APPEAL BY: Britaniacrest Recycling Ltd

SITE: Former Wealden Brickworks, Langhurstwood Road, Horsham, RH12 4QD

PROPOSAL: Recycling, Recovery and Renewable Energy Facility and Ancillary Infrastructure

APP/P3800/W/18/3218965

WSCC/015/18/NH

PROOF OF EVIDENCE ON BEHALF OF THE LOCAL PLANNING AUTHORITY

WEST SUSSEX COUNTY COUNCIL

BY DAVID COOMES

APPENDIX 14

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VERIFIED VIEW METHODOLOGY

0.1 Methodology Overview

The methodology applied by Rendered Image Ltd to produce the verified images or views contained in this document is described below. In the drafting of this methodology and the production and presentation of the images, guidance has been taken from the Third Edition of the good practice Guidelines for Landscape and Visual Impact Assessment 2013 & the Landscape Institutes Advice Note 01/11. The disciplines employed are of the highest possible levels of accuracy and photo-realism which are achievable with today's standards of architectural photography and computer-generated models.

0.2 View Selection

The viewpoints have been selected through a process of consultation with relevant statutory consultees and having regard to relevant planning policy and guidance.

CONTENTS

1.0 PHOTOGRAPHY

1.1 Digital Photography

With the latest advances in Digital Photography it is now possible to match the quality of plate photography.

1.2 Digital Camera

Rendered Image Ltd used a Nikon Digital 610 SLR with Full Frame Sensor and 50mm focal length prime lense - high resolution digital camera for the digital photography.

1.3 Position, Time and Date Recording

The photographer is provided with (i) an Ordnance Survey map indicating the position of each viewpoint from which the required photographs were to be taken, and (ii) a digital photograph taken by Rendered Image Ltd of the desired view. For each shot the camera was positioned at a height of 1.60 meters above the ground level which closely approximates the human eye altitude. A point vertically beneath the centre of the lens was marked on the ground as a survey reference point and a digital reference photograph were taken of (i) the camera / tripod location and (ii) the survey reference point (as shown in Figure 1). The date and time of the photograph were recorded by the photographer.

We take additional measures where a panoramic view is required to avoid distortion (and parallax error) – this is a technique where single frames are stitched together to form a wider view. We ensure there is a 50% overlap between frames to allow for the most accurate part of the image to be used and a sliding plate is employed to allow the camera to be positioned so the nodal point of the lens is directly over the axis of rotation.

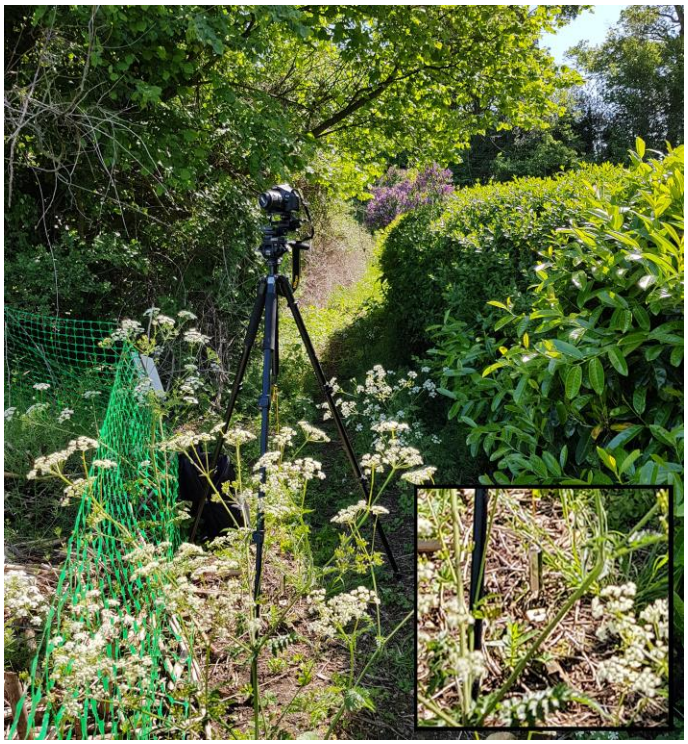
Figure 1. Survey reference point

Figure 2. Distant view

2.0 – 3.0 RAW FILE CONVERSION AND DIGITAL IMAGE CORRECTION

2.1 Raw File Conversion

Nikon cameras produce a raw file format, which is then processed digitally for both high detail and colour accuracy[1]. The final image is outputed as a tiff or jpeg[2] file.

3.1 Digital Image Correction

The digital images were then loaded into Rendered Image Ltd's computers running Adobe Photoshop®[3] software to prepare the digital image for the next stage of camera matching (see section 6). Since the digital images may vary slightly in size, each digital image is 'size corrected' to provide consistency and accuracy during the following stages. 'Size correction' is a process of adjusting the total pixel[4] matrix to a size of exactly 6000 pixels x 4000 pixels. The image is also 'bank'[5] corrected which means ensuring that the horizon in each digital image is precisely horizontal.

In spite of the selection of the most advanced photographic equipment, lenses are circular which results in a degree of distortion on the perimeter of images. The outer edges of an image are therefore not taken into consideration; this eliminates the risk of inaccuracy.

The adjusted or corrected digital image, known as the 'background plate', is then saved to the Rendered Image Ltd computer system ready for the camera matching process (see section 6). In preparation for the survey (see section 4) Rendered Image Ltd marks up each background plate selecting a number of points in the view, such as corners of buildings, for survey (see Figures 3 and 4).

Figure 3. Background plate highlighting critical survey points in red

Figure 4. Area of interest to be surveyed as shown in Figure 3

[1] RGB (red green blue) is a format that maintains the full colour range of the image.
[2] TIFF or JPEG is the name given to a specific format of image file stored digitally on a computer.
[3] Adobe Photoshop® is the industry standard image editing software.
[4] Pixel stands for picture element. It is the most basic component of any computer graphic and corresponds to the smallest thing that can be drawn on the computer screen.
[5] By aligning the vanishing points.

4.0 GPS SURVEY

4.1 Survey

CD Surveys Ltd are contracted to undertake the survey of (i) each viewpoint as marked on the ground beneath the camera at the time the photograph was taken (and recorded by way of digital photograph (see section 1 above)) and (ii) all the required points on the relevant buildings and other fixed points (as marked on the background plate).

The survey was co-ordinated onto the Ordnance Survey National Grid by using Global Positioning System (GPS) equipment and processing software. The Ordnance Survey National Grid (OSGB36) was chosen as it is the most widely used and because it also allows the captured data to be incorporated into other available digital products (such as Ordnance Survey maps). The height datum used was also derived using the GPS.

CD Surveys Ltd uses a baseline consisting of two semi-permanent GPS base stations. These stations are located approximately 5730 metres apart and positioned so as to optimise the results for the area of operation. The base stations are tied into the National GPS Network and are constantly receiving and storing data which allows their position to be monitored and evaluated over long periods of operation. By using the same base stations throughout the survey CD Surveys Ltd ensure the consistency of the results obtained.

Using the Real Time Kinematic method a real time correction is supplied by each base station to the rover (over the GSM[6] network) physically undertaking the field survey. This enables the rover to determine the co-ordinates of its location instantaneously (i.e. in 'real time'). The rover receives a 'corrected' fix (co-ordinates) from each base station. If the two independent fixes are each within a certain preset tolerance, the rover then averages the two fixes received. The viewpoints are, with a few exceptions, surveyed using this technique. This method of GPS survey (Real Time Kinematic) produces results to an accuracy in plan and height of between 15mm-50mm as outlined in the "Guidelines for the use of GPS in Land Surveying" produced by the Royal Institute of Chartered Surveyors.(see Figure 5)

Figure 5. GPS survey location

The particular points on each building as marked up on the background plate are surveyed using conventional survey techniques utilising an electronic theodolite and reflectorless laser technology. There are two methods used to fix the building details, namely polar observations[7] and intersection observations[8]. The position of the theodolite is fixed by the rover as described above. In certain circumstances, a viewpoint may need to be surveyed using conventional survey techniques as opposed to Real Time Kinematic, if, for example, the viewpoint is in a position where GPS information cannot be received.

[6] GSM network: the mobile phone network.
[7] Polar observation is the measurement of a distance and direction to a point from a known baseline in order to obtain co-ordinates for the point. The baseline is a line between two known stations.
[8] Intersection observation is the co-ordination of a point using directions only from two ends of a baseline.

5.0 MODEL POSITIONING

5.1 Height and Position Check

The model is positioned using a site plan provided by the architect – Paul Drew Architects. This is then overlaid onto OS positioned survey from Emapsite. Once the building has been positioned in 3ds max confirmation of height and position is checked against the architect's drawings.

6.0 CAMERA MATCHING

6.1 Creation of Scheme Model

A wireframe[11] 3D model of the proposed scheme is provided by the architects and positioned by Rendered Image Ltd. This is done by using a combination the drawings from the architects and the survey data provided by CD Surveys Ltd and Emapsite.

6.2 Camera Matching Process

The following information is required for the camera matching process:

• Specific details of the camera and lens used to take the photograph and therefore the field of view (see section 1);
• The adjusted or corrected digital image i.e. the 'background plate" (see section 2);
• The GPS surveyed viewpoint co-ordinates (see section 3);
• The GPS surveyed co-ordinates of particular points on the buildings within the photograph (the background plate) (see section 3);
• The GPS surveyed co-ordinates of the site of the proposed scheme (see section 4);
• A 3D model of the proposed scheme (see section 5).

A background plate (the corrected digital image) is opened on computer screen, the information listed above is then used to situate Rendered Image Ltd's virtual camera such that the 3D model aligns exactly over the background plate (i.e. a 'virtual viewer' within the 3D model would therefore be standing exactly on the same viewpoint from which the original photograph was taken. This is the camera matching process.

6.3 Wireline Image

Rendered Image Ltd is then able to insert the wireframe 3D model of the proposed scheme into the view in the correct location and scale producing a verified wireline image of the proposal.

The camera matching process is repeated for each view and a wireline image of the proposal from each viewpoint is then produced. The wireline image enables a quantitative analysis of the impact of the proposed scheme on views.

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[9] The field of view or focal length depends on the type of lens used.
[10] A polygon mesh representing elevation data of a land surface.
[11] A wireframe is a 3D model, a wireline is a single line representing the outline of the building.

7.0 RENDERING

7.1 Rendering

Rendering is a technical term referring to the process of creating a two-dimensional output image from the 3D model.

7.2 Texturing

In order to assist a more qualitative assessment of the proposals, the output image needs to be a photo-realistic reflection of what the proposed scheme would look like once constructed. The process of transforming the wireframe 3D scheme model (see Section 4) into one that can be used to create a photo-realistic image is called texturing[12].

Prior to rendering, Rendered Image Ltd requires details from the architect regarding the proposed materials (e.g. type of glass, steel, aluminium etc.) to be utilised. This information is used to produce the appearance and qualities in the image that most closely relates to the real materials to be used.

7.3 Lighting and Sun Direction

The next stage is to light the model. Rendered Image Ltd utilises High Dynamic Range (HDR) Imaging[13] for its environmental lighting. The date (including the year) and time of the photograph and the latitude and longitude of the city are input into the HDR program. Rendered Image Ltd selects a 'sky' (e.g. clear blue, grey, overcast, varying cloud density, varying weather conditions) from the selection of 'skies' held within the HDR database to resemble as closely as possible the sky in the background plate. The 3D model of the proposed scheme is placed within the selected sky and using the material properties also entered, the computer calculates the effects of the sky conditions (including the sun) on the appearance of the proposed scheme.

An image of the proposed scheme is produced showing the effect of light and sun. The selection of the matching sky is the only subjective input at this stage.

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[12] Texturing is often referred to as part of the rendering process, however, in the industry, it is a process that occurs prior to the rendering process.

[13] An industry standard technique for rendering images with a high dynamic range (HDR); e.g. sky images. HDR images capture a greater exposure latitude than standard images. Using HDR, a light probe image can record the colour and brightness of every light source.

8.0 POST PRODUCTION

8.1 Post Production

Finally the rendered image of the scheme model is inserted and positioned against the camera matched background plate. Once in position the rendered images are edited using Adobe Photoshop®. Masks are created in Photoshop where the line of sight to the rendered image of the proposed scheme is interrupted by foreground buildings. The result is a verified image or view of the proposed scheme.