A47 North Tuddenham to Easton Dualling

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6.3 Environmental Statement Appendices
Appendix 7.2 – ZTV and Verified Photomontage Methodology

APFP Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

The A47 North Tuddenham to Easton Development Consent Order 202[x]

ENVIRONMENTAL STATEMENT APPENDICES
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1. ZTV and Verified Photomontage Methodology

1.1. Introduction

1.1.1. This document describes the methodology used for digital modelling of the Zone of Theoretical Visibility (ZTV) and verified photomontages for the Proposed Scheme.

1.1.2. The purpose of the ZTV is to provide an indication of the potential extent of area from which the Proposed Scheme may be visible. The purpose of the verified photomontages is to present an accurate representation of the proposed development to enable its potential visual effects to be evaluated, assessed and reported in the Environmental Statement (ES) (**TR010038/APP/6.1**)..

1.1.3. The methodology described in this document is based on current best practice and follow recommendations from:

- Design Manual for Roads and Bridges (DMRB) LA 107 Revision 2 Landscape and Visual Effects (Highways England, September 2019)
- Guidelines for Landscape and Visual Impact Assessment - 3rd edition (GLVIA3) – Landscape Institute and Institute of Environmental Management and Assessment
- Landscape Institute (LI) Technical Guidance Note 06/19: Visual Representation of Development Proposals
- Scottish Natural Heritage – Visual Representation of Windfarms Version 2, 2014

1.2. ZTV

1.2.1. A ZTV has been produced using Digital Surface Model (DSM) data which creates a 3D model environment that includes the screening influence of topography, vegetation and buildings. The dataset used comprises Photogrammetric DSM 2m data providing a +/- 1m vertical accuracy and +/- 1.5m horizontal accuracy in survey data. The ZTV provides an indication of the potential visibility of the Proposed Scheme and informs identification of the study area and visual receptors.

1.2.2. The Proposed Scheme ZTV includes distinction between the potential visibility of the Proposed Scheme overbridges ((as the tallest and potentially most visible components of the Proposed Scheme) and the general visibility of the Proposed Scheme infrastructure and vehicles (refer to Figure 7.4 (Visual Context)) (**TR010038/APP/6.2**). The ZTV model has been generated based on ‘visibility’ points located every 20m along the Proposed Scheme highway and elevated 4m above carriageway level to represent lorry height. The viewer height has been

taken as 1.6m in accordance with GLVIA3 best practice guidance. The extent of ZTV has been run to a 1.5km offset from the Proposed Scheme in recognition of Planning Inspectorate Scoping Opinion (**TR010038/APP/6.6**) response to consider the potential for visual effects beyond a 1km study area. The ZTV model does not take into account the effect of removal of existing vegetation on the potential extent of visibility of the Proposed Scheme.

1.2.3. Whilst ZTVs are used as a working tool to inform the assessment, the actual visual effects of the Proposed Scheme have been assessed through a more detailed analysis of specific viewpoints, by field survey observations and through the production and analysis of photomontage visualisations (refer to Figures 7.6.1 to 7.6.13 for viewpoint photomontage figures) (**TR010038/APP/6.2**). The ZTV indicates areas from which the Proposed Scheme may be seen within the study area but does not differentiate the variability in nature or magnitude of visual effects that may occur.

1.3. Verified Photomontage

Approach to Visualisation

1.3.1. The visual effects of the Proposed Scheme have been assessed in the field using computer generated visualisations ('photomontage') as prompts. Visualisations are illustrations that aim to represent the observer's view of the Proposed Scheme. To this end, a series of computer-generated photomontages were produced for agreed viewpoint locations within the study area. The photomontage illustrations presented within this ES, together with ZTVs and field surveys, were used to assist professional judgement in the assessment of the potential effects on the landscape and visual resources and their significance.

1.3.2. Photomontages combine a photograph of an existing view with a computer-generated image. They provide photo-realistic, rendered representations of how the Proposed Scheme may look in the context of the existing landscape and thereby inform the process by which assessment judgments are made. A photomontage can however only illustrate how the Proposed Scheme would appear in a photograph, as they can never exactly match what is experienced in the field. A combination of baseline and photomontage images have been used to illustrate the representative viewpoints shown in Figures 7.6.1 to 7.6. (**TR010038/APP/6.2**).

1.3.3. Photo visualisations included in the assessment represent a typical range of daytime lighting conditions and seasonal variation, including winter views taken in March 2018 / February 2020 and summer views taken in July 2018 / September 2019.

1.3.4. In recognition of Landscape Institute Technical Guidance Note 06/19's intention to provide an industry standard for visualisation, this methodology takes its lead on approach to visualisation from the 'typology' set out in Table 2 of the guidance note.

1.3.5. In this respect the methodology presents visualisation to a 'Type 4 – Photomontage/Scale Verifiable' standard with the guidance defined aim 'to represent scale, appearance, context, form, and extent of development'.

1.3.6. In compliance with the guidance note, viewpoint panorama images have been presented with a maximum field of view of 90 degrees as 820mm x 240mm images on 841mm x 297mm sheets.

Photography

1.3.7. Sweco used a Canon 5D (mark iv) full frame digital camera with a Canon Electro Focus 50mm 1.4 Ultra Sonic Motor lens. The camera is mounted in landscape format on a tripod with a panoramic head attached. The lens centre (its nodal point) is set at an eye level of 1.6m. The camera height may be different if features such as fences or hedges obscure the view, however this will be recorded. The levelling plate is adjusted to level the camera in both its pitch and roll axes.

1.3.8. Use of the panoramic head allows the camera to rotate directly around the lens centre (its nodal point) to avoid parallax effects between incremental photos. In landscape orientation the camera is rotated 20° between each photograph.

1.3.9. Using a plumb line the camera position can accurately be located on the ground. The physical viewpoint location is marked with either a survey nail or peg hammered into the ground. Camera location coordinates are taken by a chartered surveyor during the site visit.

1.3.10. Supplementary photos are taken to record the camera setup and survey nail / peg position. These are used by the surveyor to locate positions or if additional photography at the viewpoint location is subsequently required.

Survey

1.3.11. Ideally the site is attended with both the photographer and chartered surveyor. This is to prevent potential viewpoint location inaccuracies if surveyor were to attend separately.

1.3.12. A Total Station is used by the chartered surveyor to accurately record the camera position and also capture an array of selected survey reference points used to

camera match and calibrate the photography. All survey points are captured in the British National Grid co-ordinate system recording an X, Y and Z co-ordinate.

1.3.13. An adequate number and spread of survey points is recorded per photo to verify the overall view alignment. Where a viewpoint does not contain sufficient fixed targets suitable for surveying, temporary targets such as ranging poles are set up to allow the survey to be completed at the same time as the photography.

1.3.14. If the surveyor cannot attend the site visit with the photographer, the surveyor will need to locate the survey nail / peg on site with use of supplementary photos of the setup taken during photography visit. Marked up viewpoint photography would be supplied to the surveyor, to show the points to be surveyed if the situation required it.

1.3.15. The survey data is post-processed and then supplied in an Excel table for each set of viewpoint photography. Tables contain co-ordinates for the camera and surveyed reference points, which are used to align and verify viewpoint camera alignments.

Model Creation

1.3.16. A full-scale site model, either received from the client or produced in house is positioned in its own 3D Studio Max file, the model is geo located and sized accurately. Further colour, material and finish detail is added to the model. One x-ref model is used for all viewpoints for consistency and ease of updating viewpoints with site design iterations. Planting and mitigation designs varied as required to suit the development stages are also added to the model as required by the client.

Viewpoint Alignment / Verification

1.3.17. Using 3D Studio Max software, the viewpoints are recreated in a digital 3D environment. Each individual viewpoint is setup using verified survey points, camera and a lighting environment.

1.3.18. Surveyed X, Y, Z coordinates of reference points and the camera position are set up in 3D Studio Max. Survey points are represented by renderable cross hairs. The camera is positioned and assigned again using the survey data and matched with settings taken from the photography Exchangeable Image File (EXIF) data, such as ISO and exposure.

1.3.19. Using a ‘daylight system’ in 3D Studio Max, a lighting environment is also accurately set up using settings related to EXIF material and global positioning; time of photography, date of photography, time zone and site longitude & latitude.

1.3.20. Once the viewpoint model, camera and positioned survey points are located the camera is set to the required field of view and view direction, aligned with the survey data.

Rendering and Post Production

1.3.21. Using 3D Studio Max plugin V-ray each viewpoint is rendered.

1.3.22. The rendered image is overlaid and positioned against the viewpoint photo. Once in position any parts of the render that would be obstructed by the foreground scene are masked from the render.

1.3.23. Images are then placed in a presentation figure layout template, with standard title block, alongside viewpoint description and information.

1.4. References

Landscape Institute & Institute of Environmental Management and Assessment. (2013). *Guidelines for Landscape and Visual Impact Assessment Third Edition*. Routledge

Landscape Institute. (2019). Landscape Institute Technical Guidance Note 06/19: Visual Representation of Development Proposals

Scottish Natural Heritage. (2017). *Scottish Natural Heritage – Visual Representation of Windfarms Version 2.2*. Scottish Natural Heritage