

Rhoscrowther | Wind Farm



Environmental Statement

Volume III: Technical Appendices

Appendix 5.7 - Methodology for Production of ZTVs and Visualisations

October 2021

Methodology for Production of ZTVs and Visualisations

Introduction

A5.7.1. Zones of Theoretical Visibility (ZTVs), panoramic photographs and visualisations (wirelines and photomontages) are graphical materials produced to assist and illustrate landscape and visual impact assessments (LVIAs) (including seascape and cumulative impact assessments). The following methodology has been used for undertaking the viewpoint photography and for producing the ZTVs and visualisations that illustrate the LVIA in Chapter 5 of the ES. It accords with current guidance, including the Scottish Natural Heritage guidance *The Visual Representation of Wind Farms, Version 2.2* (SNH February 2017) and the Landscape Institute Technical Guidance Note 06/19: *Visual Representation of Development Proposals* (LI 17 September 2019).

Methodology for Production of ZTVs

A5.7.2. The blade tip and hub height ZTVs were generated using the ReSoft WindFarm software, which uses a digital terrain model (DTM) and 3-dimensional computer models of the locations and dimensions of the proposed wind turbines to calculate the theoretical visibility of the proposed development across the existing landscape. The computer model takes account of the effects caused by atmospheric refraction and the curvature of the Earth. The ZTVs have been generated using the following combined DTM datasets:

- Ordnance Survey Terrain 50: used to aid in the production of the ZTV plots and wirelines at long distances exceeding those covered by the 30km x 40km area of the more detailed OS Terrain 5 data, these tiles provide a digital record of the existing landform of Great Britain, based on 50m grid squares and models representing the specified geometry and position of the proposed turbines; and
- Ordnance Survey Terrain 5: used to produce a more detailed ZTV plot or wireline for a limited area, in the case of Rhoscrowther Wind Farm, covering 30km x 40km around the site. These tiles provide a digital record of the existing landform of Great Britain based on 5m grid squares and models representing the specified geometry and position of the proposed turbines.

A5.7.3. The resulting ZTV plots have been overlaid on Ordnance Survey mapping at an appropriate scale and presented as figures using GIS software.

A5.7.4. The ReSoft WindFarm software has also been used to calculate a cumulative ZTV plot to illustrate the intervisibility of the proposed development with the existing operational wind farms (Wear Point, Castle Pill and Lower Scoveston Farm).

Methodology for Baseline Photography

A5.7.5. Photographic viewpoint locations were initially selected with the aid of the ZTVs. Each location was then visited, confirmed, and assessed in the field. Panoramic photography was taken to record the view and the details of the viewpoint locations and associated data were recorded to assist in the production of visualisations and to validate their accuracy.

A5.7.6. The following photographic information was recorded:

- Date and time.
- GPS recorded locational data in the form of a 12-figure grid reference accurate to ~4m.
- GPS recorded elevation data in the form of metres above Ordnance Datum (mAOD).
- Camera model, lens focal length and format used.
- the approximate horizontal angle of view photographed.

A5.7.7. All of the photographs included in this assessment were taken with a full-frame digital SLR camera equipped with a 50 mm fixed focal length lens. This produces photographs that are equal in horizontal and vertical extent to those taken with a manual 35 mm SLR camera with a fixed 50 mm focal length lens. Almost all were taken in landscape (horizontal) format. The exceptions were the photographs for Vp 2, where the camera and 50 mm lens were used in portrait (vertical) format, and the photographs for Vp 1, where the camera was fitted with a 35 mm fixed focal length lens and used in portrait (vertical) format. This was to provide more vertical extent in the panoramic photographs at these two closest viewpoints.

A5.7.8. All photography was taken using a tripod equipped with a levelling head and a panoramic head set to take photographs at 20° intervals (i.e. approximately a 50% overlap between each frame).

Methodology for Production of Visualisations

A5.7.9. Each viewpoint has been illustrated with a panoramic photograph of the existing view together with a wireline and a photomontage to illustrate the parts of the proposed development that could be visible from each location.

A5.7.10. The wirelines and photomontages were produced using ReSoft WindFarm software to generate a perspective view of the wind farm. This software creates a 3D computer model of the existing landscape and the proposed development using the DTM and models representing the specified geometry and position of the proposed turbines. The computer model includes the entire Study Area and all visualisations take account of the effects caused by atmospheric refraction and the Earth's curvature. The computer model does not take account of the screening effects of any intervening built development or vegetation.

A5.7.11. The photographs from each viewpoint were joined to form a cylindrical projection panorama, using appropriate photography panorama stitching software. This panorama was imported into ReSoft WindFarm using the locational data recorded at each viewpoint. A wireline of the proposed development and the existing landform was generated for each viewpoint using the same software. A series of fixed reference points were identified within each panoramic view, the alignment of which, in tandem with the topography visible within the panorama, enabled the wireline to be superimposed and accurately positioned both horizontally and vertically over the panorama. To produce the photomontage, the 3D computer models of the turbines were then rendered to appear 'life-like' taking into account the position of the sun at the date and time of the photography and weather conditions occurring on the day.

A5.7.12. The completed baseline panoramic photographs, wirelines, photomontages and accompanying data have been presented as figures using desktop publishing/graphic design software.

Printing of Maps and Visualisations

A5.7.13. All electronic maps and visualisations should be printed out and viewed at the correct scale as noted on the drawings.

Limitations of Visualisations

A5.7.14. Whilst two-dimensional images cannot fully represent the real viewing experience, the panoramic photographs and visualisations aim to provide a realistic representation of the baseline view and proposed development, based on current information and photomontage methodology.

A5.7.15. However, in using these to form a judgement on the wind farm proposal, it is important to be aware of their limitations. These include:

- Photographs and visualisations cannot illustrate how the existing view and proposed development would appear in different lighting, weather and seasonal conditions. These vary both daily and seasonally in the UK and affect the clarity of the photographic image. Every effort is made to take the photographs on days when the lighting is strong and the visibility is very good. However, photographs can capture only the conditions at the moment the photograph is taken, and it is usual to match these conditions when creating the photomontages. Therefore, photographs and visualisations will illustrate the existing view and proposed development only under the lighting, weather and seasonal conditions that were present when the photographs were taken.
- Photographs and visualisations produced and viewed in accordance with this methodology, provide a good impression of the location and scale of the proposed wind turbines and their distance from each viewpoint, but can never be 100% accurate due to varying degrees of accuracy in the data and process, for example, in the GPS locations taken in the field, in the OS DTM and in the software packages that handle the data. They also cannot take into account any micro-siting of the wind turbines that may occur during construction phase (if micro-siting is permitted within the consent).
- A static image cannot convey rotor movement, or flicker or reflection from the sun on the turbine blades as they move.

- The viewpoints illustrated by the photographs and visualisations are representative of the more sensitive locations in the study area and where there are most likely to be relatively open views of the wind turbines. However, they do not represent all views of the proposed development.
- The viewpoint photographs and visualisations are best viewed in the field at the viewpoint in order to gain the most realistic impression of how the proposed development would appear to the viewer at each location.
- Printed images must be printed at the paper size stated on the image. In this case, 841mm x 297mm (half A1) for the viewpoint images (Figures 5.21 - 5.45) and 420mm x 297mm (A3) for the residential wireframes (Figures 5.47 - 5.57). All the figures have margins on all four sides, hence the “image sizes” are slightly smaller than the paper sizes.
- Printed images should be viewed correctly. All the photographs, wirelines and photomontages in Figures 5.21 - 5.45 have a horizontal field of view of 120° and are cylindrically projected so, when printed at the correct size (half A1), have a principal viewing distance of 400mm. This means that they should be held at a distance of approximately 400mm from the eye (relaxed arms’ length) and curved through 120° (ie gently curved). All the wirelines in Figures 5.47 - 5.57 have a horizontal field of view of 60° and are cylindrically projected so, when printed at the correct size (A3), have a principal viewing distance of ~375mm. Therefore, they should be held at a distance of approximately 375mm from the eye (slightly more relaxed arms’ length) and curved through 60° (ie gently curved).
- It is preferable to view printed images, rather than view images on screen. However, if the images are viewed on a screen, ideally, they should be viewed on an A3-sized monitor and enlarged to the full screen height.

A5.7.16. The SNH guidance advises that, given the limitations of depicting wind turbines in photographs and photomontages, they will usually be of most value for views within 20km of a wind farm site as, at distances greater than this, it can be difficult to represent the wind turbines realistically. All the viewpoints used to illustrate the LVIA for this proposed development are within 11km of the proposed wind turbines.