

How to create Lidar contours with QGIS

QGIS (Quantum Geographic Information System) is a powerful and widely-used open source GIS program. A key use for orienteering mappers is the means to process Lidar data and create contours. Current and recent versions of QGIS have built-in Lidar support: QGIS gives earlier QGIS versions and OpenOrienteering Mapper similar functionality.

QGIS is free to download. The current version (23 July 2022) is 3.26 'Buenos Aires'. It's a large program and may take a while. My notes are for version 3.10 which works in a similar way.

Obtaining Lidar data

Go to Defra Survey Data Download

<https://environment.data.gov.uk/DefraDataDownload/?Mode=survey>

Zoom the map in to the desired location with your mouse. You will see the OS 5km x 5km grid tiles.

Select the Polygon tool on the right and draw the rough area you want.

Click **Get Available Tiles** and wait until the right-hand box changes to 'Download your data' with options.

Product: choose **National LIDAR Programme DTM**

Leave Year and Resolution as they are.

Under 'Available tiles' you'll see a link like [National-LIDAR-Programme-DTM-2021-SY49se](#).

Click to download the zip file.

Save it where you like on your PC and extract the files. You'll find the relevant **.tif** format file in a subfolder.

Starting QGIS

Open the QGIS Desktop.

From the top menu select **Plugins / Manage and Install Plugins**. Scroll to 'Contour plugin'. Check the box and install it.

From the top menu select **Project / New**.

Then select **Layer / Add Layer / Add Raster Layer**.

A Data Source dialogue box appears asking you what Raster Dataset(s) to use.

Click the Browse button to the right and navigate to your Lidar **.tif** file.

Click the filename. Then **Open / Add / OK**.

Close the dialogue box.

Usually the 5km x 5km tile containing your selected area will have appeared as a grey tone square, but not all parts of the UK are covered yet. You may unfortunately have a part-tile or no coverage.

Extracting contours

In the top menu select **Raster / Extraction / Contour**. Your file should appear in the Contour dialogue box / Input layer.

Choose the Interval between contour lines, say 5m. **Run**.
Close when finished.

In the Layers panel on the left, you can use the checkboxes to toggle the original layer or the contours on or off. If you want contours in a different colour, right-click on the word 'Contours' and select Properties.

Select another file & repeat if wished.

Smoothing the contours (optional)

After creating contours go to

Processing (top bar)

Toolbox

Vector geometry

Simplify (double click)

Tolerance is the distance between contour nodes. Try maybe 3 metres.

Modify All Features

Then back to **Vector geometry / Smooth** (double click)

Set number of Iterations, say 4.

Modify All Features

(After Processing / Toolbox you may need to click **Edit features in place** tab to see list which includes Vector geometry. Different QGIS versions have their idiosyncracies!)

Preparing a background map (non-georeferenced)

In the top menu select **Project / Import/Export / Export Map to Image**.

In the 'Save Map as Image' box change Resolution if you wish to. I usually increase it to at least 192 dpi for detail clarity.

Save. Browse to where you want it saved on your PC.

Give it a File name. In 'Save as type' select image format - normally JPG.

You should now be able to open the jpg in Ocad as a Background map.

Note: the image you save is the area onscreen. If you've zoomed in, you may want several images. They can be opened separately or stitched together with editing software like Adobe Photoshop or PaintShop Pro.

Preparing a background map (for georeferenced maps)

In the top menu select **Project / Import/Export / Export Project to DXF**.

In the 'DXF export' box browse to where you want it saved on your PC. Give it a File name. **Save**. You are saving the whole area, not just the onscreen image.

In Ocad, go to **File / Import**. Find the DXF file. It will open as a grey basemap. Brown contour lines can either be created directly or you can draw over the grey lines yourself.

Note: As far as I can discover, the Import process is irreversible, so back up your original Ocad map file first!