Aultmore Wind Farm Redesign

Technical Appendix 6.2: Visual Aids

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Appendix 6.2 Visual Aids

A.1 Guidance and Standards Used

All Visibility Maps (ZTVs), photography, visualisations (wirelines and photomontages) and their graphical presentation has been undertaken in line with the Landscape Institute's Technical Guidance Note 06/19, Visual Representation of Development Proposals and Visual Representation of Wind Farms: v2.2. Scottish Natural Heritage, February 2017.

A.2 The Computer Model

To generate wireline visualisations and photomontages, computer models of the proposed site and study area are produced. Resoft WindFarm software is used to create a 3D computer model of the proposed development representing the specified geometry and position of the proposed development, and the existing landform (terrain). The landform information is derived from 50m resolution terrain data incorporating 5m resolution terrain data around the site and each viewpoint and viewpoints where required (either by local guidance, or where we judge it is needed for accurate modelling).

The computer models include the entire study area and all calculations take account of the effects caused by atmospheric refraction and the Earth's curvature. The computer models do not take account of the screening effects of any intervening objects such as vegetation, buildings or other non-terrain features, unless expressly stated.

The computer models combine the existing landform with the model of the proposed development and detailed data collected in the field to enable the output of accurate visual and graphical information and associated data for presentation as finished figures.

A.3 Visibility Maps: Zone of Theoretical Visibility

Zone of Theoretical Visibility (ZTV) maps have been generated using a GIS to assist in identifying areas where visibility would not occur as well as viewpoint selection, illustrate areas from where part or all of the proposed development may be visible and to indicate its potential influence in the wider landscape.

Unless expressly stated, the visibility maps present the extent of potential visibility on the basis of a 'bare ground' scenario: They do not account for the effects of screening and filtering of views as a result of intervening features (e.g. buildings, trees, hedgerows, etc) and so tend to over-estimate visibility, both in terms of the area from which the project can potentially be seen and potentially in terms of the extent of the development visible from a particular viewpoint.

ZTVs which include vegetation and buildings may use real height information derived from standard DSM products such as LiDAR – this approach is typically used for smaller study areas and urban areas. For larger study areas assumed heights are used which are stated on the ZTV figure. The location and extent of woodland and buildings is derived from OS data and assumed heights for these are added to the bare ground model. As a result, the ZTV study does not take account of all above ground features – only those included as woodland and buildings in the OS mapping at the time the ZTV was prepared. These ZTV studies present a more realistic visibility pattern than bare ground studies, but do not take detailed account of felling cycles, tree growth, demolition or construction.

A.4 Visualisations: Annotated Photos (Type 1)

Baseline photography has been undertaken at each representative viewpoint location using a high-quality digital SLR camera with full frame sensor and a 50mm fixed focal length lens – in accordance with the relevant guidance identified above. The resulting photos are either presented as single frame images or combined into panoramas using PTGui photo stitching software and saved as planar projection images. Single frame and panoramic images are presented at either A3 or on wide format sheets, in accordance with Technical Guidance Note 06/19, and are annotated to indicate the extent of the proposed development and highlight any important features within the view.

A.5 Visualisations: Photomontages (Types 3 & 4)

Baseline photography has been undertaken at each agreed representative viewpoint location using a high-quality digital SLR camera with full frame sensor and a 50mm fixed focal length lens, in combination with a panoramic head equipped tripod at 1.5m height Above Ground Level (AGL) unless stated otherwise – in accordance with the relevant guidance identified above. The resulting photos are combined into panoramas using Adobe Photoshop and/or PTGui photo stitching software and saved as cylindrical and planar projection versions for use in visualisation production.

The Resoft WindFarm computer model is used to generate a perspective view from each viewpoint of the proposed development, using landform in the computer model and the specified geometry and position of the proposed development.

Using the computer model, a wireline diagram showing the proposed development (and any cumulative sites as required) is generated for each viewpoint to meet the relevant requirements of guidance (e.g. blades upwards, numbered, facing the viewpoints, etc).

To produce a photomontage, the above wireline is combined with the photographic panorama using Resoft WindFarm and/or Adobe Photoshop. Detailed viewpoint information as recorded on site (e.g. GPS grid co-ordinates; ground level information; compass bearings; and any other known references; etc) is used to enable the accurate alignment of the photographs with the computer model. A perspective match is achieved between the computer generated wireline and the photographs by iteratively adjusting the parameters until all the major features in the image are aligned satisfactorily. The proposed development is then rendered using Resoft WindFarm, Autodesk 3DS Max or Trimble SketchUp Pro, taking into account the time and conditions occurring on the day of the photography to provide a realistic image. Where required, elements such as proposed tree planting, tree removal and other site infrastructure are also rendered and incorporated into the montage using Adobe Photoshop.

Where provided, dusk/dawn visuals are prepared on the same basis as daytime visuals but there is a degree of judgement required to illustrate the brightness of the lighting compared to the background photography (which is more constrained than daytime photography) including exposure settings.

A minimal amount of image processing is undertaken. Where necessary, the contrast between the background photograph and the proposed development is increased to ensure that the development is apparent in the photomontage, as far as possible. It should be noted that there is an element of professional judgement inherent in the illustration of the changes represented by any photomontage.

The information shown on the visualisations and within the LVIA is generated via the computer model or from mathematical calculations.

The completed base photography, wirelines, photomontages and accompanying data are then presented as figures using desktop publishing/graphic design software to meet the relevant guidance requirements.

A.6 Image Verification

Should the user wish to undertake verification of the images, please refer to ANNEX E of the Visual Representation of Wind Farms: Version 2.2 (SNH, 2017) for full details of the methods required.

A.7 Data Accuracy

The Ordnance Survey (OS) provides accuracy figures for the following terrain data products expressed statistically as root-mean-square error (RMSE) in metres:

- OS Terrain®50 (50m resolution): 4m RMSE.
- OS Terrain®5 (5m resolution): Urban and major communication routes 1.5m RMSE; Rural 2.5m RMSE; Mountain and moorland 2.5m RMSE.

A.8 SNH Visualisation Guidance Annex A: Information on limitations of visualisations

"Visualisations of wind farms have a number of limitations which you should be aware of when using them to form a judgement on a wind farm proposal. These include:

- *A visualisation can never show exactly what the wind farm will look like in reality due to factors such as: different lighting, weather and seasonal conditions which vary through time and the resolution of the image;*
- *The images provided give a reasonable impression of the scale of the turbines and the distance to the turbines, but can never be 100% accurate;*
- *A static image cannot convey turbine movement, or flicker or reflection from the sun on the turbine blades as they move;*
- *The viewpoints illustrated are representative of views in the area, but cannot represent visibility at all locations;*
- *To form the best impression of the impacts of the wind farm proposal these images are best viewed at the viewpoint location shown;*
- *The images must be printed at the right size to be viewed properly (260mm by 820mm);*
- *You should hold the images flat at a comfortable arm's length. If viewing these images on a wall or board at an exhibition, you should stand at arm's length from the image presented to gain the best impression.*
- *It is preferable to view printed images rather than view images on screen. If you do view images on screen you should do so using a normal PC screen with the image enlarged to the full screen height to give a realistic impression. Do not use a tablet or other device with a smaller screen to view the visualisations described in this guidance."*