APPENDIX 6.1 - TECHNICAL METHODOLOGIES FOR VISUAL REPRESENTATION

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1. TECHNICAL METHODOLOGIES FOR VISUAL REPRESENTATION

1.1 Introduction

1.1.1 The following is a detailed methodology for production of technical outputs contributing to the Landscape and Visual Impact Assessment (LVIA).

1.1.2 The LVIA of the Proposed Development is informed by several technical models and drawings. The methods for producing these are described below.

1.1.3 It should be remembered that,

"visualisations, whether they are hand drawn sketches, photographs or photomontages, can never exactly match what is experienced in reality. They should, however, provide a representation of the proposal that is accurate enough for the potential impacts to be fully understood" (SNH, 2017g: para 96, p22) and that *"visualisations in themselves can never provide the full picture in term of potential impacts; they only inform the appraisal process by which judgements are made"* (SNH, 2017[1]g; para 98, p22).

1.1.4 Photography for visualisations has been undertaken by ASH design + assessment Ltd (ASH). All editing and modelling has been completed by ASH.

Current Guidance

1.1.5 The main guidance documents which have informed the technical methodologies used to undertake this LVIA and prepare the supporting drawings and visualisations are as follows:

- Scottish Natural Heritage (SNH), (2017), *Visual Representation of Wind Farms* (Version 2.2) (SNH, 2017g[1]) (the NatureScot, 2017 Guidance).
- The Highland Council (THC), (2016), *Visualisation Standards for Wind Energy Developments* (THC, 2016[2]) (the THC, 2016 Guidance).

1.1.6 The documents comprise best practice guidance and have been used at the request of THC and NatureScot.

1.1.7 The Landscape Institute also provides technical guidance on visualisation production (below). While the guidance prepared by NatureScot (2017)[1] and THC (2016)[2] are the most relevant for the Proposed Development, this document is also a useful reference guide:

- Landscape Institute, (2019)[3], *TGN 06/19 Visual Representation of Development Proposals*.

1.1.8 As agreed through Scoping, two sets of visualisations (comprising wirelines and photomontages) have been prepared to support the LVIA from a Visualisation Location (VL) agreed with THC and NatureScot at Scoping stage:

- One set to accord with the NatureScot, 2017 Guidance[1], included as **Volume 3a** of the EIA Report; and
- One set to accord with the THC, 2016 Guidance[2], included as **Volume 3b** of the EIA Report.

[1] Scottish Natural Heritage (2017g), *Visual Representation of Wind Farms (Version 2.2)*. Available at: https://www.nature.scot/doc/visual-representation-wind-farms-guidance [accessed August 2024]
[2] The Highland Council (2016) *Visualisation Standards for Wind Energy Developments.* Available at: https://www.highland.gov.uk/downloads/file/12880/visualisation_standards_for_wind_energy_developments [accessed August 2024]
[3] Landscape Institute (2019) *TGN 06/19 Visual Representation of Development Proposals.* Available at: https://landscapewpstorage01.blob.core.windows.net/www-landscapeinstitute-org/2019/09/LI_TGN-06-19_Visual_Representation.pdf [accessed August 2024]

1.1.9 A location plan for both sets of visualisations are also provided, which illustrate the horizontal field of view (HFOV) for the VL in each set of visualisations. It should be noted that the illustrated HFOV fans in **Volume 3b** (produced to THC 2016[2] Guidance) for single frame images are representative of the field of view of these images but do not take account of permissible offsets in the angle of view.

1.2 Zone of Theoretical Visibility (ZTV) Production

1.2.1 A Zone of Theoretical Visibility (ZTV) diagram has been prepared using Esri ArcGIS, Version 10.7 (ArcGIS) and an Ordnance Survey (OS) Terrain 5 digital terrain model (DTM) to illustrate the potential visibility of the proposed poles and towers. **Figure 6.1** shows a ZTV run for 10 km from each tower / pole.

1.2.2 Terrain 5 is a grid of heightened points with regular five metre post spacing. The software uses this information to create a virtual, three-dimensional, bare ground model which is representative of the earth's surface. It does not take into account elements above the ground such as buildings or trees. Therefore, while the ZTV indicates areas of potential visibility of the Proposed Development, in reality, not all locations within the ZTV would necessarily afford a view of it. Nevertheless, the ZTV is a valuable tool in both landscape character and visual impact appraisal.

1.2.3 While Terrain 5 is a product which is updated by OS on a quarterly basis, the terrain model was created using data purchased in 2024.

1.2.4 ZTVs have been run using the designed heights for each tower, as identified in the Indicative Tower and Pole Schedule (see **Appendix 3.1**).

1.2.5 The ZTVs have been prepared based on a viewer height of 2 m above ground level in line with the NatureScot, 2017 Guidance, with earth curvature and light refraction set to 0.075.

1.3 Photography

1.3.1 Photographs have been taken using a full frame sensor (equivalent to a 35mm film frame), digital single lens reflex (DSLR) cameras. Cameras used include:

- Canon EOS 5D Mark II with Canon EF 50mm f/1.4 USM lens; and
- Sony ILCE-7RM3 with Sony 50mm f/1.2 Sony DT50mm lens.

1.3.2 The details of the camera and lens used for the VL are included on the relevant photograph or photomontage.

1.3.3 Lenses were fitted with a Polarising filter and/or Neutral Grad filter where appropriate to maximise the quality of light balance and photography at source and minimise the need for computer enhancement.

1.3.4 The baseline photograph was taken in landscape format by a camera attached to a tripod and rotating panoramic head unit (set to 20° intervals) with a levelling base in order to maintain a stable platform for photography work, and to ensure an even overlap for successive panorama images. Photography was taken at a height of 1.5m above ground level.

1.3.5 On arrival at each VL, a global positioning system (GPS) navigation device was switched on and allowed to acquire satellite positions. This device will identify its location, to the nearest metre, using a 12 figure OS grid reference, e.g. 252294 925050 or NC 52294 25050. In order to increase the accuracy of readings, the grid reference was not recorded until all other work at the VL was completed and the GPS device had been switched on for several minutes. This passage of time allows the GPS device to increase the accuracy of readings through repeated, automated measurements. All GPS readings taken were to a maximum of ±5 m accuracy.

1.3.6 While at a VL, the landscape architect or photographer recorded the grid reference, ground level and camera viewing height along with a brief description of the nature of view, weather conditions and visibility. The camera embeds details of the date, time, camera make and model, the lens focal length, shutter speed, f-number and ISO speed rating as metadata in each photograph file. A photograph of the tripod position was also taken.

1.3.7 Baseline photographs were then downloaded and combined to create 360° baseline panoramic images in cylindrical projection using PTGui software. Where applicable these were converted to planar projection using Hugin – Panorama Stitcher software (Hugin). All single frame images conform to the fields of view characteristic of the lenses they represent (50mm or 75mm).

1.3.8 As detailed in **Table 1** below, some adjustments were made using Adobe Photoshop CC 20.0.5 (Photoshop) to the baseline photographs, for example, to alter the brightness and/or contrast.

Table 1: Visualisation Locations (VLs)

Visualisation Location	OS Grid Coordinates	Date and Time	Weather Conditions	Notes
VL1	NC 83071 61060	28 / 06 / 23 15:43	Sunny with cloud	Minor enhancement to brightness and contrast.

1.4 Wireline Preparation

1.4.1 Wirelines of the Proposed Development were created for the VL using 43D Topos R2 (Topos) using specific tower models provided by the client and Terrain 5 DTM (see **Part 1.2**). Where appropriate, wirelines were converted to planar projection using Hugin.

1.4.2 Topos automatically shows the main ridge-lines and changes in terrain within the wirelines. Where necessary, additional lines are added by hand to help improve the understanding of the wireline for the viewer. The extent of the wirelines is limited to that included within the 3d model. For this reason, where a very extensive view is obtained, the full backdrop and horizon line visible in photographs is not always represented in the wireline view. Wirelines should therefore always be viewed in combination with baseline photographs and photomontages.

1.4.3 Similar to the limitations of the ZTV, the wireline visualisation provides an indication of the Proposed Development's potential appearance but does not take account of screening elements such as buildings, trees or minor variations in topography.

1.5 Photomontage Preparation & Rendering

1.5.1 The Photomontage visualisation was created using the wireline and baseline panoramic photograph images described above in Section 1.3. Towers and Poles were rendered in Topos and exported to Photoshop, using the wireline to position these accurately into the photograph. Tracks and forestry felling which are included in the application were added where these would be visible using 3d georeferenced models and Topos which accurately places these features in the view and manually rendered into the image using Photoshop. Final touch-up rendering to create a realistic image was applied in Photoshop.

1.6 Viewing Instructions

1.6.1 The graphic material used in this assessment is for illustrative purposes only and should not be considered completely representative of what the human eye will see. While visualisations can give a reasonable impression of the scale and distance to the Proposed Development, they cannot show exactly what they will look like in reality. This is due to various factors, including the resolution of the image; and the static nature of

visualisations which cannot convey movement of changing light/shadows, weather and seasonality etc. As such, visualisations are best viewed at the VL to appreciate the wider context.

1.6.2 The visualisation, whether prepared in accordance with NatureScot[1] or THC[2] guidance, should be printed at the specified size and viewed flat at a comfortable arm's length. The graphic below has been extracted from the *THC, 2016 Guidance to illustrate how single frame images prepared in accordance with the THC guidance should be viewed.*

The image should be viewed at a comfortable arm's length (approximately 500mm) and viewed normally with both eyes. The page should obscure any foreground not visible within the photomontage itself. This enables the photomontage to be directly compared within the wider context of the real landscape.

Plate 1.6.1: Viewing Instructions for Single Frame Visualisations, Extracted from the THC, 2016[2] Guidance

1.6.3 If the visualisation is viewed on a computer screen, rather than printed at the specified size, this should be enlarged to the full screen height to give a realistic impression. Use of devices with smaller screens, such as tablets, should be avoided for viewing visualisations.

1.6.4 It should be noted that, that the THC, 2016[2] Guidance 75mm focal length photomontage and the NatureScot, 2017[1] Guidance 53.5° field of view images, when printed at the correct size, illustrate an image greater than actual size if held at a comfortable arms length. This is intended to counteract the effects of a loss of relative perspective when viewing a flat image. It is important to note that the visualisation is provided for illustrative purposes to support the LVIA and is presented in a format to conform with the NatureScot, 2017[1] and THC, 2016[2] Guidance. Whilst it provides a helpful tool for assessment purposes, the judgements of landscape and visual effects reported in the LVIA are not reached wholly on the basis of this image, but through the landscape architect's professional experience and understanding of how the Proposed Development would appear in the field.