

Appendix 6.1

Methodology for preparation of Visuals

1.1. ZTV Studies

ZTV studies are prepared using the ArcGIS Viewshed routines. This creates a raster image that indicates the visibility (or not) of the points modelled. Each turbine is analysed at nacelle and blade tip height. Two studies are carried out, with the first using a topographic model alone, in accordance with SNH guidance. A second study is also prepared including settlements (generally mapped in at an assumed average of 7.5m above ground level) and woodlands (generally mapped in at an assumed average of 15m high above ground level). If significant deviations from these assumed heights are noted during site visits, for example young or felled areas of woodland, or significant areas of single storey development, the features concerned will be adjusted within the model. The areas of settlement and woodlands are based on the Census 2001 Urban Area vector dataset (this was all urban settlements of a population greater than 1,500 people in 2001) and the National Inventory of Woodland Types (all woodlands of 2ha or more in size in England) from the Forestry Commission.

The visibility is modelled taking into account both the curvature of the earth and light refraction, in accordance with SNH guidance. Within a ZTV all observers are presumed to be 2m tall (in order to compensate for the likely margin of error within the ground model as indicated within the SNH Guidelines). The ZTV also begins at 1m from the observation feature (for example the wind turbine) and will work outwards in a grid of the set resolution (generally 20-30 sq. m) until it reaches the end of the terrain map for the project.

For all plan production LDA Design will produce a ZTV that has an overlay of the 1:50,000 Ordnance Survey Raster mapping in a Bitmap 50% threshold form. The ZTV will be reproduced at either 1:50,000 or 1:100,000 scale depending on the study area. For a typical 25km radius study area, the ZTVs will be printed on an A1 sheet at 1:100,000 scale.

1.2. Ground model accuracy

Depending on the project, different height datasets may be used. Ordnance Survey Landform Profile (roughly linked to quality of 10K mapping) and Landform Panorama (roughly linked to the quality of 50K mapping) are supplied as point datasets from which a triangulated mesh is created within GIS (often referred to as a TIN). Below is listed the different data products and their specifications:

Product	Distance Between Points	Vertical Error	Horizontal Error
Landform Profile	10m	+/- 1.8m	+/- 1m
Landform Panorama	50m	+/- 5m	+/- 3m

For most purposes, the Landform Panorama data will be used, but on certain occasions more detailed analysis of areas close to the site may be required, in which case, ZTVs based on Landform Profile data with areas of vegetation and building footprints drawn from the OS 1:10,000 mapping may be used. Similarly, more detailed surface mapping products such as Nextmap or LIDAR (also supplied as point datasets) may be used.

1.3. Wireframes

Wireframes are produced in 6 key stages:

- 1) Photography is undertaken by a professional photographer using a digital SLR camera and 50mm equivalent lens. A tripod (usually 1.6m high) is used to take overlapping (50%)

landscape format photographs which are joined together using Adobe Photoshop software to create a single panoramic image for each viewpoint. These are then saved at a fixed height and resolution to enable correct sizing when reproduced in the final images. The photographer also notes the GPS location of the viewpoint and takes bearings to visible landmarks whilst at the viewpoint.

- 2) Creation of a ground model and 3D Mesh to illustrate that model - This is created using OS landform panorama point data and KEY Terrafirma ground modelling software.
- 3) The addition of the turbine wireframes to the 3D model using AutoCAD- The turbines are correctly proportioned to match the nacelle height and blade lengths proposed for the development. They are also modelled to closely resemble the turbines proposed. The turbines are then inserted into the 3D model at the proposed locations, facing into the prevailing wind direction.
- 4) Wireframe generation – The viewpoints are added within the 3D AutoCAD model with each observer point being inserted at 2m above the modelled ground plane. The location of the landmarks identified by the photographer may also be included in the model. The view from the viewpoint is then generated using the AutoCAD camera function, creating a number of single frame images, which also include bearing markers. For cumulative wireframes, each wind farm will be shown in a different colour. As with the photographs, these single frame images are joined together using Adobe Photoshop software to create a single panoramic image for each viewpoint. These are then saved at a fixed height and resolution to ensure that they are the same size as the photographs.
- 5) Wireframe matching – The wireframes are matched to the photographs using a combination of the visible topography; bearings taken on site and the bearing markers; and the landmarks which have been included in the 3D model.
- 6) Reproduction – the wireframe images are presented on sheets which are 297mm high and the length needed to show the view. The photographs are shown at 140mm high (a viewing distance of 300mm) with the wireframes below. Data required by the SNH guidance and a location plan is also included on each sheet. Where very wide panoramas (more than 180 degrees) are required to show all of the schemes within a cumulative study, the view will be split across two sheets.

1.4. Photomontages

Photomontages are produced in 4 key stages:

- 1) Wireframe preparation, up to stage 5 above.
- 2) AutoCAD is used to produce a rendered 3D view of the turbines from the viewpoint. The rendering uses a pale grey colour (similar to that used for many turbines) and lighting conditions according to the time of day for the viewpoint photograph. These images are then saved at a fixed height and resolution to ensure that they are the same size as the photographs.
- 3) The rendered turbines are then added to the photographs in the positions identified by the wireframe (using Adobe Photoshop to overlay the photograph with both the wireframe and rendered turbines to ensure accuracy). The images are then layered to ensure that the turbines appear in front of and behind the correct elements visible within the photograph.
- 4) Reproduction – the photomontage images are presented on sheets which are 297mm high and the length needed to show the view which is usually cropped to 90 degrees of the wireframe view, focussed on the wind farm location. The photographs are shown at 200mm high (a viewing distance of 500mm). Data required by the SNH guidance and a location plan is also included on each sheet. Where very wide panoramas (more than 180

degrees) are required to show all of the schemes within a cumulative study, the view will be split across two or more sheets.