layer down should be an aerial photograph and the bottom layer should be the Geo Tiff.

These three layers will give you the base from which you can do different, more advanced things with qgis.

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Making 3d maps

The first of these might be the creation of a 3D map.

Creating a 3D map

The first step is to load the qgis 3 JS plugin. Detail about this can be found here.

Going to the qgis menu at the top of the screen, find it on the list and install it.

Once installed zoom the screen to show in plan the extent of the land you wish to see in the 3d model. Then click the Little Green Triangle. The model will display. check and uncheck the layers at the side. As a starting point it should be displaying the aerial photograph projected onto the terrain of your land.

This is a reasonable starting point and a quick visualisation of your land. Much more can be done though. At this stage save the model as a complete web page using either the local viewing option, or for use under a domain, if you are uploading to a website you own.

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Digitising custom data

To have a useful map you will want to go beyond the public domain data from linz.

Here is a method for either making a dead simple preliminary map, or for getting a data layer for import into qgis, with all its capabilities.

Get a google account if you don't already have one (free) and login. Go to [my maps](

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