APPENDIX 5.2: VISUALISATION METHODOLOGY

Contents

1.0 Introduction

1.1.1 The purpose of this methodology is to provide an understanding of how visualisation material prepared to support the Landscape and Visual Impact Assessment (LVIA) included in the Environmental Statement (ES) has been produced.

1.1.2 It should be recognised that production of visualisations is only one component of a LVIA, which will consider a range of other factors when identifying and assessing changes to the landscape and to views. The use of visualisations is a useful aid when undertaking LVIA, but the assessment process is not dependent on them. LVIA may be undertaken without use of visualisation material, although for major developments the inclusion of visualisations is accepted practice.

1.1.3 Current good practice regarding the production of visualisations is set out in:

- Landscape Institute and Institute for Environmental Management and Assessment (3rd edition, 2013), *Guidelines for Landscape and Visual Impact Assessment*. This document is referred to hereafter as 'the GLVIA';
- Landscape Institute (2019), *Visual Representation of Development Proposals. Technical Guidance Note 06/19*. This document is referred to hereafter as 'TGN 06/19'.

1.1.4 The remainder of this Methodology document is structured as follows:

1.1.5 Section 2.0 gives details of how the Zone of Theoretical Visibility (ZTV) mapping was produced.

1.1.6 Section 3.0 includes the details required as part of the 'Visualisation Types Methodology' that forms part of the Technical Methodology specified in Appendix 10 of TGN 06/19.

1.1.7 Section 4.0 gives details of how the viewpoint visualisation material was produced, and includes the remaining details required by the Technical Methodology specified in Appendix 10 of TGN 06/19.

2.0 ZTV

2.1.1 Zone of Theoretical Visibility (ZTV) maps have been generated in order to better understand the likely extent of the surrounding landscape across which the Proposed Development would be visible.

Data Source

2.1.2 The ZTV was produced using a commercial 2m Photogrammetric Digital Surface Model (DSM) available from Bluesky International. This is derived from aerial photography captured in 2020 and takes account of screening features such as buildings and vegetation.

2.1.3 The DSM is based upon a 2m grid spacing. The horizontal RMSE of the data is 1m, and the vertical RMSE is 1.5m.

ZTV creation

2.1.4 The ZTV was calculated and created using QGIS open source software. The ZTV calculation process takes account of the curvature of the earth's surface and light refraction. The eye height of the receptor in the computer model was set at 1.7m above ground level in accordance with guidance set out in GLVIA.

1.1.1 Three separate ZTVs have been produced, reflecting the following:

- theoretical visibility of lorries on the proposed New Access Road and in the proposed Lorry Park, at a height of 4.5m;
- theoretical visibility of structures at the proposed 132kV Substation, at a height of 6m;
- theoretical visibility of the proposed Weighbridge Building, at a height of 9m.

2.1.5 The ZTVs are presented on Figures 5.1b-d of the Environmental Statement. A series of marker points representing the different features are shown on the Figures, and visibility was modelled from each of these points.

2.1.6 In relation to the Lorry ZTV, which is presented on Figure 5.1b of the ES, as lorries would be present across much of the Site. The visibility of different parts of the Site may therefore vary from the surrounding area. As such, colour banding is used to differentiate between locations where more, or fewer lorries (based on the marker points) would be visible.

2.1.7 For the Substation ZTV (Figure 5.1c of the ES) and the Weighbridge Building ZTV (Figure 5.1d of the ES), a single colour is used to represent theoretical visibility. The Substation structures are all located in close proximity to one another. And the Weighbridge Building is a single feature. As such, there are no location where more or fewer features would be visible.

Limitations

2.1.8 A ZTV, as use of the term theoretical implies, is not an absolute indication of the extent of visibility but rather a computer-generated aid that utilises available relative data to indicate areas of inter-visibility and screening in relation to a specific modelled object. ZTVs are tools to assist the LVIA. The technique aims to give a better understanding of the areas where visibility is likely and unlikely but imperfections in data are such that it must only be seen as an aid to understanding. This limitation needs to be recognised when interpreting the ZTVs.

2.1.9 An additional caveat is that the ZTVs simply illustrates that part of a structure would be theoretically visible. As such, it makes no distinction between a clear view of all or most of a proposed feature and a view of a very small proportion of a feature (for example one corner of a building roof, or the top of a stack). This is especially relevant in the case of the Proposed Development, where views from the surrounding area are often limited by vegetation cover.

2.1.10 The ZTV produced using the DSM does reflect the presence of screening features in the landscape. However, it should be recognised that the DSM reflects a single moment in time (i.e. when the underlying aerial photography was taken). In reality, the extent and / or height of vegetation cover is dynamic and changes as vegetation inevitably increases in stature over time and / or is planted, trimmed or removed. Similarly, there is potential for buildings to have been erected, demolished or modified, subsequent to the data being captured.

2.1.11 Additionally, the DSM tends to assume that vegetation captured forms a solid visual barrier, when in reality views can sometimes be available through leaves and branches, especially in winter when deciduous foliage is absent. As such, the real-world visibility of the Proposed Development could potentially be underestimated in places.

2.1.12 Field work undertaken as part of the LVIA included groundtruthing the ZTV and confirmed that it is a relatively accurate depiction of visibility. However, at Viewpoint

L (ES Figure 5.2i) no visibility of the Proposed Development is predicted, whereas in reality, views would be available through gaps between tree trunks. In contrast, visibility is predicted from Viewpoint E (omitted from the LVIA due to lack of visibility), whereas in reality the hedgerow adjacent to the Viewpoint would wholly screen views towards the Site.

2.1.13 Finally, the DSM does not distinguish between the ground surface and the surface of structures and vegetation. As a consequence, the ZTV output may indicate visibility from areas known to be occupied by woodland and buildings. Whilst in theory it may be possible for people to experience the views from such locations (by climbing onto roofs, or into the tops of trees), this is not representative of typical day to day visibility, and as such there is the potential to overstate the actual visibility of the Proposed Development. Ordnance Survey open mapping data (OS Zoomstack Woodland) datasets have been added to the ZTV figure, to mask out mapped areas of tree cover.

3.0 Viewpoint Selection

Introduction

3.1.1 When considering which viewpoints to include as part of an assessment it is important to not assess too few or too many viewpoints. A proportionate approach to viewpoint selection is necessary, in line with the recommendations of the GLVIA (*Guidelines for Landscape and Visual Impact Assessment*, 3rd edition 2013, Landscape Institute and Institute of Environmental Management and Assessment).

3.1.2 The absence of a viewpoint from any location does not imply that there would be no view of a proposed development, nor that views from such a location have not been considered in the LVIA.

3.1.3 Details of the process by which these were selected are set out in the LVIA and the accompanying Viewpoint Selection Appendix (Appendix 5.3 of the ES).

3.1.4 Appendix 10 of TGN 06/19 sets out details of what should be included in the Technical Methodology for Viewpoint Visualisations (i.e. in this Methodology document). The list of required information is stated to be indicative.

3.1.5 Part of the required information is a 'Visualisation Type Methodology' including:

- The anticipated purpose/ users of the viewpoint visualisations;
- The indicative assessment of sensitivity and magnitude, and resulting likely indicative overall degree or level of effect; and
- Other factors influencing the selection of the visualisation type.

3.1.6 The purpose of the viewpoint visualisations is to inform the LVIA and the decision-making process. Users are likely to be landscape professionals, other environmental professionals and planning officers, consultee bodies and interested members of the public.

3.1.7 On the basis that the LVIA includes a detailed assessment of visual effects from each viewpoint including a description of the sensitivity of receptors, the magnitude of change in view that would occur, and the resultant effect, it is considered that there is little benefit in providing an indicative assessment in this Methodology document.

3.1.8 The LVIA and the accompanying Effects on Viewpoints Appendix (Appendix 5.6 of the ES), both include details of the type of receptors that each viewpoint seeks to

represent, and a brief description of the viewpoint location. It is considered that this information should be sufficient indication as to the factors that have influenced the selection of the viewpoint.

3.1.9 Winter baseline photography is provided from each viewpoint, which is annotated where deemed appropriate to highlight key features. Summer baseline photography is also provided on for viewpoints where there would notable changes in views toward the Site as a result of seasonal change in vegetation cover, or from locations in Chirk Castle where people are more likely to be present during the summer months. One Viewpoint (Viewpoint Z) was identified during a summer site visit, and only summer photography is provided for this Viewpoint.

3.1.10 Photomontages and wireframes illustrating how the Proposed Development would appear are also included from selected viewpoints. These illustrate the change in view that would occur from sensitive locations within the Chirk Castle Estate, along the Llangollen Canal, and on the B5070 adjacent to residential properties at the edge of Chirk.

4.0 Viewpoint Visualisations

Photography

4.1.1 All photography for this assessment was taken using a Canon EOS 5D Mark II digital single lens reflex (DSLR) camera with a full-frame sensor, using a 50mm lens. The camera was mounted on a tripod to ensure a stable support and minimise camera shake. The camera was mounted on a panoramic tripod head with built-in spirit level (Nodal Ninja 3 MkII), which allows for the rotation of the camera at fixed intervals around a fixed point in vertical alignment with the camera lens, thereby eliminating parallax error. The camera was levelled using an auto-leveller device (Nodal Ninja EZ-Leveler II). The camera height was 1.5 m above the ground.

4.1.2 Photographs were taken over a full 360 degree sweep from each viewpoint location. The precise location of each photograph was recorded using a hand-held Garmin Oregon 600 GPS device (which has an accuracy of approximately 3m). A photograph was also taken of the tripod location (these photographs are included in Annex A). Following the Site visit, the GPS data was loaded into Google Earth, and the GPS waypoints were moved manually where necessary to reflect the actual tripod location. A spreadsheet was completed recording information about the viewpoint.

3D Model

4.1.3 A digital model of the Proposed Development was created based upon design information provided by the Applicant. This was imported into industry standard software (Autodesk 3DStudioMax), along with the viewpoint data recorded on site (as discussed above). This enables a series of 'camera' points to be created within the model, reflecting the view from each viewpoint towards the Proposed Development.

4.1.4 A series of markers were added to the model, representing real-world locations such as topographic features, vegetation and buildings. The locations of these markers were determined via the use of aerial imagery (e.g. Google Earth), Environment Agency LIDAR data, and OS Mastermap data.

4.1.5 Proposed planting was also added to the model, reflecting both initial planting height, and anticipated growth rates after five years.

4.1.6 The planting proposed is a combination of transplants (height at time of planting approx. 50cm) and standard trees (height at time of planting approx. 3-4m).

4.1.7 Five years after planting, the transplants are anticipated to have grown to a height of approximately 3m, and the standard trees are anticipated to have grown to a height of approximately 5-6m, reflecting an anticipated growth rate of approximately 50cm per annum.

4.1.8 The models were then lined up with the individual photograph that focuses on the Site. The markers were used to ensure that the model lines up both horizontally and vertically as accurately as possible with the photograph (by matching the markers with the real-world equivalent), and to assist with identifying which features in the photograph would appear 'in front' of the Proposed Development, which would appear 'behind' and which, if any would be removed.

4.1.9 Once the models are lined up as accurately as possible, the Proposed Development was rendered, having regard to the particular materials and colours that are to be used, and to reflect light conditions typical of the time and date of the photography.

Photomontages and Wireframes

Photomontages

4.1.10 Photomontages are computer-generated images, showing images of the Proposed Development superimposed upon the existing photography, with the aim of producing a visualisation that should give a realistic impression of how the Proposed Development would appear within the landscape.

4.1.11 Following the lining up of the 3D model with the photograph that includes the Site, and the rendering of the Proposed Development, the full sweep of photos taken from each viewpoint were stitched together using the software package PTGui. The software reads the exif data attached to each individual photograph file to identify the specifications of the camera and lens, ensuring accurate production of the stitched panoramic image.

4.1.12 The resulting stitched viewpoint image was loaded into Adobe Photoshop. Any parts of the Proposed Development that would not be visible from an individual viewpoint due to the presence of intervening features were cropped out.

Wireframes

4.1.13 For the Proposed Development, a wireframe view has been used at Viewpoint T from which views of the Proposed Development would be very heavily filtered through vegetation cover, making accurate rendering of visible parts of the proposal somewhat challenging.

4.1.14 An outline of the Proposed Development is superimposed upon the existing photography, and those parts of the proposal that would be visible are indicated via use of transparent hatching.

Limitations

4.1.15 It should be understood that viewpoint visualisations can never provide an exact match to what is experienced in reality. Visualisations are tools in the assessment process but independent from it. They illustrate the likely change in view in the context of a specific date, time and weather conditions, that would be seen within a photograph and not as seen by the human eye. As such, visualisations need to be used in conjunction with site visits and should be considered in the context of the totality of views experienced from the viewpoint and not just focussed on the Proposed Development.

4.1.16 Photography was taken in January, March and July 2022. The photographs reflect the level of foliage present at those times of year.

4.1.17 The software (3DStudioMax) used to produce the model of the Proposed Development from each Viewpoint does not take account of the curvature of the earth's surface, and assumes a flat horizon. The effects of the earth's curvature do influence what is visible, especially in longer range views. If a flat horizon is assumed, then a feature located approximately 5km away from any viewpoint would appear approximately 1.7m higher than in reality. As such the model slightly exaggerates the height that the Proposed Development would appear in each view. As all of the viewpoints are located relatively close to the Proposed Development any discrepancies in the height of the proposed new structures would be minor. As such, it is not considered that this is material to the conclusions of the LVIA.

Presentation & Viewing

4.1.18 Once the final viewpoint images have been produced, they are inserted into a Figure template, which also includes information about the viewpoint, including the date and time of photography, and details of the camera used.

4.1.19 Annotated baseline photography is presented on Figures 5.2a-s of the ES. This includes winter and summer photography as deemed necessary for each Viewpoint.

4.1.20 Photomontages are presented for selected Viewpoints on Figures 5.3a and c-e of the ES. These include winter and summer views as deemed necessary for each Viewpoint. The visualisations are presented across a series of sheets for each Viewpoint. The first sheet shows the baseline view (also presented on Figures 5.2a-s) without annotation. The remaining sheets show the predicted change in view at the time of opening (Year 0) and after five years (Year 5).

4.1.21 The wireframe visualisation from Viewpoint T is presented on Figure 5.3b. the first sheet of this Figure shows the baseline view without annotation, and the second sheet shows a wireframe indicating parts of the proposal likely to be visible from Viewpoint.

4.1.22 The images presented on each sheet are displayed at an enlargement factor in accordance with the guidance set out in TGN 06/19. The enlargement factor is stated on each sheet.

4.1.23 The field of view displayed for each Viewpoint has been determined in accordance with the guidance set out in TGN 06/19 and is stated on each sheet.

4.1.24 Each sheet should be printed at the size stated on it. All printed sheets should be viewed **held flat at a comfortable arm's length**.

ANNEX A: Tripod Location Photographs

Viewpoint B

Viewpoint C

Viewpoint F

Viewpoint G

Viewpoint H

Viewpoint I

Viewpoint J

Viewpoint K

Viewpoint L

Viewpoint M

No tripod photo

Viewpoint N

Viewpoint Q

Viewpoint T

Viewpoint U

Viewpoint V

Viewpoint W

Viewpoint X

Viewpoint Y

Viewpoint Z