Lough Neagh LIDAR – Note on datasets

Lough Neagh LIDAR

The data was acquired by and is published by the Department for Infrastructure - Rivers. The data was acquired (flown) in the spring of 2017. The data is provided "as is" under the conditions of the Open Government Licence (http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/). The data is not supported.

LIDAR

LIDAR (**LI**ght **D**etection **A**nd **R**anging) is a system which uses lasers to measure the distance between (in this case) an aircraft and the ground. The resultant cloud of distances is processed to produce a regular grid of cells (typically 1m x1m), each with a mean sea level elevation at the centre. Further processing removes, if required, vegetation cover, vehicles and buildings to produce a grid of heights which represent 'terrain'. This is 'stripped' LIDAR which is known as a Digital Terrain Model (DTM). When the data is 'unstripped', a Digital Surface Model (DSM) is created which includes the tops of vegetation cover, vehicles and buildings.

LIDAR Coverage

The land area covered by these datasets is 183sqkm, focused on the peripheral environs of Lough Neagh. For file size management, the data is subdivided to cover 4 quadrant groups: North East, North West, South East, South West. Coverage details are provided in the following accompanying files:

- LIDAR_Extents_Grid_Index_Map.pdf - Areas by quadrant name + 1km square reference grid for file names.

Spatial data files are also provided.

- LoughNeaghLIDAR_Coverage.shp – Polygons, extent of LIDAR coverage.
- LoughNeaghLIDAR_Grid_Index.shp – Polygons, 1km square reference grids for data files.

LIDAR file index structure

The datasets are provided in files covering 1km x 1km squares. The six-digit filename assigned to each file is a concatenation of the first three numbers of the Irish Grid easting & northing coordinates of the centre of the 1km cell.

LIDAR Currency

Datasets were collected on 28/04/2017. **There are no plans to update the data.**

LIDAR coordinate system

Position is expressed in Irish Grid coordinates. Elevations are w.r.t. Mean Sea Level Belfast.

LIDAR data types provided

Three data types are provided:

DSM_1m. Digital Surface model (DSM). Consists of a regular grid of points at spacing of 1m x 1m with an elevation at the centre of each cell. The data represents the surface of the land as recorded, i.e. representing the elevation of the tops of trees, tops of buildings, parked cars etc. ('unstripped' LIDAR).

DTM_1m. Digital Terrain model (DTM). Consists of a regular grid of points at spacing of 1m x 1m with an elevation at the centre of each cell. The data has been processed to remove the elevations of the tops of trees, tops of buildings, parked cars etc. and replace the elevations with interpolated values to represent the 'bare earth' surface of the land ('stripped' LIDAR).

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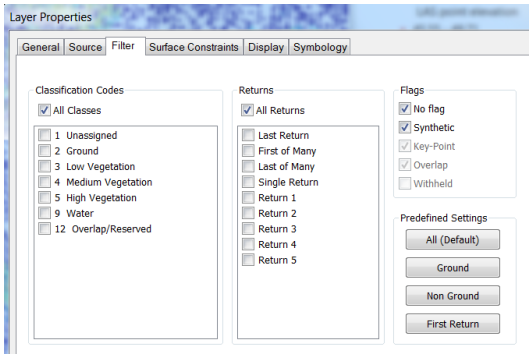
LAS. Raw observations, the precursor to the above datasets, in an open 'LAS' format. Data point positions are irregular, with a spatial resolution of 0.2m upwards. The LAS format provides for the classification of data points as shown (for example) below.



As an open standard, LAS-formatted data can be loaded and analysed in a range of software systems.
NOTE: With higher resolution, the LAS files can be very large, slow to download w.r.t. DTM & DSM files (up to 100mb per 1km x1km square).

LIDAR data formats provided

Both DTM & DSM datasets are provided as points in an ASCII text format. The ASCII format, read by a number of survey systems, is as follows:

ncols 1000 *(number of columns)*
nrows 1000 *(number of rows)*
xllcorner 282000 *(eastings in metres)*
yllcorner 398000 *(northings in metres)*
cellsize 1 *(in metres)*
NODATA_value -9999 *(the value in the file when there is no data)*
58.21 58.22 58.25 58.25 58.23 58.22 58.26 58.22 58.23 58.22 58.22 58.2 58.21 58.24 58.23 58.19 58.16 58.17 58.16 58.16 58.14 58.13 58.13 58.1 58.13 58.13 58.15 58.16 58.12 58.1 58.08 58.06
(list of elevations in metres)

Other format provided:
LAS – A widely used format for storing LIDAR. Details of the standard are available on the web (e.g. http://asprs.org/a/society/committees/standards/LAS_1_4_r13.pdf)

LIDAR data ~ directory structure

Select the area you require from the index map '**LIDAR Extents Map For OpendataNI.pdf'**
Download the zip file covering the area. The file contains the following (example):

'Lough Neagh North East_DSM_DTM.zip'
'Lough Neagh North East_DSM_28042017'
LIDAR_DSM – Contains all the ASCII raster files covering the area
'Lough Neagh North East_DTM_28042017'
LIDAR_DTM - Contains all the ASCII raster files covering the area
'**LIDAR_Notes** - These Notes 'Lough Neagh LIDAR Note.pdf'
LIDAR_Extents_Grid_Index Map.pdf
Extents + Index grid in Shapefile formats
'Lough Neagh_GCP_Report.txt' QC results : Ground Survey v. LIDAR .

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LAS files. These are large files, sub-directories are typically structured as follows. The size of each zip file is up to 700mb.

'Lough Neagh North East_LAS_Part1of4.zip'

LIDAR_LAS_Part1of4 – contains LAS format files

LIDAR_Notes - These Notes 'Lough Neagh LIDAR Note.pdf'
LIDAR_Extents_Grid_Index Map.pdf
Extents + Index grid in Shapefile formats
'Lough Neagh_GCP_Report.txt' QC results : Ground Survey v. LIDAR .

LIDAR Elevation Accuracy (general information)

The elevation accuracy quoted by the industry is 0.15m RMSE (Root mean square error). DTM accuracy is reduced in areas with tree cover and steep terrain. These figures provide a general guide. They do not define or represent the accuracy of the data provided.

LIDAR Elevation Accuracy Assessment - Lough Neagh dataset

In total 440 ground points were surveyed using GPS-RTK systems to check the accuracy of the final product. In summary the results were as follows:

Vertical accuracy assessment: LIDAR elevation v. ground surveyed elevation – 440 points

Average vertical Delta	0.015m
Minimum vertical Delta	-0.093m
Maximum vertical Delta	0.099m
Mean vertical Delta	0.032m
Root Mean square	0.040m
Standard Deviation	0.037m

See file '**Lough Neagh_GCP_Report.txt'** (within 'LIDAR_Notes') for full list of check results.

The information provider as per the Open Government Licence v3.0 is

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The following attribution statement text must be included with the data as per the Open Government Licence v3.0

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