

## IMPORTING LIDAR DATA FROM UK DEPARTMENT FOR ENVIRONMENT (DEFRA) SURVEYS

- 1) Get the postcode of the golf club you want to map. In this case I have chosen Littlestone Golf Club in Kent ... one of the qualifying courses for the Open when it is held at Royal St George's, Sandwich (or in this year's case when it wasn't held at Sandwich!).

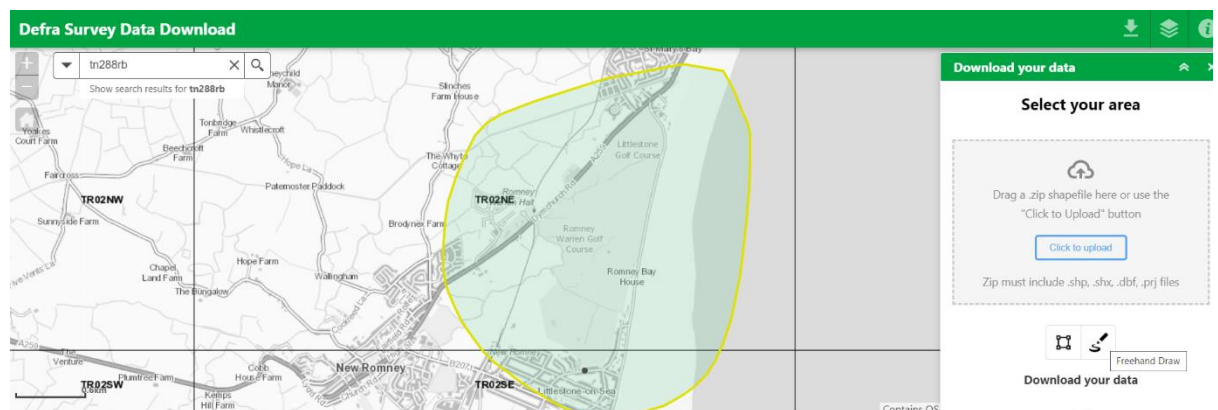
Postcode: TN28 8RB

- 2) Go to the DEFRA data download page:

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

Click on the map to get the 'Download your data' pop-up. Enter the postcode in the top left of the screen where it says 'choose tile or location'. The map will zoom to the clubhouse address. Zoom in or out until you have the area of the golf course visible on the map.

Use the freehand select tool to circle the area you need. This will automatically select the tiles needed, although in this case you can see from the map that you will need tiles TR02NE and TR02SE.



In the 'Download your data' pop up on the right, scroll down until you see an arrow with 'get available tiles written below it'. Click on this, and the following pop-up will come up.

Select:

Product: LIDAR Composite DTM

Year: Latest available

Resolution: DTM 1M or DTM 2M (don't select less than 1M as there are too many data points and coverage is not complete (and the game only goes to 1M resolution anyway). Anything more than 2M will not have the resolution for the finer details)

There are two tiles available in this case at 1M resolution: LIDAR-DTM-1M-TR02ne and -TR02se

Click on each tile in turn to download, and extract the zip files to a single folder.

C:\Users\XXXX\Desktop\LIDAR\Littlestone tiles

- 3) We now need a tool that can combine the whole group of .ASC files  
I eventually found LAStools, and there are Command Line versions available at  
<https://www.cs.unc.edu/~isenburg/lastools/>

Download LASgrid.exe which is in the long list of downloadable files, and the readme file next to it, which is a fairly impenetrable instruction manual.

NOTE: When you use the software, the following prompt comes up: 'Please note that LAStools is not "free" (see <http://lastools.org/LICENSE.txt>) contact 'martin.isenburg@rapidlasso.com' to clarify licensing terms if needed.'

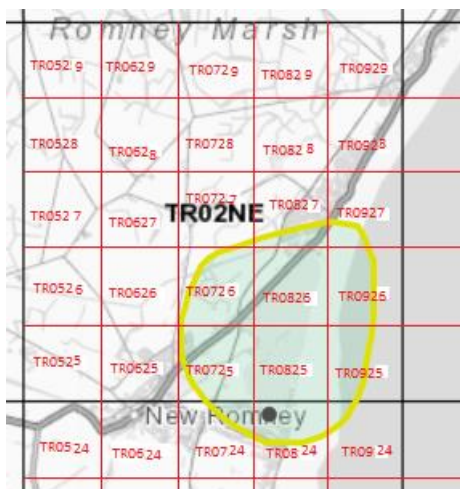
I have read the text file, and the software is free to use for non-commercial purposes.

- 4) Copy the .exe file into the folder where your .ASC files are saved. This isn't strictly necessary, but makes the syntax of the commands easier to deal with.

Note that the free version of the software has a limit of 10 million points, beyond which it puts a diagonal line through the data. Each DEFRA tile (eg TR02ne) is made up of a 5x5 grid of 25 smaller .asc files, each of which is 1km square ... ie 500 x 500 2 Metre points, or 1000 x 1000 1 Metre points). The maximum number of tiles at 2M is therefore 40 (or 10 at 1M res) before you will need to split into multiple files and upload separately into the course builder.

The WGC2011 Course Creator also crashes if the file is too big, so again, keep the number of tiles to a minimum, or drop the resolution down for background tiles.

I would recommend removing the tiles that you won't need from the folder you are working in. The naming convention of the tiles is shown in the grid below:

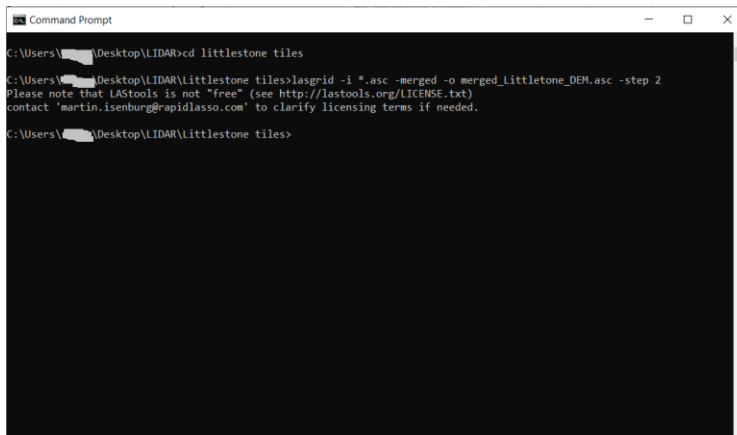


We will need 3 tiles for the Championship course: TR0824, TR0825, TR0826. Move all other files to a sub-folder.

Open your Command Prompt and navigate to the folder with the 3 remaining tiles and the lasgrid.exe file. In my case the command would be:  
`'CD Desktop\LIDAR\Littlestone tiles'`  
(Make sure you use the path to your own folder ...)

Enter a command in the following format:  
`'lasgrid -i *.asc -merged -o merged_Littlestone_DEM.asc -step 2'`

Where the file name at the end is your output file name (.ASC format for the purposes of this guide).



*lasgrid* = .exe file

*-i \*.asc* = sets the input files, selecting all .ASC files in the folder

*-merged* = opens them together in a single raster

*-o* = output the merged tiles into a single .ASC file

*-step 2* = the distance between points ... 2

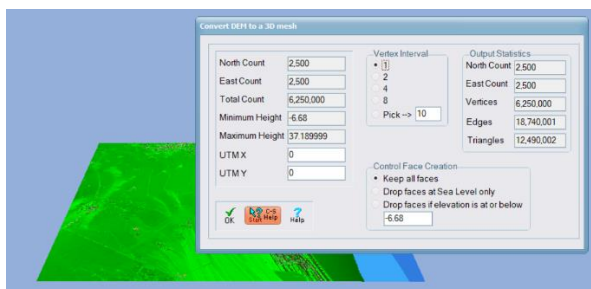
(metres) in this example as I

used the 2M DTM, but could be 1 if you use the 1M DTM files.

This will output a single merged file to the folder that you are working in.

5) Using Accutrans3D (see BrianZ's tutorial) import the new .ASC file.

Once it loads, click on the '3D' button on the left, setting Vertex interval to 1 to ensure you have enough definition to get the breaks on the greens. Note that this uses up a lot of memory, so when preparing files for surrounding scenery you will want to use a lower resolution.



You should end up with a screen that looks something like this after you have rotated the image a bit:



Now you can click:

'File'

'Save with Options'

select .DXF output format from the drop down

select flags: Point cloud, Lines, and AutoCAD

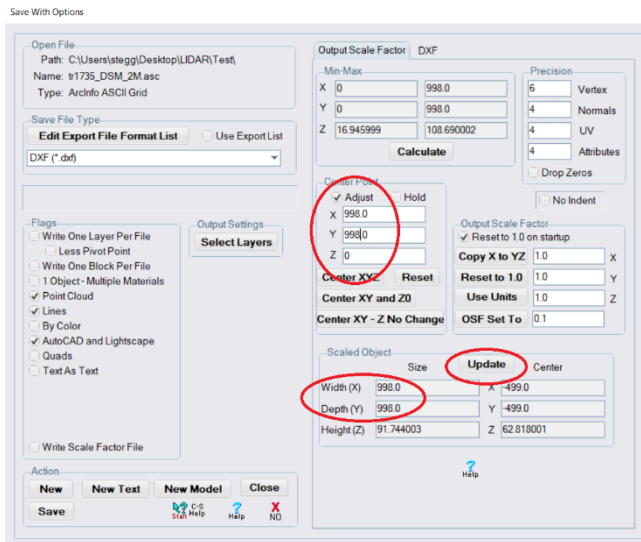
'Center XYZ'

'Save'

All other options should already be correct by default, but check Brian's tutorial for further

settings info if needed.

Note that if you are creating additional files to terrain that you have already imported, you will need a slightly different process, as you need to offset the coordinates of the file to align with the ones you have already loaded into the course creator.



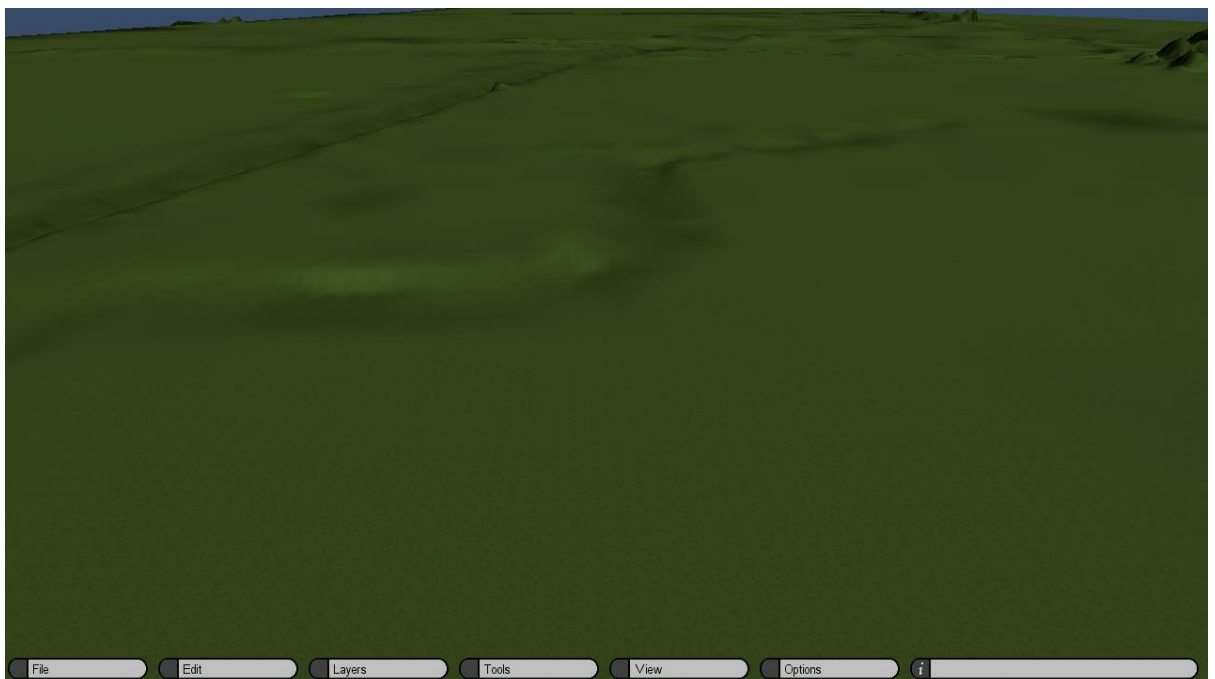
Instead of clicking Center XYZ, check the 'Adjust' option and enter the X and Y offset (in meters) that you will need. Then click the 'Update' button.

The exact offset is dependent on the size of your terrain, which is given by Width(X) and Depth(Y).

In this example, but Adjusting by +998, +998 I am importing the tile one KM West and one KM south of the existing tiles in the game. The top right corner will touch the

corner of the existing tile. To add the tile to the East or North of existing tiles, you need to take into account the number of tiles already imported. ie if there are existing two tiles laid 2x1 West to East, the adjustment would be -1996 (X) to import to the East, but only -998 (Y) to import to the North.

- 6) The .DXF file created in this way can be imported directly into the course creator using the DXF tool (copy it to the right folder in WGC2011 first).



Once imported to the course builder, you can zoom in to see the terrain in the height layer. Here we see the bunkers at the front of the 1<sup>st</sup> green, with a gully to the right of the green running across in front of the second tee shot, and a dyke to the left separating the championship course from the Warren Course.