CLEVE HILL SOLAR PARK

ENVIRONMENTAL STATEMENT
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ZTV, PHOTOGRAPHY AND PHOTOMONTAGE METHODOLOGY

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A7.1.1 ZTV Methodology

1. Ordnance Survey Terrain 5 dataset was used as the Digital Terrain Model (DTM) for the Bare Earth Zone of Theoretical Visibility (ZTV). This DTM is a 5 m by 5 m raster dataset that is representative of the land form across Great Britain.

2. The ZTV was produced using ArcGIS Pro 2.1 software, and the calculations were based on the solar panels and associated infrastructure. The ZTV is created by highlighting areas on the DTM where a potential piece of infrastructure may be visible, based on the DTM. The height value given to the infrastructure was dependent on the flood depth value per field within the Development, plus the height of solar panels.

3. Environment Agency LiDAR 2 m data plus National Tree Mapping (NTM) data were combined to create a DTM that would be used for the Screened DTM. The LIDAR data takes account of all surface infrastructure – buildings and vegetation, while NTM data takes account of trees. The reason for using the NTM data is that it provides a way of ensuring that the trees are accurately depicted within the DTM, as when they are captured using LiDAR there may be scatter from the Laser returns that result in a poor representation of a structure such as a tree.

4. The NTM data[1] that was used provides location, height and canopy extents for individual trees over three metres in height. The data comprises of canopy polygons which represent individual trees or closely- grouped tree crowns. The data also features idealised crowns which look at crown polygons visualised as circles and remain true to original canopy feature. The data also contains height points which detail the centre point and height of each canopy feature. The accuracy of the data is greater than ninety percent of the canopy coverage and greater than ninety five percent within 50 m of buildings. The NTM data is based on canopy extents and uses NDVI (Normalised Difference Vegetation Index) which uses near-infrared to detect vegetation. The ZTV is run in the same way and with the same infrastructure as the bare earth ZTV. Once this has been calculated, the ZTV highlights areas on top of trees and buildings, and so these are removed using the NTM data polygons and Ordnance Survey Mastermap data.

A7.1.2 Viewpoint Photography

5. The viewpoints are prioritised based on their location in relation to the proposed site. This is so that viewpoints east of the site are visited in the morning and viewpoints west of the site are visited in the afternoon to guarantee where possible that the sun is behind the photographer at the time of any viewpoint photography being captured. Viewpoint location maps at 1:25,000 are printed for each viewpoint to aid location once on site.

6. Upon arrival at each proposed viewpoint location, minor adjustments to position are made in order to obtain as clear a view to the site centre as possible, avoiding trees, landscape or man-made obstructions where possible.

7. The precise direction of the proposed site centre is confirmed using the Garmin eTrex H GPS unit. The tripod is set up. The camera is placed on the panoramic head in a landscape orientation where its height is confirmed and set at 1.6 m (please note: a portrait camera orientation is sometimes used in situations where the viewpoint is very close to a Development in order that the top of the Development is not cut off by the image boundaries). The head is then levelled followed by levelling of the camera itself using a hot-shoe spirit level. With the camera’s viewfinder centred on the perceived site centre,

[1] Purchased from Blue Sky.

exposure and focus settings are taken. These are then fixed manually on the camera so that they cannot be inadvertently altered. The head is rotated 90° to the left where the first frame of the 360° sequence is then taken. Each subsequent frame is taken using a 50% overlap of the previous frame until the full 360° sequence is captured.

8. The camera is then removed from the tripod and a viewpoint location photograph is captured showing the tripod in its position.

9. Viewpoint information is captured using a Garmin eTrex H GPS with 3m accuracy.

10. The camera and tripod configuration used is as follows:

Nikon D3 – Summer Photography and Visualisations

- Camera body: Nikon D3 professional specification digital SLR (full frame CMOS sensor)
- Camera lens: Nikkor AF 50mm f1.8 prime
- Tripod: Manfrotto 055MF4 with Manfrotto 438 ball leveller
- Panoramic head: Manfrotto 303SPH

Camera settings used for all photography:
- Camera mode: Manual Priority
- ISO: 200
- Aperture: f13
- Image format: RAW

Nikon D5 – Summer Photography and Visualisations

- Camera body: Nikon D5 professional specification digital SLR (full frame CMOS sensor)
- Camera lens: Nikkor AF 50mm f1.8 prime
- Tripod: Manfrotto 055MF4 with Manfrotto 438 ball leveller
- Panoramic head: Manfrotto 303SPH

Camera settings used for all photography:
- Camera mode: Manual Priority
- ISO: 200
- Aperture: f13
- Image format: RAW

11. The single frame photographs are opened in Adobe Photoshop CC2018 where they are checked and any dust spots are removed before being saved as a high resolution TIFF image.

12. Photos are stitched together to create panoramas from the individual images making up the required field of view. Stitching is done in PTGui Pro version 10.0.12 professional photographic stitching software using the required projection settings. They are then checked and any further dust spots are removed before being saved as a high resolution TIFF image.

A7.1.3 Photomontage Methodology

13. In producing the computer model and verified view, the following methodology has been used:

A. Base mapping and height data of the relevant area are set up to real-world OS coordinates;
B. The height data of the existing baseline is located according to Above Ordnance Datum (AOD) heights based on aerial topographical survey data.

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C. The proposed development is located according to the scheme design and XYZ coordinates supplied by the surveyor;
D. The arrangement and size of the development is modelled in accordance with the application using 3D Studio Max software;
E. Viewpoint locations are inputted using GPS data collected on-site;
F. 3D Studio Max standard 'cameras' are correctly positioned in virtual space;
G. The viewpoint photography is loaded and aligned into the environment background;
H. Each camera's field of view is overwritten in 3D Studio Max to match the field of view of the single photo the direction, and the viewing angle of each camera is aligned using GPS data and matched up to the surveyed reference points (provided by the surveyors);
I. Due to the nature of aerial topographical survey data, there can be small micro discrepancies in the ground plane caused by vegetation for instance or disturbed earth from ploughed land. Where such discrepancies impact upon the exact line of security fencing (i.e. casue a small variation in heights ground truthing has been utilised by a Landscape Architect and the 3D model adjusted to reflect the onsite conditions (i.e.) a flat/level fence line. This ensures a robust approach is undertaken and modelling reflects the baseline topographic conditions at a micro level with a variance of + or – 0.1m;
J. The rendered images are stitched in cylindrical projection using the PTGui Software;
K. The models within the stitched images are rendered for each viewpoint and merged with the full resolution base photographs using Adobe Photoshop;
L. Any foreground elements within the panorama are masked out using Adobe Photoshop;
M. The proposed vegetation screening guides (place markers) are then created within the model, which is rendered out added and replaces to real life trees to the Adobe Photoshop document with the required growth scenarios (e.g., for 5 year and 10 year); and
N. For year 1, the proposed vegetation screening is created within the model, which is rendered and added to the Adobe Photoshop document.

O. The production of visualisations for the ES have been created to most accurately represent how the Development would appear at different times of the year (Summer and Winter) where light effects the visual perception of the Solar Panels. 3D modelling has been used to place the model accurately within the verifiable photography and the sun angle within the model has been set to represent the time of year and day the photography was taken to ensure the view is as accurate as reasonably possible. A site visit to a similar model of panels was undertaken in Holland to help understand how light affects the panels and the result was the panel colour is reflective of the overriding colour of the sky. This has been used to refine the colour of panels at the time of year and seasonally. This level of detail is in addition to that presented at PEIR to provide a more accurate representation of how they will appear in the landscape. The final stage of this process is based on professional judgement based on experience of previous solar farm applications and completed sites visited at various times of the year.