TECHNICAL APPENDIX 7.2: LVIA ZTV AND VISUALISATION METHODOLOGY

Kirkton Energy Park

Prepared for: Kirkton Wind Farm Limited

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BASIS OF REPORT

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1.0 Introduction

This Appendix sets out the methodologies used to prepare the figures which form part of the LVIA. The LVIA is contained in Chapter 2 of this Environmental Impact Assessment Report (EIA Report) and the supporting Figures are contained in Volume 3a Figures and Volumes 3b,c,d LVIA Visualisations to both NatureScot and The Highland Council specifications.

Zones of Theoretical Visibility (ZTV) and Photomontages for the project have been prepared in accordance with the accepted methodologies included in the following guidance documents:

- Landscape Institute Advice Note 02/17: Visual representation of development proposals issued March 2017;
- Scottish Natural Heritage (SNH): Visual Representation of Wind Farms, Version 2.2 issued February 2017; and
- Guidelines for Landscape and Visual Impact Assessment (Landscape Institute and Institute of Environmental Management and Assessment) 3rd Edition 2013.

2.0 ZTV Methodology

A ZTV is used to identify the theoretical visibility of a wind farm development. It is a computer generated analysis which evaluates visibility using the height and extent of a proposed development against a Digital Terrain Model (DTM).

SLR use ESRI ArcGIS 10.5.1 to produce ZTVs as it is an industry recognised software package designed to perform this type of analysis.

Wind farm layouts are created in ArcGIS and the correct turbine dimensions assigned. The ZTVs are then run using a combination of OS Terrain 50 and Terrain 5 height data as a terrain base. The observer height is set to 2m above ground level and the Earth's curvature (radius = 6370km) and atmospheric refraction (refraction coefficient = 0.075) is applied.

The completed ZTV is then presented in a title block in ArcGIS.

The ZTV analysis does not take into account the screening effects of vegetation, buildings or other surface features.

3.0 Visualisation Methodology

3.1 Guidance and Standards Used

All 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. The guidance provided by 'Visualisation Standards for Wind Energy Developments', The Highland Council, 2016 has also informed the approach and visualisations provided.

3.2 The Computer Model

To generate all wireline visualisations and photomontages, a computer model of the proposed site and study area has been produced using Resoft WindFarm release 5 software. This 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 5m and 50m resolution terrain data covering the project study area.

The computer model includes the entire study area and all calculations 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 objects and forestry, so does not show any vegetation, buildings, woodland or other non-terrain features, unless expressly stated.

The computer model combines 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.

3.3 Visualisations

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 Hugin photo stitching software and saved as cylindrical and planar projection versions for use in visualisation production. 'Single frame' 50mm and 75mm planar images are produced by cropping and re-projecting stitched cylindrical images to match the extent of the original 50mm photographs.

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 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 turbines are then rendered taking into account the time and conditions occurring on the day of the photography to provide a realistic image.

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 Resoft WindFarm 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.

3.4 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.

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

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