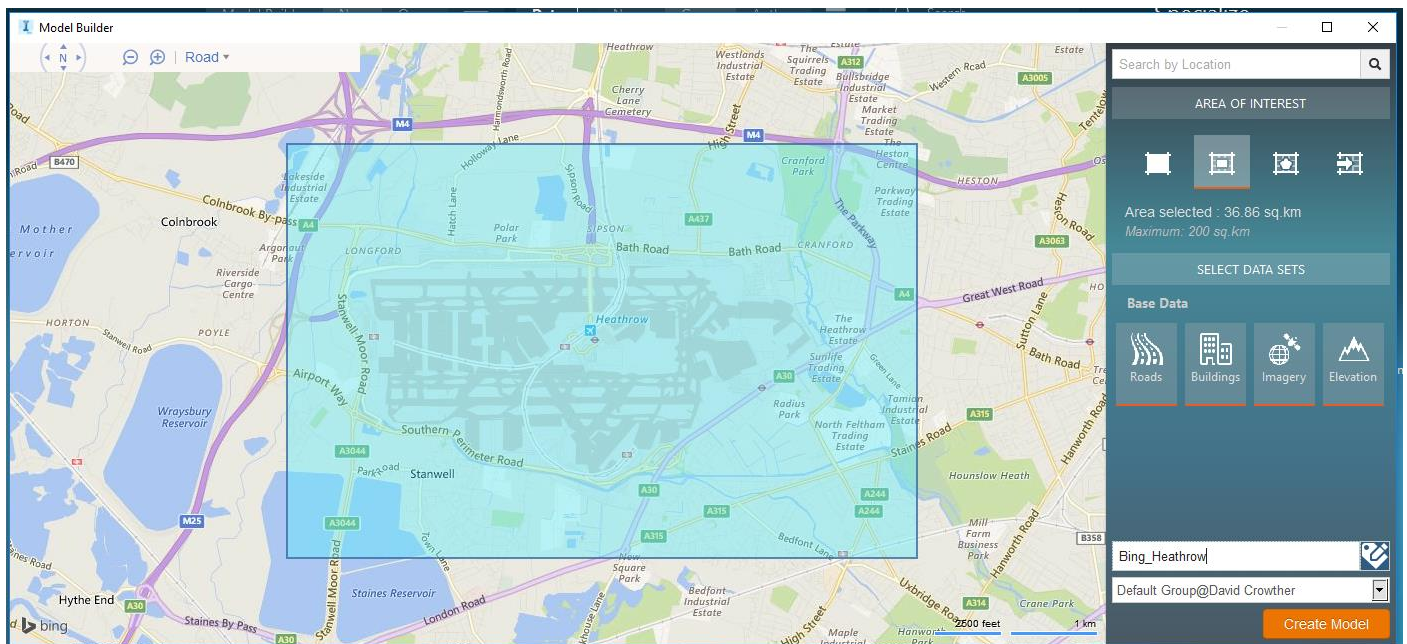


# Using Open Source 1M Lidar Terrain Data within InfraWorks

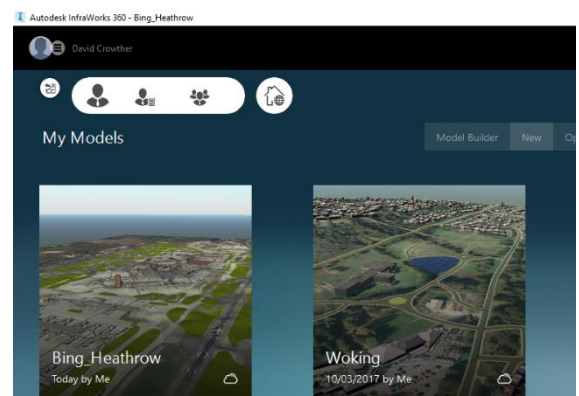
by David Crowther

InfraWorks provides a **Model Builder** tool which allows you to create 3D Models for locations across the globe in minutes. This tool therefore allows you to generate real world geographic models without leaving your desk or undertaking expensive onsite surveys.

Simply open the Model Builder tool, find your location and draw an area of extents, for example **Heathrow Airport**.



Within a few minutes your 3D Model is created and can be viewed within the **Home Page** of InfraWorks.



Clicking on the new file will open the 3D Model and allow you to then navigate around the site to explore the data provided.



The datasets included within the 3D Model are as follows:

- **Roads and Rail:** *OpenStreetMap's Highway and Railway datasets.*
- **Buildings:** *OpenStreetMap's Building dataset.*
- **Imagery:** *Satellite imagery from Microsoft® Bing Maps.*
- **Elevation:** *Terrain data for the United States and its territories uses USGS 10 and 30 meter DEMs from the National Elevation Dataset (NED). Between -60° and +60° latitude we use SRTMGL1 30m DEM data. Between +60° and +83° latitude we use ASTER GDEM v2 30m DEM data.*

These Open Source datasets mean that the Model Builder can access free to use data across the globe, allowing users to generate 3D Models without incurring expensive upfront or longer term data licensing costs.

While Open Source datasets mean increased availability to data, which is also processed on the fly for the user, this can often lead to the following issues:-

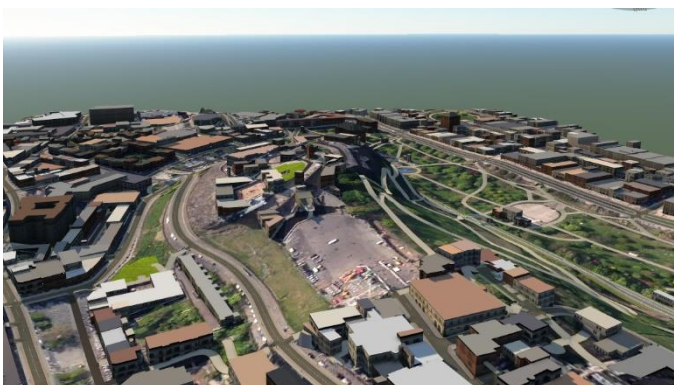
## Poor Data Coverage:

Open Source datasets often utilise **Crowd Sourcing** to collect information. In the case of OpenStreetMap which is used to generate the Roads and Buildings within the Infracworks Model Builder, in some areas e.g. City Centre's the datasets coverage and detail can be extremely high. However, in other locations this information may not be quite as detailed, leading to missing buildings and road features. For example, below, on the left is an Infracworks Model showing **OpenStreetMap** buildings near the OS offices in Southampton, and on the right, is the same location using the **Ordnance Survey MasterMap** layer. As you can see the buildings for this location are not available within OpenStreetMap.

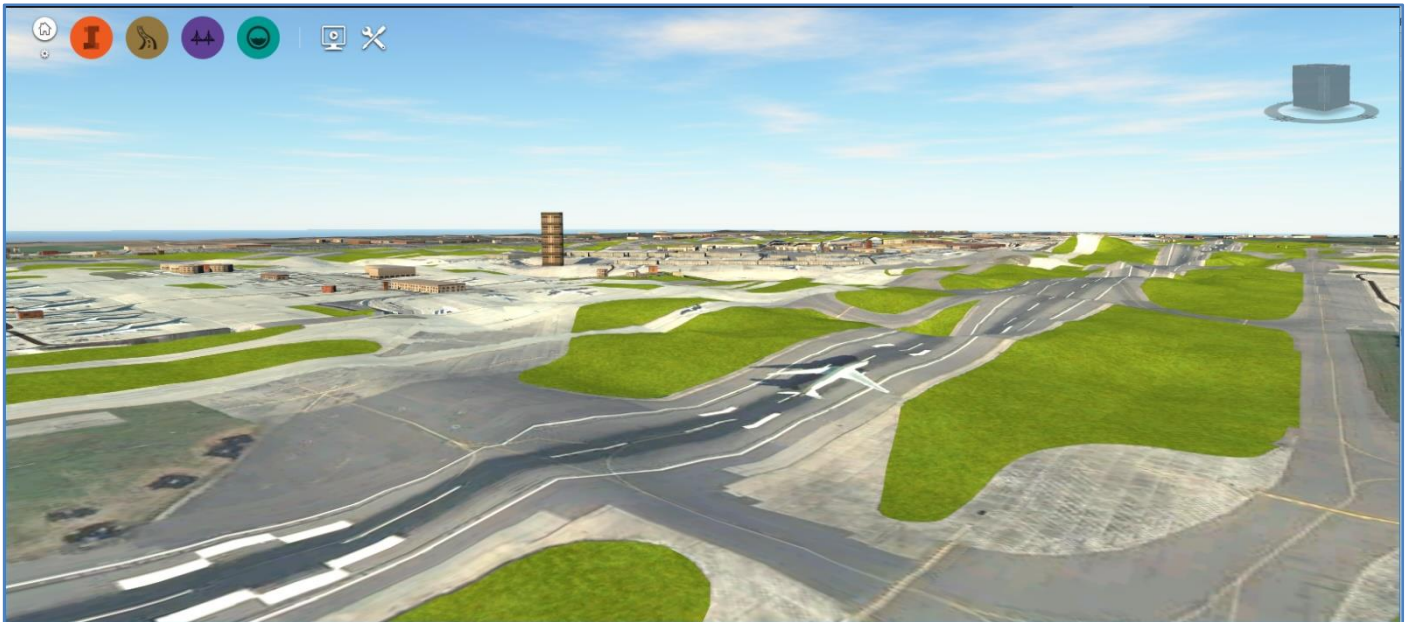


## Inaccurate Data:

Poor coverage is not the only issue with some Open Source datasets as they can also suffer from high levels of inaccuracy. For example, the Infracworks Model Builder utilises terrain data from **Satellite imagery** which can vary from 10-60 metre accuracy. In the examples below, the terrain data from the Model Builder barely shows the terrain for Edinburgh Castle, whereas the **Ordnance Survey Terrain 5** data more accurately represents this location.



If we further inspect the Heathrow Model that we downloaded earlier and zoom in to view the terrain, we can see how inaccurate the elevation model is.



These inaccuracies can lead to end users questioning the validity of the Model, which ultimately can make them reject the processes and software being used. So what's the answer? Should we now purchase commercially available datasets, or indeed invest in costly onsite surveys to make these models more accurate?

For me the initial answer would be to source other complimentary Open Source datasets which provide higher accuracy and coverage. Here are some example locations to source free to use spatial data within the UK:

**OS OpenData:** <https://www.ordnancesurvey.co.uk/business-and-government/products/opendata-products.html>

- **OS Open Map Local** – is a detailed backdrop map for Great Britain including buildings and other street level features.
- **OS Open Roads** - is a connected road network for Great Britain.
- **OS Open Rivers:** is a connected river network for Great Britain.
- **OS Terrain 50:** is a new height product for Great Britain. It is supplied both as a set of 50m gridded digital terrain model (OS Terrain 50 grid) and 10m contours and spot heights (OS Terrain 50 contours).

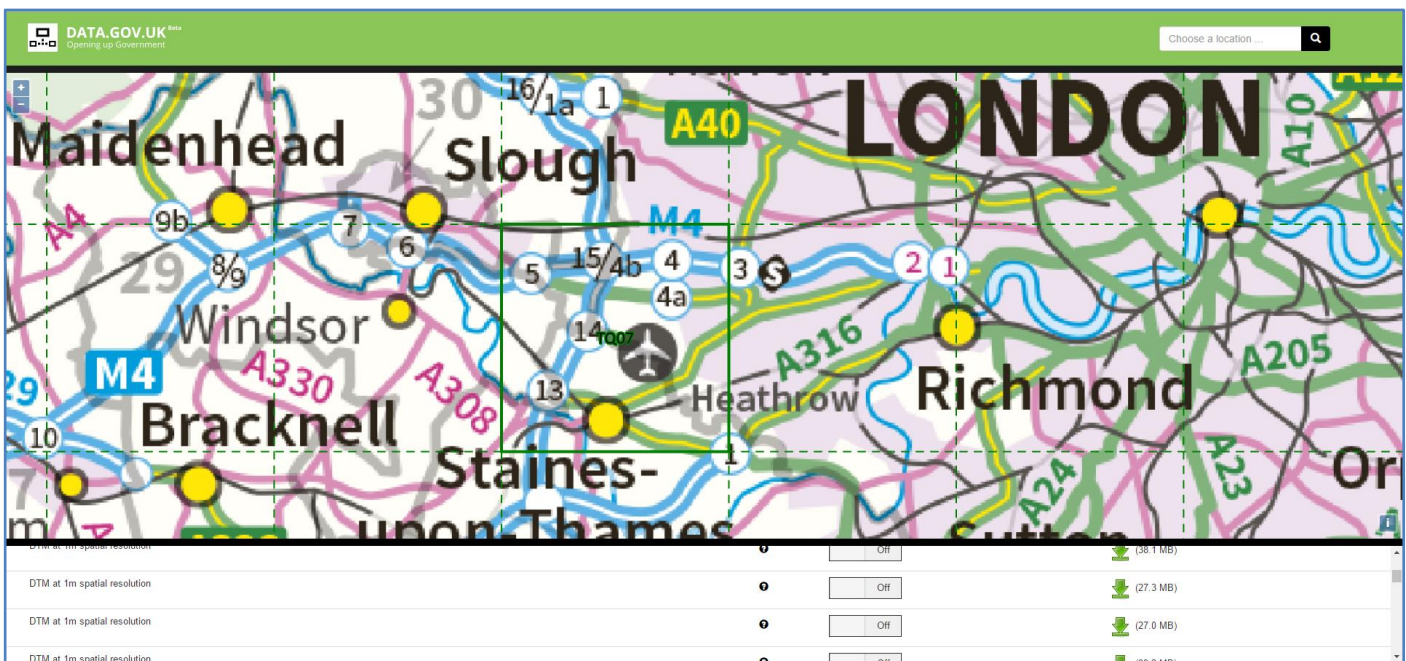
Data.Gov.UK Environmental OpenData: <http://environment.data.gov.uk/ds/catalogue/>

- **Canal and River Trust Data:** Bridges, Lakes, Reservoirs.
- **Defra:** Noise Regulation Data.
- **Environment Agency:** Flood Risk Areas, Lidar Terrain Data.
- **Forestry Commission:** Woodland Areas, Conservation Land.
- **Historic England:** Conservation Areas, Listed Buildings, Registered Parks.

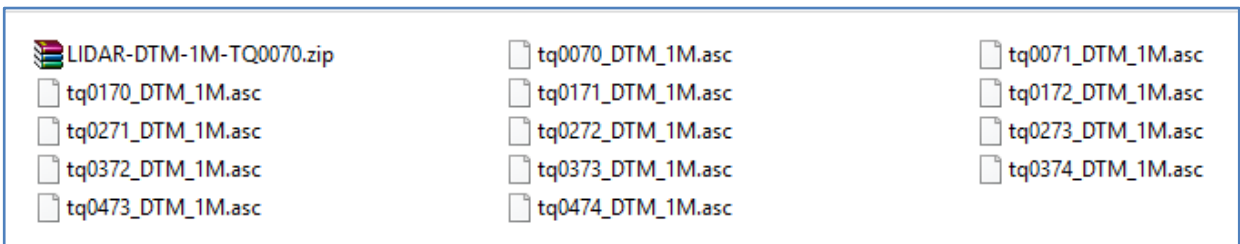
In this Blog we will explore making use of **Open Source Terrain** data in order to make our Heathrow 3D Model more accurate.

The Data.Gov.UK website provides links to download Open Source Terrain datasets, for example **1M Lidar Terrain** data, with a map of Great Britain to allow you to pick the geographic area of interest.

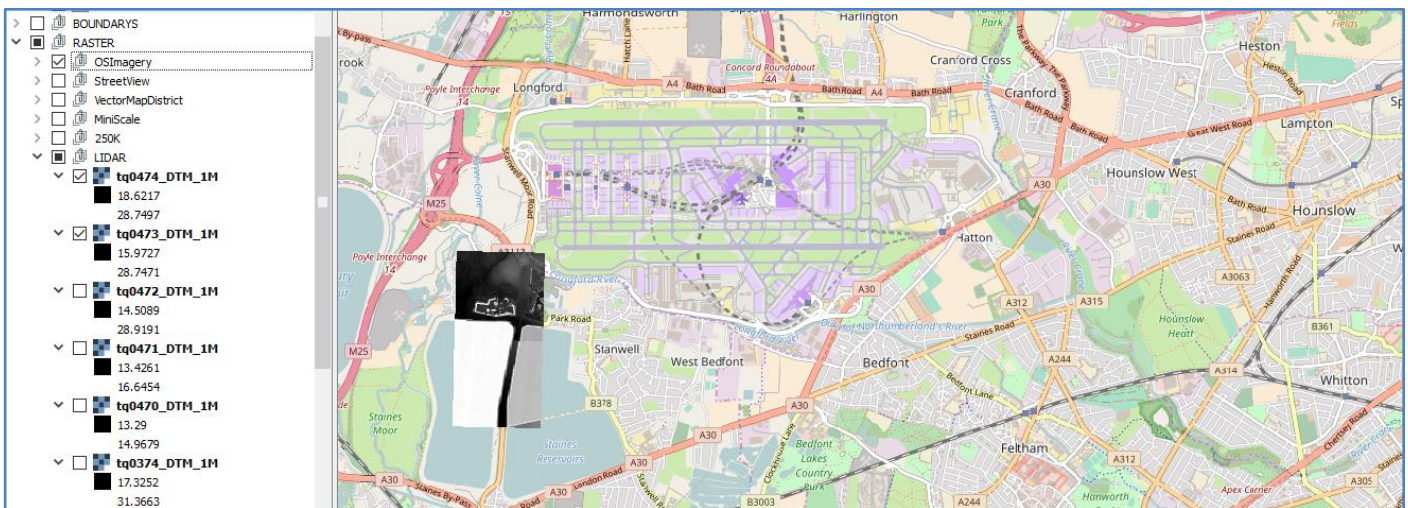
<http://environment.data.gov.uk/ds/survey/index.jsp#/survey>



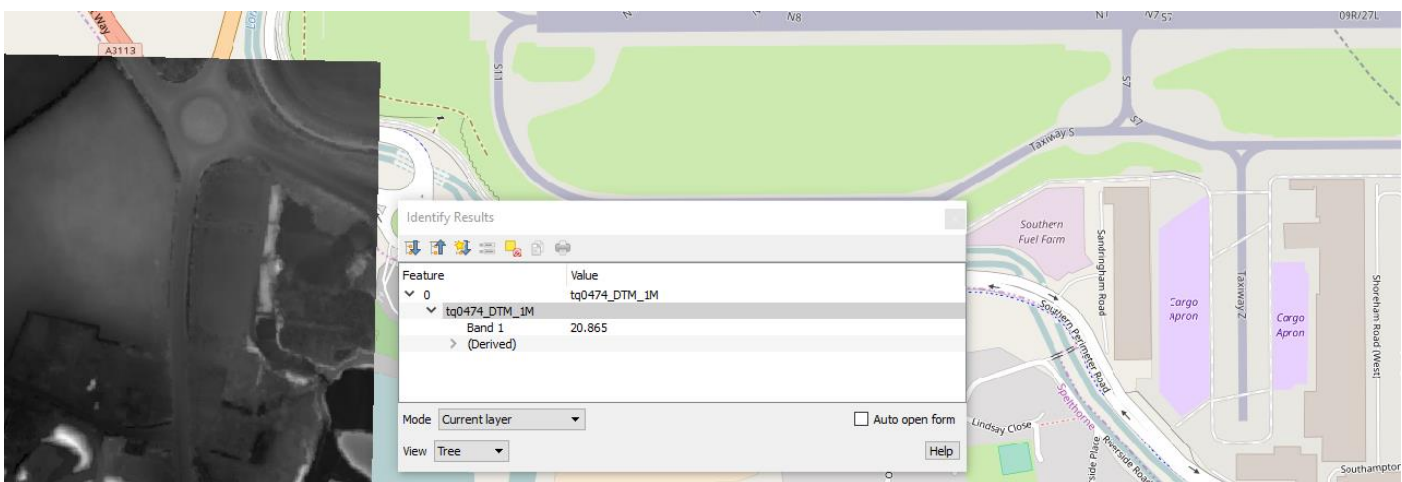
By clicking in the map, your area of interest is chosen and links for downloading the terrain data are provided below the map. The download will be a zip file, which when unzipped will provide access to the Terrain tiles for the chosen geographic area.



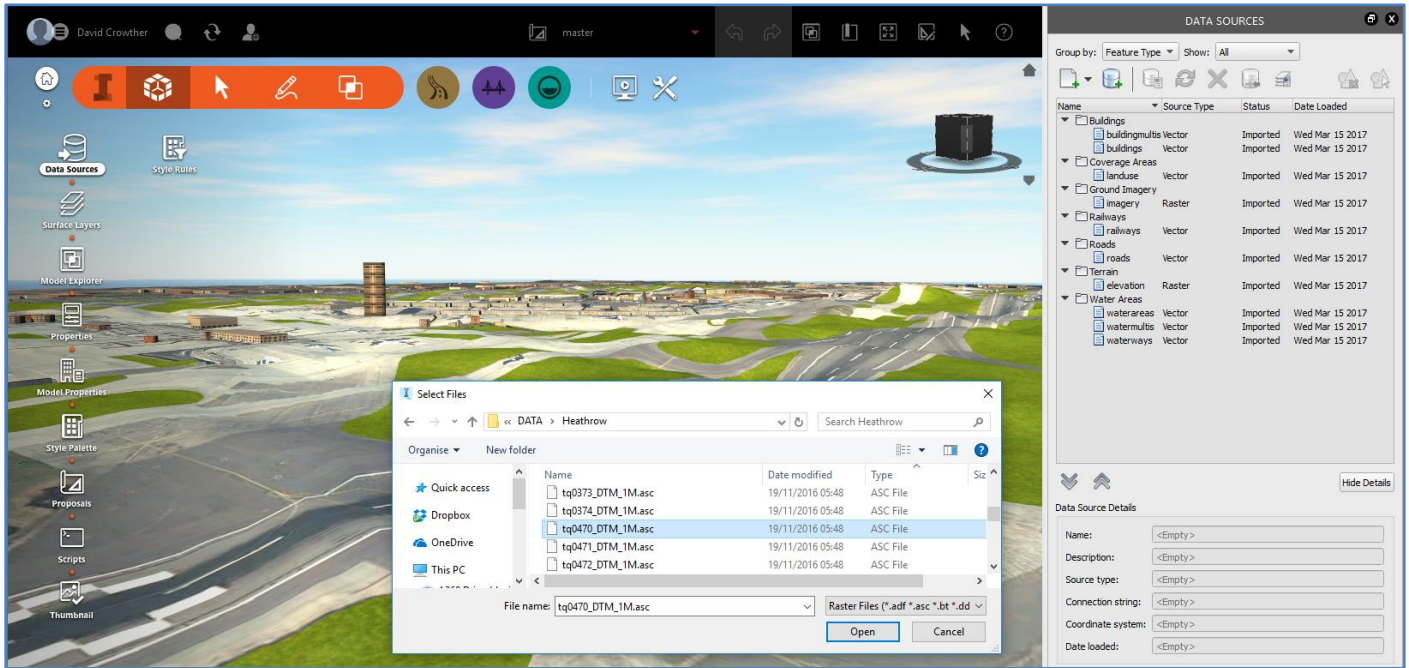
Using a desktop GIS, such as **QGIS**, we can then check that the downloaded Terrain data covers our area of interest. Each file, is a **Raster ASCII** Terrain tile, which when opened will start to cover the map for the chosen area of interest.



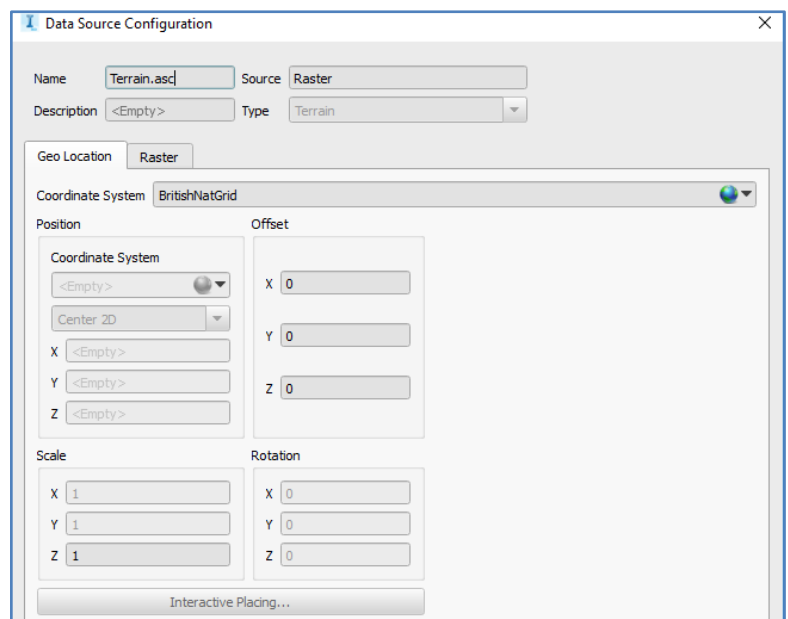
The **Information Tool** in QGIS enables you to view the terrain height for any given location within the Raster image.



Having downloaded the correct data, we can then start to include these new tiles in our Infracore 3D Model to increase the accuracy of the Terrain at Heathrow Airport. Within Infracore use the **Data Sources** menu to add the 1M Lidar Terrain data to your model.



Having opened the ASCII Lidar data, you can **configure** the data to become part of the models wider terrain, in this case being projected to British National Grid.



Once the Lidar Terrain data has been configured the 3D model updates. As per the image below, the runway at Heathrow airport is now using a **1 metre accurate Digital Terrain Model** and is now far more accurate than the initial model that we created using the Model Builder.



We could now start to explore the other freely available datasets from either the OS or the Data.Gov.UK website to see how we can continue to increase the accuracy and coverage of spatial data within our 3D model, without incurring the costs of expensive commercial data or onsite surveys.