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A303 Amesbury to Berwick Down

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6.3 Environmental Statement Appendices

Appendix 7.11 Visually Verifiable Montage Methodology

APFP Regulation 5(2)(a)

Planning Act 2008

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

October 2018

Visually Verifiable Montage Methodology Statement

Overview

This document has been prepared by AECOM to explain the methodology used for the production of Visually Verifiable montages (VVM). The purpose of a VVM is to present an accurate visualisation of the proposed development, enabling its impact on the skyline, surrounding area and setting to be objectively evaluated. This methodology complies with the current photography and photomontage advice note, which can be found here:

http://www.landscapeinstitute.co.uk/PDF/Contribute/LIPhotographyAdviceNote01-11.pdf

Photographs and photomontages often form an important part of planning applications and Environmental Statements, in which the preparation and presentation of reliable visual information is integral to the assessment of landscape and visual impacts. Photographs and photomontages are technical documents in this context, and should be produced and used in a technically appropriate manner.

Objectives

The overall aim of a photomontage is to represent both the landscape context under consideration and the proposed development, as accurately as is practical.

The objective of a photomontage is to simulate the likely visual changes that would result from a proposed development, and to produce printed images of a size and resolution sufficient to match the perspective in the same view in the field.

Photomontages use photographs of an actual scene modified by the insertion of an accurate representation of the visible changes brought about by the proposed development. They are subject to the same inherent limitations as photographs, for example only showing the scene as it would appear under the same conditions that prevailed when the original photograph was captured. A properly constructed photomontage can serve as a useful means of indicating the potential visual impact of a future development.

1 Photography

1.1 Digital Photography

Changes in all aspects of photography and photomontage have taken place over the last ten years. 35mm colour film and the associated cameras and lenses have been almost completely supplanted by digital cameras; digital image processing is now a fundamental element of photography, both within the firmware of the camera and as a subsequent operation on a computer, and printing has become wholly digital, using a wide variety of devices offering different qualities of output. Future changes will undoubtedly further change the parameters for landscape photography.

A good quality camera and lens are essential to the production of photographs and photomontages for landscape and visual impact assessment work.

1.2 Digital Camera & Lenses

AECOM capture high resolution digital photographs with a Canon EOS 5D Mk III, a full-frame digital camera predominantly using a 50mm fixed focal-length lens. The camera is fixed to a tripod 1.6m above ground. Using this lens and full-frame camera, distortions are minimised and a view obtained close to that seen by the human eye.

1.3 Data capture

The photographer is provided with Ordnance Survey (OS) location coordinates indicating the position of each viewpoint from which the required photographs are to be taken, plus a digital photograph taken by AECOM of the desired view. For each photograph, the camera is positioned at a height of 1.6m above the ground level to approximate the human eye level. OS Location of the camera position is captured , as well as the focal length, date, time, weather and lighting conditions of the photograph.

2 Image Processing

2.1 File conversion

The camera outputs a 'raw' file format, which is then processed digitally to ensure colour accuracy. The final image is then outputed as a standard compressed file-type, such as JPG, TIFF or PSD.

2.2 Image correction

The compressed photographs are then processed and stitched using the package 'Hugin', which provides a suite of advanced features and libraries for re-projecting and blending multiple source images into panoramics with exposure, vignetting and white balance correction. Despite the advances in digital photography over the last 10 years, the circular nature of lenses results in a small amount of distortion on the perimeter of images.

Due to this, the very outer edges of an image are often not taken into consideration to minimise the risk of inaccuracy.

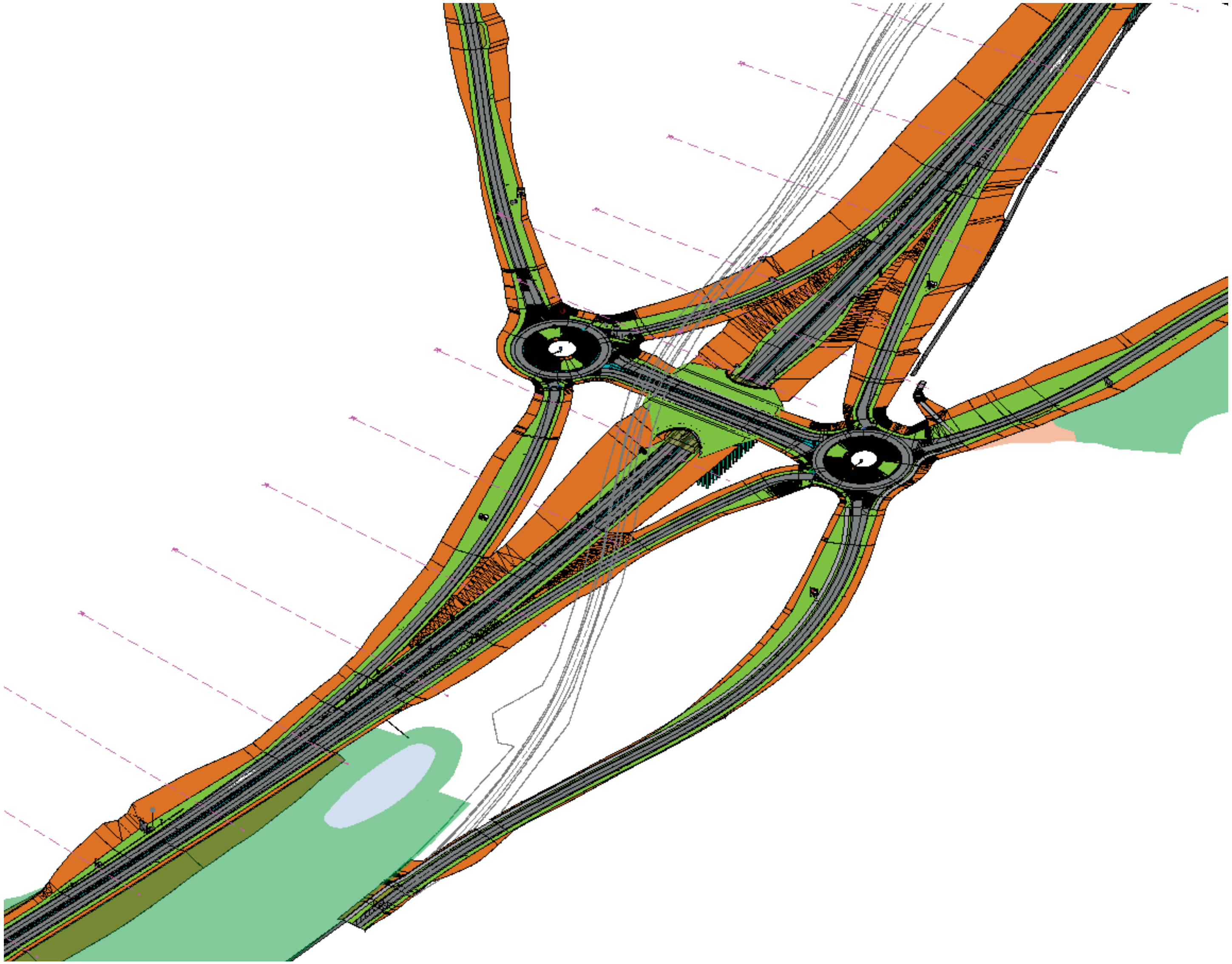
3 Survey

3.1 Survey equipment

We use both a Leica and Trimble GNSS Centimetre accurate GPS for our survey capture, as well as Trimble surveying instruments to obtain laser measurements of buildings.

Each viewpoint location is surveyed and identified by Ordnance Survey co-ordinates. The heights and distances of significant points within each view that are easily distinguishable are recorded as Ordnance Survey grid and level datum. These surveyed 'control points' are used to fix the computer model into the photograph, and provide an effective check for ensuring that the three dimensional model and existing views are accurately merged together in the camera matching stage. Additionally a mobile laser scanning unit was used to capture a 'cloud' of points along the route of the existing highway, allowing rapid capture of a much higher density of control points surrounding the road.

If the subject is more than 5Km from the camera, then earth's curvature comes into play. However, if control points close to the subject are recorded, the earth's curvature is automatically accounted for.



4 3D model

4.1 3D model creation

A three-dimensional computer model of the proposed development is then produced, based upon supplied detailed design two dimensional CAD drawing files and proposed materials information of the scheme.

The drawings of the proposed development are inserted into Autodesk Revit, or 3D Studio Max, ensuring a real world scale and the same co-ordinate system as the survey data are used. These plans, elevations and sections can then be traced over using snap tools and advanced 3D modelling techniques within the program to create an accurate three dimensional model of the proposed development. A check of heights / widths is then carried out between the three dimensional model and the design files supplied of the scheme to test and obtain accuracy.

4.2 Scale, height & Position check

Once created, the model is positioned using an OS site plan and contour information, a topographical survey or Digital Terrain Model (DTM) data . Once the building has been accurately positioned, we confirm height, scale and position from the architect, or scheme designer. As a further check, both the fixed floor levels and overall heights are cross-checked with site sections.

The surveyed control points are then built into the model, in an easily visible contrasting colour. The location of these points is then checked against the position of the created 3D model and verified they appear in the correct geo-located position within the site.

5 Camera matching

5.1 Data requirements

There are a number of important datasets required for the camera matching process, such as:

- The camera and lens used to take the photograph
- The field of view
- The adjusted or corrected photograph
- The GPS surveyed viewpoint co-ordinates and control points
- A 3D model of the Scheme

Virtual cameras, with heights, locations and lens types matching the recorded photography are created within Autodesk 3D Studio Max, using the Choasgroup Vray physical camera. This allows us to use real-world parameters to set up the virtual camera (e.g. f-stop, lens focal length etc). It also makes it easier to use light sources with real-world illumination values.

5.2 Camera matching process

The cameras and target points are then correctly aligned by matching the surveyed points within each photo visually to 3D equivalents generated using the survey coordinates. Now, within the 3D model there will be a view through the virtual camera, displaying the same viewpoint from which the original photograph was taken

Each view is then rendered as a wireline image (see example below) with the camera-matched 3D model of the proposed development, at the same size, scale, resolution and aspect ratio as the digital photography. This gives a series of 3D rendered images ready for compositing with the photos of the existing baseline site.

6 Rendering

6.1 Materials and textures

In order to provide a qualitative assessment of the proposals within an EIA or LVIA, the final VVM can show a photo-realistic reflection of what the Scheme would look like once built. Photographic textures and physically accurate materials are can be applied., which starts the process of turning the wireframe 3D model into a photo-realistic image.

6.2 Sunlight & daylight

To obtain photo-realism, physically accurate lighting is required alongside materials and textures.

The VRaySun and VRaySky are special features within our rendering software which are provided as part of the the Chaosgroup Vray renderer, utilised by AECOM. Developed to work together, the VRaySun and VRaySky reproduce the real-life Sun and Sky environment of the Earth. Both are coded so that they change their appearance depending on a number of factors, such as the direction of the VRaySun; which can be dynamically linked and geo-referenced to the real world position of the site, the time, day and month. Different sky options can also chosen (clear, overcast etc) to match the digital photography.

Using this lighting system, alongside the physically accurate material properties, the software calculates the effects of the sun and sky conditions on the appearance of the Scheme, creating photo-realism.

7 Post production

7.1 Post production

Once the rendering stage is complete, the images are brought into Adobe Photoshop to superimpose the proposed development onto the digital images of the site. The foreground details such as trees, buildings or signage are then overlaid as masks; ensuring the depth of the various items is represented correctly. If required, the rendered image is then further edited to accurately match the colour, saturation and environmental effects shown in the photograph. This is a qualitative or subjective process, but effort is made to ensure it provides objectively accurate views of the development as proposed.

8 Review

8.1 Review

A final qualitative check of all of the VVMs is carried out with other members of the project team to ensure that they provide objectively accurate views of the development from the information provided.

8.2 Annotation

Once the VVMs are approved, they are inserted into either a drawing or report template where the following information is added as a series of annotations:

- Site & viewpoint location map
- Camera information (time /date of photograph, lens type, focal length, field of view)
- Relevant Coordinate values
- Distance to site
- Viewing distance

8.3 Issue

The final set of VVMs are issued seperately or as part of the EIA/LVIA via AECOM's secure FTP, or copied to a CD for issue.

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Registered office Bridge House, 1 Walnut Tree Close, Guildford GU1 4LZ
Highways England Company Limited registered in England and Wales number 09346363