The Droves Solar Farm

Appendix 6.4: Methodology for Zone of Theoretical Visibility Studies and Visualisations

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4.0 Appendix 6.4 Methodology for Zone of Theoretical Visibility Studies and Visualisations

4.1. ZTV Studies

4.1.1. ZTV studies are prepared using the ESRI ArcGIS Viewshed routine. This creates a raster image that indicates the visibility (or not) of the points modelled. LDA Design undertake a ZTV study that is designed to include visual barriers from settlements and woodlands (with heights derived from LiDAR surface mapping data). If significant deviations from these assumed heights are noted during Site visits, for example young or felled areas of woodland, or recent changes to built form, the features concerned will be adjusted within the model or the adoption of a digital surface model will be used to obtain actual heights for these barriers. Two ZTV's have been produced, one using surface mapping data (Digital Surface Model (DSM)) and the other using terrain mapping data (Digital Terrain Model (DTM)).

4.1.2. The ZTV with surface mapping data is more refined and has been used to include buildings and vegetation in the ZTV model.

4.1.3. Both ZTV models are also designed to take into account both the curvature of the earth and light refraction, informed by the SNH guidance. LDA Design undertake all ZTV studies with observer heights of 2m.

4.1.4. The ZTV analysis begins at 1m from the observation feature and will work outwards in a grid of the set resolution until it reaches the end of the terrain map for the project.

4.1.5. For all plan production LDA Design have produced a ZTV that has a base and overlay of the 1:50,000 Ordnance Survey Raster mapping or better. The ZTV has been reproduced at a suitable scale on an A3 template to encompass the study area.

4.2. Ground model accuracy

4.2.1. Depending on the project and level of detail required, different height datasets may be used. Below is listed the different data products and their specifications:

Table 4-1: Data products

Product	Distance Between Points	Vertical RMSE Error

LiDAR	50cm – 2m	up to +/- 5cm
Photogrammetrically Derived Heights	2m – 5m	up to +/- 1.5m
Ordnance Survey OS terrain 5	5 m	up to +/- 2.5m
NextMap25 DTM	25 m	+/- 2.06m
Ordnance Survey OS terrain 50	50 m	+/- 4m

4.2.2. Site-specific topographical survey data may also be used where available.

4.3. Photomontages and Photowires

4.3.1. Verified / verifiable photomontages are produced in seven stages. Photowires are produced using the same overall approach, but only require some of the steps outlined below.

1) Photography is undertaken using a full frame digital SLR camera and 50mm lens. A tripod is used to take overlapping photographs which are joined together using an industry standard application to create a single panoramic image for each viewpoint. These are then saved at a fixed height and resolution to enable correct sizing when reproduced in the final images. The photographer also notes the GPS location of the viewpoint and takes bearings to visible landmarks whilst at the viewpoint.

2) Creation of a ground model and 3D mesh to illustrate that model. This is created using NextMap25 DTM point data (or occasionally other terrain datasets where required, such as Site-specific topographical data or Photogrammetrically Derived Heights) and ground modelling software.

3) The addition of the Scheme to the 3D model. The main components of the Scheme are accurately modelled in CAD and are then inserted into the 3D model at the proposed locations and elevations.

4) **Wireline generation:** The viewpoints are added within the 3D CAD model with each observer point being inserted at 1.5m above the modelled ground plane. The location of the landmarks identified by the photographer may also be included in the model. The view from the viewpoint is then replicated using virtual cameras to create a series of single frame images, which also include bearing markers. As with the photographs, these single frame images are joined together using an

industry standard application to create a single panoramic image for each viewpoint. These are then saved at a fixed height and resolution to ensure that they are the same size as the photographs.

5) **Wireline matching:** The photographs are matched to the wirelines using a combination of the visible topography, bearing markers and the landmarks that have been included in the 3D model.

6) For the photomontage, an industry standard 3D rendering application is used to produce a rendered 3D view of the Scheme from the viewpoint. The rendering uses materials to match the intended surface finishes of the development and lighting conditions according to the date and time of the viewpoint photograph.

7) The rendered development is then added to the photograph in the position identified by the wireline (using an image processing application) to ensure accuracy. The images are then layered to ensure that the development appears in front of and behind the correct elements visible within the photograph. Where vegetation is proposed as part of the development, this is then added to the final photomontage.

4.3.2. In accordance with the guidance provided in Landscape Institute Technical Guidance Note 06/19 Visualisation of development, visualisations will be prepared to the technical methodology set out below.

4.3.3. The photowires and photomontages prepared in support of the LVIA **ES Chapter 6 [APP/6.2]** adhere to the Type 3 visualisation specification as surveyed locational accuracy is not generally necessary but image enlargement, to illustrate perceived scale, would be appropriate.

4.5. Technical Methodology

Table 2: Technical Methodology

Information	Technical Response
Photography	
Method used to establish the camera location	Aerial photography in ESRI ArcGIS along with GPS reading taken on Site
Likely level of accuracy of location	Better than 1m
If lenses other than 50mm have been used, explain why a different lens is appropriate	N/A
Written description of procedures for image capture and processing	See Paragraph 6I.10.1 point 1 above
Make and type of Panoramic head and equipment used to level head	Manfrotto Levelling Head 338 and Manfrotto Panoramic Head MH057A5
If working outside the UK, geographic co-ordinate system (GCS) used	N/A
3D Model/Visualisation	
Source of topographic height data and its resolution	TBC
How have the model and the camera locations been placed in the software?	Georeferenced model supplied by engineers/architects Camera locations taken from photography viewpoint locations
Elements in the view used as target points to check the horizontal alignment	Existing buildings, infrastructure/road alignments, telegraph poles/street lighting/signage, field boundaries, DSM
Elements in the view used as target points to check the vertical alignment	Topography, existing buildings

Information	Technical Response
3D Modelling / Rendering Software	Civil 3D / AutoCAD / 3DS Max / Rhino / V-Ray