

**The Great Grid Upgrade**

Chesterfield to Willington

# Preliminary Environmental Information Report

Volume 3: Appendix 6D Visualisations and ZTVs Methodology

March 2026

nationalgrid

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# 6D. Visualisations and Zones of Theoretical Visibility (ZTVs) Methodology

## 6D.1 Introduction

6D.1.1 Zones of Theoretical Visibility (ZTVs) and visualisations (annotated viewpoint photography, and photomontages) are graphical images produced to assist and illustrate the preliminary Landscape and Visual Impact Assessment (LVIA). The methodology used for the ZTVs and visualisations accords, where relevant, with the following technical guidance documents:

- Technical Guidance Note 06/19: Visual Representation of Development Proposals (Ref 6D.1); and
- The Guidelines on Landscape and Visual Impact Assessment, Third Edition (GLVIA3) (Ref 6D.2).

## 6D.2 Methodology for Production of ZTVs

6D.2.1 ZTVs are used to display the area over which elements of the Project could theoretically be seen. ZTVs indicate areas from where the Project would be theoretically visible but cannot show what it would look like, nor can they indicate the nature or magnitude of landscape and visual effects. The ZTVs are generated using ESRI ArcGIS Pro© software. This software is used to export a raster output showing areas of theoretical visibility of the Project using digital terrain data as follows:

- LIDAR Composite Digital Surface Model on a 2 m grid. This is considered suitable data for detailed ZTV production on the Project as during analysis it is likely to detect smaller features which may affect visual screening such as buildings and vegetation.
- The ZTV was created using a viewer height of 1.6 m. The Project was modelled using the emerging design that is being presented at Stage 2 (statutory) consultation and ZTVs run for the following parameters:
  - height to lowest pylon 'arm' (illustrating the theoretical visibility between elements theoretically visible from the base of the pylons to the lowest arm); and
  - total pylon height (illustrating the theoretical visibility between elements theoretically visible from the base of the pylons to the upper sections/top).

6D.2.2 The ZTV model was run using the heights of pylons as described in **Chapter 4 Project Description**, which vary in height from 44.5 m to 66.0 m, depending on engineering requirements. The pylon heights may change during the Project's subsequent stages, and these changes will be reflected in the ZTVs accordingly.

6D.2.3 The resulting ZTV exports were overlaid on an Ordnance Survey map base at an appropriate scale and are presented as figures using ESRI ArcGIS Pro©.

## 6D.3 Methodology for Baseline Photography

6D.3.1 Once a suitable representative viewpoint had been selected, the location was visited, confirmed, and assessed. The viewpoint location was micro-sited to avoid foreground clutter as far as practicable and then photographed during fair weather and light conditions. A photographic record was taken to record the view. The details of the viewpoint location and associated data were recorded to assist in the production of visualisations and to validate their accuracy.

6D.3.2 The following photographic information was recorded:

- date and time;
- Global Positioning System (GPS) recorded 12 figure grid reference accurate to approximately 2-5 m;
- GPS recorded as Above Ground Level (AGL), accurate to approximately 2-4 m, recorded in metres as two-digit reference;
- use of 50 mm fixed focal length of lens and full frame sensor (FFS) digital single-lens reflex (DSLR) camera;
- use of tripod; and
- appropriate horizontal field of view (in degrees) photographed.

6D.3.3 All photographs included in this assessment were recorded with a DSLR camera set to produce photographs equivalent to those of a manual 35 mm single-lens reflex (SLR) camera with a fixed 50 mm focal length lens as required.

6D.3.4 Whilst no two-dimensional image can fully represent the real viewing experience, the visualisations aim to provide a realistic representation of the Project, based on current information and photomontage methodology.

### Weather Conditions

6D.3.5 Paragraph 8.22 of GLVIA3 (Ref 6D.2) states:

*'In preparing photomontages, weather conditions shown in the photographs should (with justification provided for the choice) be either:*

- *representative of those generally prevailing in the area; or*
- *taken in good visibility, seeking to represent a maximum visibility scenario when the development may be highly visible'.*

6D.3.6 In preparing photomontages for the preliminary LVIA, photographs were taken in favourable weather conditions that are representative of the weather conditions generally and, where possible, were taken during periods of 'good', 'very good' or 'excellent' visibility conditions.

## 6D.4 Methodology for Production of Visualisations

6D.4.1 Each view has been illustrated with baseline photography, with some specific views also showing a photomontage indicating the Project. These terms are defined as follows:

- **Baseline photograph:** A photograph of the existing view recorded in fair weather conditions and usually presented as a panorama as required by the relevant guidance. These are presented as Type 1 visualisations in accordance with Technical Guidance Note 06/19 (Ref 6D.1).
- **Photomontage:** A visualisation which superimposes an image of the Project upon the baseline photograph, which is then rendered by computer software to produce an image of how the Project would appear from that viewpoint. Photomontage is a widespread and popular visualisation technique, which allows changes in views and visual amenity to be illustrated and assessed. These are presented as Type 4 visualisations in accordance with Technical Guidance Note 06/19 (Ref 6D.1).

### Baseline Photograph Production

6D.4.2 Photographs were taken using a full frame sensor digital camera, with a 50 mm fixed focal length lens in combination with a panoramic head equipped tripod. Detailed information was then recorded on-site to enable the accurate alignment of the photographs with the wireline model. Tripod locations were photographed from multiple angles to aid the viewpoint alignment process.

6D.4.3 To create the baseline panorama, the photographs from the viewpoint were then digitally joined using PTGui software to form a cylindrical panorama. Site visit photography should be undertaken in good, very good or excellent visibility and at particular times of day or from a location that avoids foreground clutter or other vertical features such as telegraph poles, particularly where this is a true representation of the view from that viewpoint area.

### Photomontage Production

6D.4.4 The photomontages were aligned horizontally and vertically using specialist software to generate a view of the Project. This software creates a 3D computer model of the existing landscape and the Project using digital terrain data and models representing the specified geometry and position of the proposed pylons. 1 meter digital terrain model was used to represent baseline terrain data and assist in the production and alignment of photomontages.

6D.4.5 The computer model includes the entire LVIA Study Area, and all visualisations take account of the effects caused by atmospheric refraction and the earth's curvature.

6D.4.6 Visualisations were produced for the agreed viewpoints identified in the preliminary LVIA, and photomontages aimed to provide a photorealistic image of the appearance of the Project. 3D model representations were combined with the baseline view photographs to create a photorealistic rendered photomontage image of the Project.

6D.4.7 The photomontage was produced by rendering the 3D model of the Project in order to add appropriate colour, texture and lighting effects. The render takes into account the time of the photography and weather conditions occurring on the day to best visually forecast the 'as-built' scenario within the limitations of the media. The

rendered export is then digitally combined with the baseline photography, taking into account the screening effects of intervening objects. Any demolished objects, such as existing pylons or cleared vegetation, are removed from the baseline imagery, with the proposed Project revealed where it is no longer screened by those elements. The completed Type 1 panoramas, Type 4 photomontages (as described in Technical Guidance Note 06/19 (Ref 6D.1) and accompanying data are then presented as figures using desktop publishing/graphic design software.

## Limitations of Visualisations

- 6D.4.8 The photomontage visualisations used in the preliminary LVIA are for illustrative purposes only and, whilst useful tools in the assessment, are not considered to be completely representative of what will be apparent to the human eye. The assessments were carried out from observations in the field and therefore may include elements that are not visible in the photographs.
- 6D.4.9 The photomontage visualisations of the Project have a number of limitations when using them to form a judgement on visual effect:
- A visualisation can never show exactly what the Project would look like in reality due to factors such as different lighting, weather and seasonal conditions which vary through time and the resolution of the image.
  - The images provided give a reasonable impression of the scale and the distance to the Project but can never be 100% accurate when compared to the final constructed effect.
  - A static image cannot convey movement such as the movement of water or the reflection from the sun.
  - The viewpoints illustrated are representative of views in the area but cannot represent visibility at all locations.
  - To form the best impression of the effects, these images are best viewed at the viewpoint location shown.
  - The visualisations must be printed and viewed at the correct size as indicated on the figures.
  - Images should be held flat at a comfortable arm's length. If viewing these images on a wall or board at an exhibition, stand at arm's length from the image presented to gain the best impression.
  - It is preferable to view printed images rather than view images on screen. Images on screen should be viewed using a normal PC screen with the image enlarged to the full screen height to give a realistic impression.

## Printing of maps and visualisations

- 6D.4.10 All electronic visualisations and maps should be printed out and viewed at the correct scale as noted on the document.

# References

- Ref 6D.1 Landscape Institute (2019). Technical Guidance Note 06/19: Visual Representation of Development Proposals. [online] Available at: <https://www.landscapeinstitute.org/visualisation/> [Accessed 22 October 2025].
- Ref 6D.2 Landscape Institute and Institute for Environmental Management and Assessment (IEMA) (2013). Guidelines for Landscape and Visual Impact Assessment. Third Edition (GLVIA3).

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