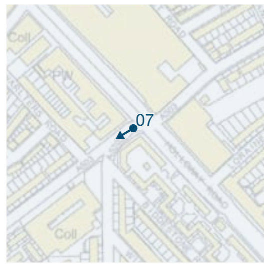
07

Camden Road, junction with Holloway Road

Camera Location

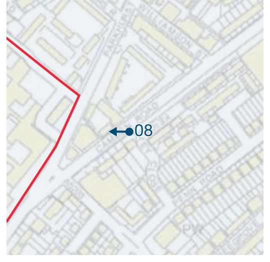


View Location

08

Camden Road, east of the former Camden Road New Church

Camera Location

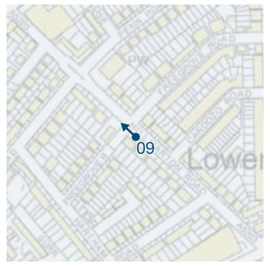


View Location

09

Hillmarton Road, north of junction with Freegrove Road

Camera Location

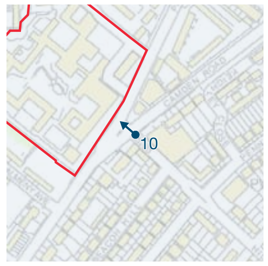


View Location

10

Hillmarton Road, north of the junction with Penn Road

Camera Location

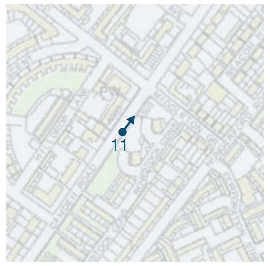


View Location

11

Camden Road, junction with Middleton Grove

Camera Location

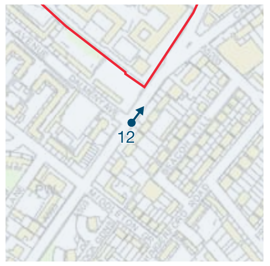


View Location

12

Camden Road, opposite junction with Dalmeny Avenue

Camera Location

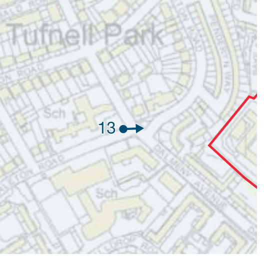


View Location

13

Dalmeny Avenue

Camera Location

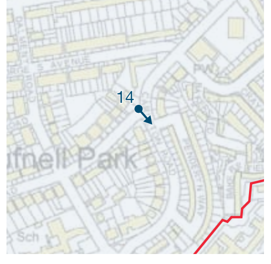


View Location

14

Carleton Road, junction with Anson Road

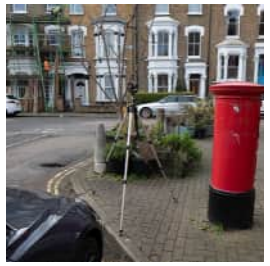
Camera Location



View Location

15

Crayford Road, junction with Cardwell Road



Camera Location

View Location

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Appendix F: A Cityscape Verified Views Methodology

0.0 INTRODUCTION

0.1 Methodology overview
The methodology applied by Cityscape Digital Limited 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 London View Management Framework SPG March 2012. 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.

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 Lenses
For local views a wide angle lens of 24mm or 35mm is generally used in order to capture as much of the proposal and its surroundings as possible. Intermediate distance views were photographed with a lens between 35mm to 70mm and occasionally long range views may be required with lens options ranging from 70mm to 600mm. As a guide, the following combinations were used:

Distance to subject	View	Lens Options
0 – 800 metres	Local	24mm to 35mm
800 to 5000 metres	Intermediate	35mm to 70mm
5000+ metres	Long	70mm to 600mm

Examples of these views are shown in Figures 4 and 5.

1.3 Digital camera
Cityscape uses a Canon 5D MK IV (shown in figure 1) and a Canon 1DS MK III (all full frame digital SLRs) high resolution digital camera for the digital photography. Also used were Canon's 'L' series professional tilt and shift lenses which produce high quality images that are suitable for the camera-matching process without the need for processing and scanning.

1.4 Position, time and date recording
The photographer was provided with (i) an Ordnance Survey map or equivalent indicating the position of each viewpoint from which the required photographs were to be taken, and (ii) a digital photograph taken by Cityscape of the desired view. For each shot the camera was positioned at a height of 1.60/1.65 metres (depending on whether image is SPG or RPG3A view) 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 two digital reference photographs were taken of (i) the camera/tripod location and (ii) the survey reference point (as shown in Figures 2 and 3). The date and time of the photograph were recorded by the camera.

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1 Canon 1DS Digital Camera

2 Camera Location

3 Survey reference point

4 Local view

5 Intermediate view

2.0 DIGITAL IMAGE CORRECTION

2.1 Raw file conversion

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

2.2 Digital image correction

The digital images were then loaded into Cityscape's computers to prepare the digital image for the next stage of camera matching (see section 5). The image is also 'bank'[2] 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. Figure 17 in section 5 illustrates the 'safe' or non-distortive area of an image which is marked by the red circle.

The adjusted or corrected digital image, known as the 'background plate', is then saved to the Cityscape computer system ready for the camera matching process (see section 5). In preparation for the survey (see section 4) Cityscape indicates on each background platethe the safe area and priority survey points, such as corners of buildings, for survey (see Figures 6 and 7)

[1] TIFF is the name given to a specific format of image file stored digitally on a computer.

[2] By aligning the vanishing points.

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6 Background plate highlighting critical survey points in purple and secondary survey strings in red

7 Area of interest to be surveyed as shown in Figure 7

3.0 GPS SURVEY

3.1 Survey

An independent surveyor was 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 within the safe zone.

The survey was co-ordinated onto the Ordnance Survey National Grid (OSGB36) by using Global Positioning System (GPS) equipment (see, for example, Figure 9) 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 Ordnance Survey Newlyn Datum and was also derived using the GPS.

The surveyor uses a baseline consisting of two semi-permanent GPS base stations (see Figure 8). These stations are located approximately 5730 metres apart and positioned so as to optimise the results for the area of operation (see location map, Figure 13). 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 the surveyor 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 (shown in Figure 10) (over the GSM[3] 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.

The required points on each building are surveyed using conventional survey techniques utilising an electronic theodolite and reflectorless laser technology (shown in Figures 11 and 12). There are two methods used to fix the building details, namely polar observations[4] and intersection observations[5]. 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.

[3] GSM network: the mobile phone network.

[4] 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.

[5] Intersection observation is the co-ordination of a point using directions only from two ends of a baseline.

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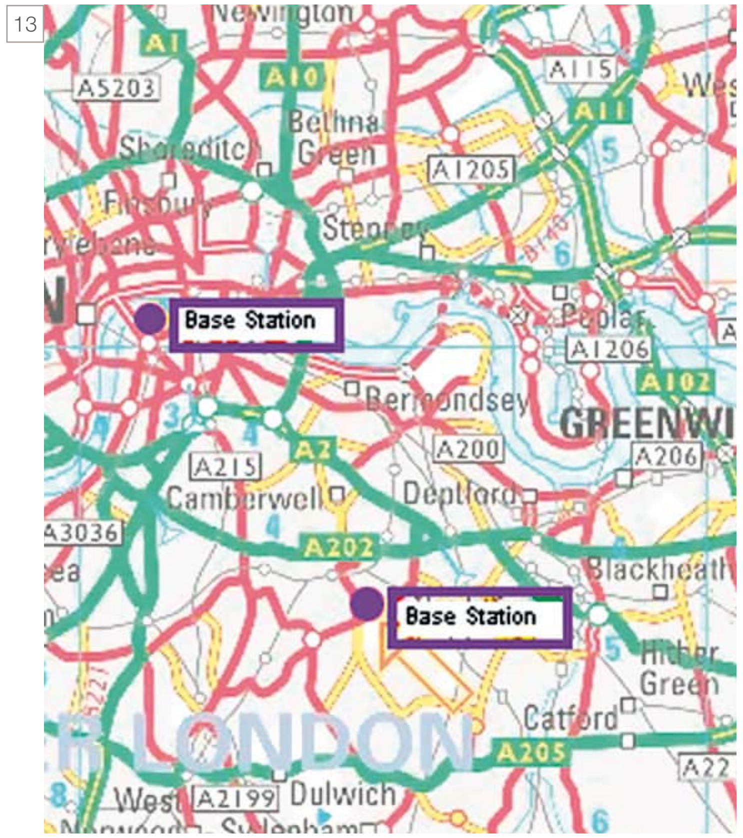


8 Marshall Survey semi-permanent GPS base station

9 GPS System

10 Field survey being carried out

11 Electronic Theodolite

12 Field survey being carried out

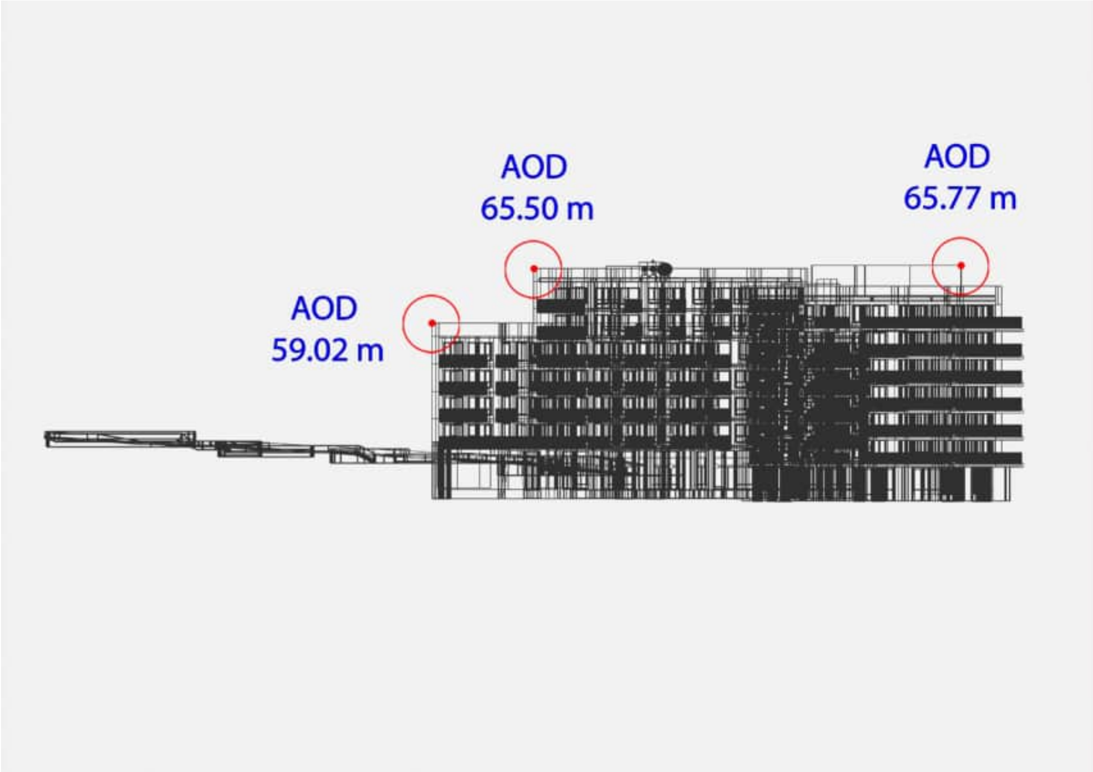
13 Location of Marshall Survey's GPS base stations

4.0 MODEL POSITIONING

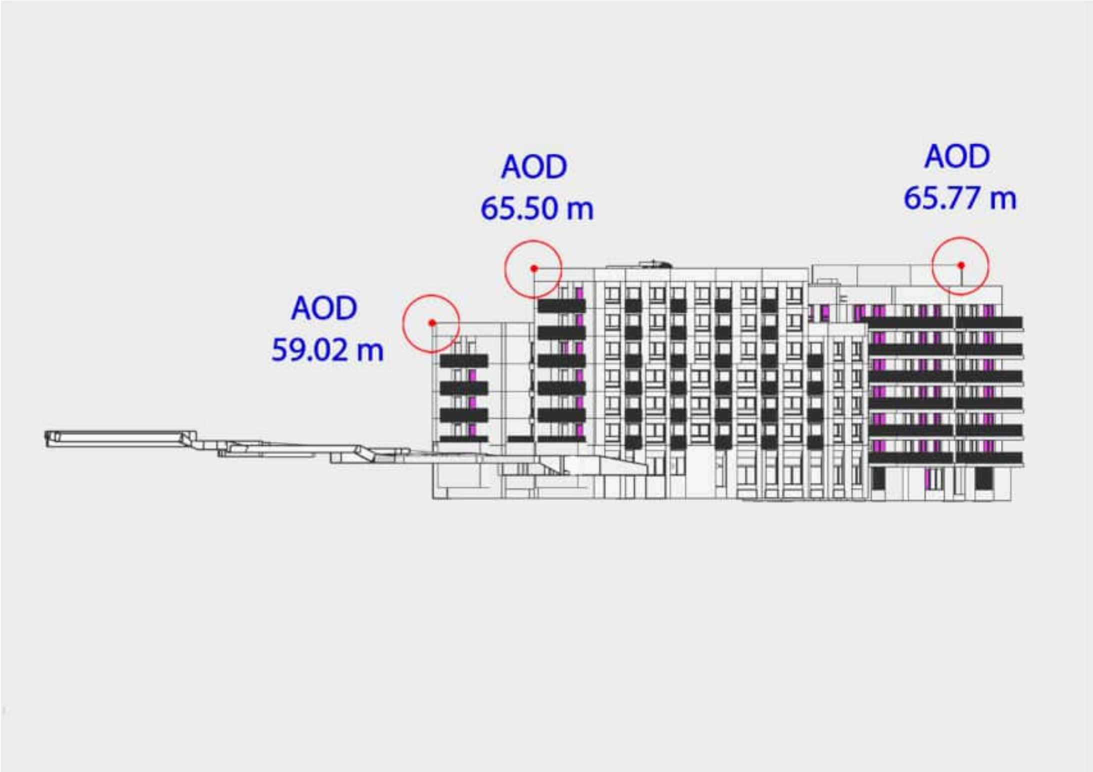
4.1 Height and position check

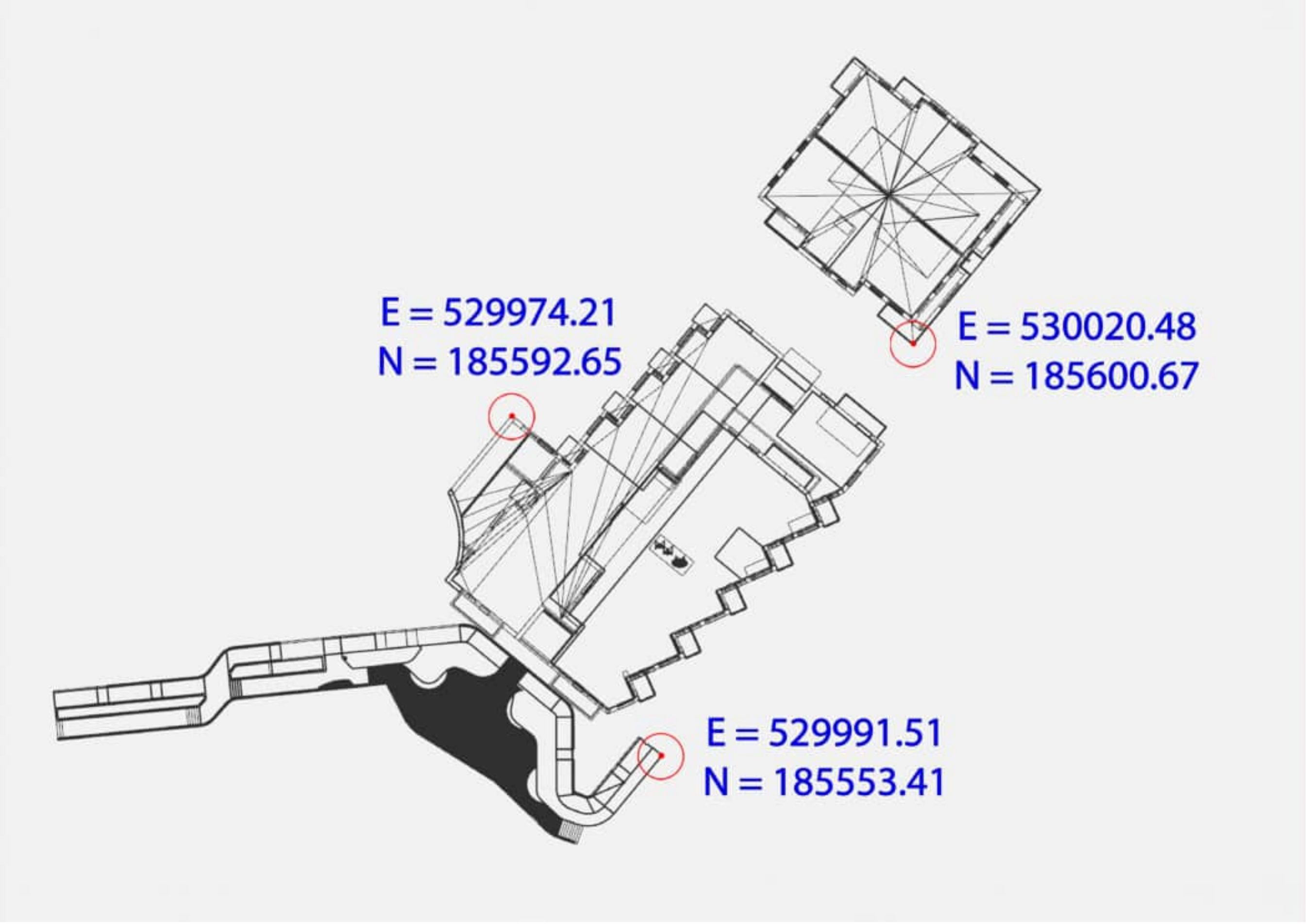
The model is positioned using a site plan provided by the architect. This is then overlaid onto OS positioned survey from a CAD provider. Once the building has been positioned, confirmation of height and position is requested from the architect.At least two clear reference points are agreed and used to confirm the site plan and Ordnance Survey. The height is cross checked against the architects section and given in metres Above Ordnance Survey Datum (AOD).

14A

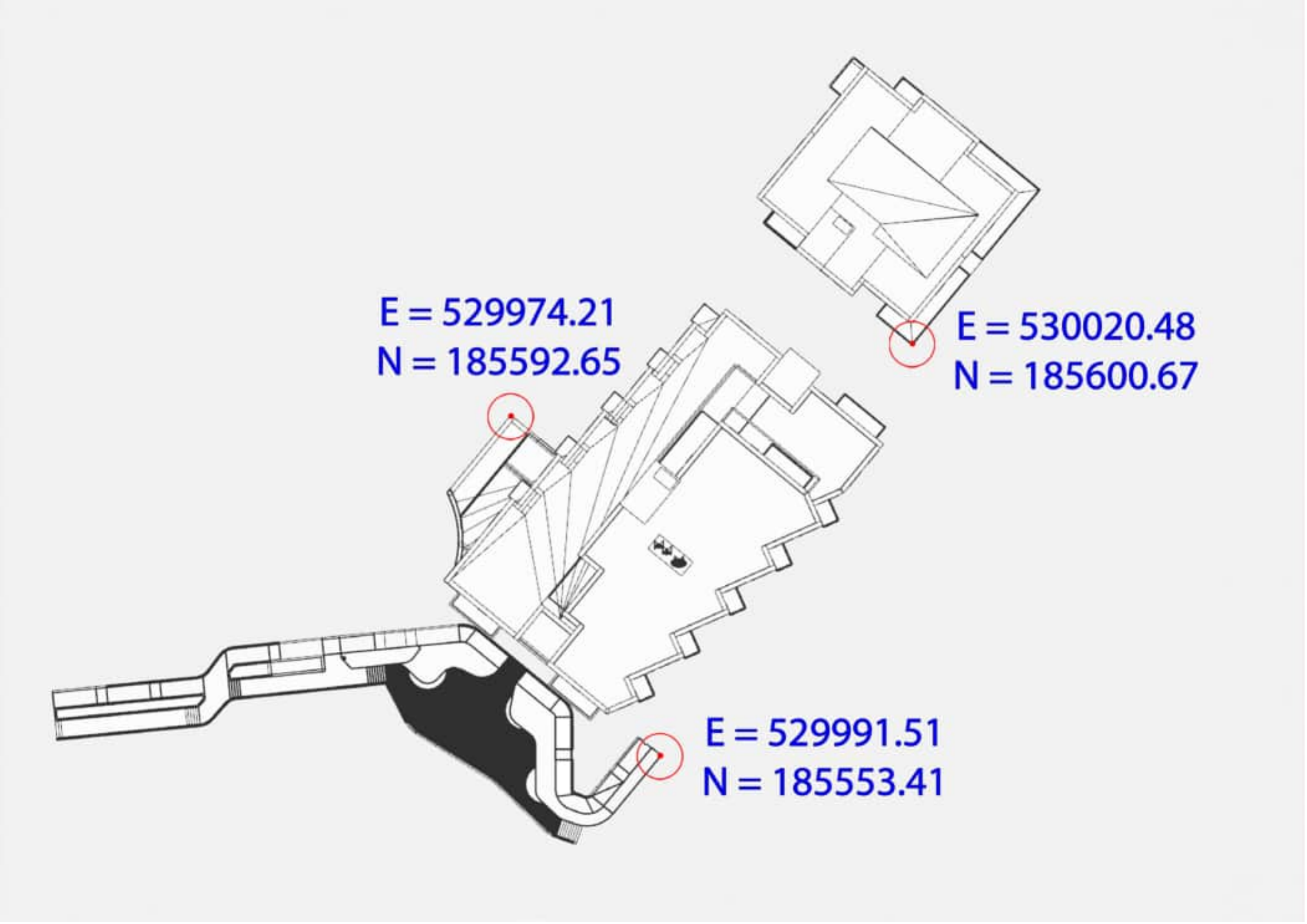


14B





15A



15B

14A Architect's Elevation Drawing

14B Cityscape's Elevation Model

15A Architect's Plan Drawing

15B Cityscape's Plan Model

5.0 CAMERA MATCHING

5.1 Cityscape's Database
Cityscape has built up a comprehensive database of survey information on buildings and locations in central London; the database contains both GPS survey information and information regarding the dimensions and elevations of buildings gathered from architects and other sources. Figure 16 shows a selection of GPS located models (yellow) within Cityscape's database which effectively represents a 3D verified computer 'model' of some prominent buildings in central London. The term '3D model' has been adopted with caution in this methodology as it is thought to be slightly misleading because not every building in central London is included in the database although the majority of those buildings which form part of the 'skyline' are included.

The outlines of buildings are created by connecting the surveyed points or from the information obtained from architects' drawings of particular buildings. By way of example of the high level of detail and accuracy, approximately 300 points have been GPS surveyed on the dome of St. Paul's. The database 'view' (as shown in Figure 16) is 'verified' as each building is positioned using coordinates acquired from GPS surveys.

In many instances, the various co-ordinates of a particular building featured in one of the background plates are already held by Cityscape as part of their database of London. In such cases the survey information of buildings and locations provided by the surveyor (see section 3 above) is used to cross-check and confirm the accuracy of these buildings. Where such information is not held by Cityscape, it is, where appropriate, used to add detail to Cityscape's database. The survey information provided by the surveyor is in all cases used in the verification process of camera matching.

5.2 Cityscape's Database
A wireframe[6] 3D model of the proposed scheme if not provided is created by Cityscape from plans and elevations provided by the architects and from survey information of the ground levels on site and various other points on and around the site, such as the edge of adjacent roads and bollards etc. provided by the surveyor.

5.3 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);
- Selected models from Cityscape's database (see section 3);
- The GPS surveyed co-ordinates of the site of the proposed scheme (see section 3);
- A 3D model of the proposed scheme (see section 4).

A background plate (the corrected digital image) is opened on computer screen (for example, Figure 17), the information listed above is then used to situate Cityscape's virtual camera such that the 3D model aligns exactly over the background plate (as shown in Figures 18 and 21) (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 (Figure 20). This is the camera matching process.

5.4 Wireline Image
Cityscape 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 (shown in Figures 19 & 22).

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.

[6] A wireframe is a 3D model, a wireline is a single line representing the outline of the building.

16

16 Selected GPS located models (yellow) from Cityscape's database, situated on Cityscape's London digital terrain model

17 Background plate & selected 3D models as seen by the computer camera. Red circle highlights the safe or non-distortive area of the image

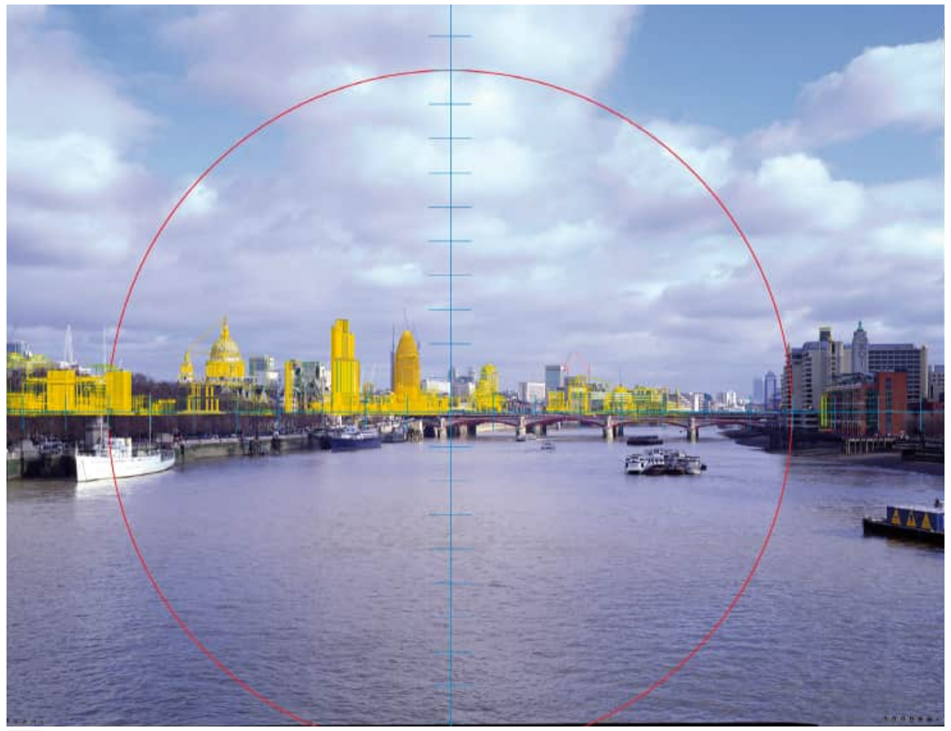
18 Background plate matched to the 3D GPS located models

19 The camera matched background plate with an example of a proposed scheme included in red

20 Background plate: digital photograph, size and bank corrected as described in section 3

21 Camera matching: the background plate matched in the 3D GPS located models

22 The camera matched background plate with the proposed scheme included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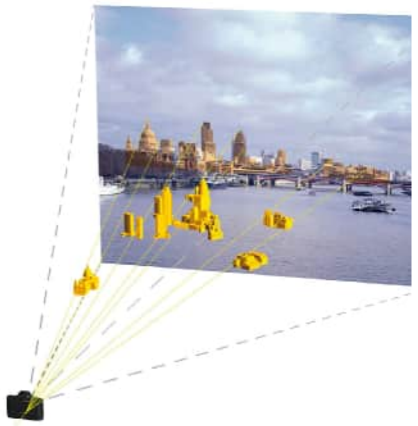
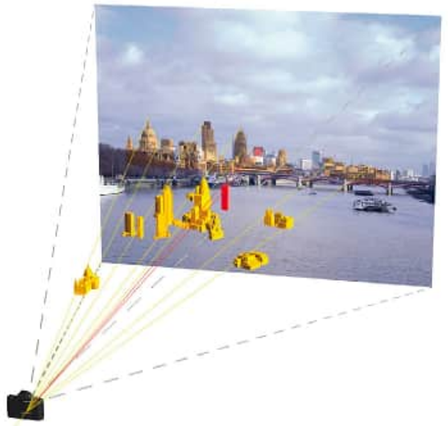


19



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6.0 RENDERING

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

6.2 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 7) into one that can be used to create a photo-realistic image is called texturing[7]

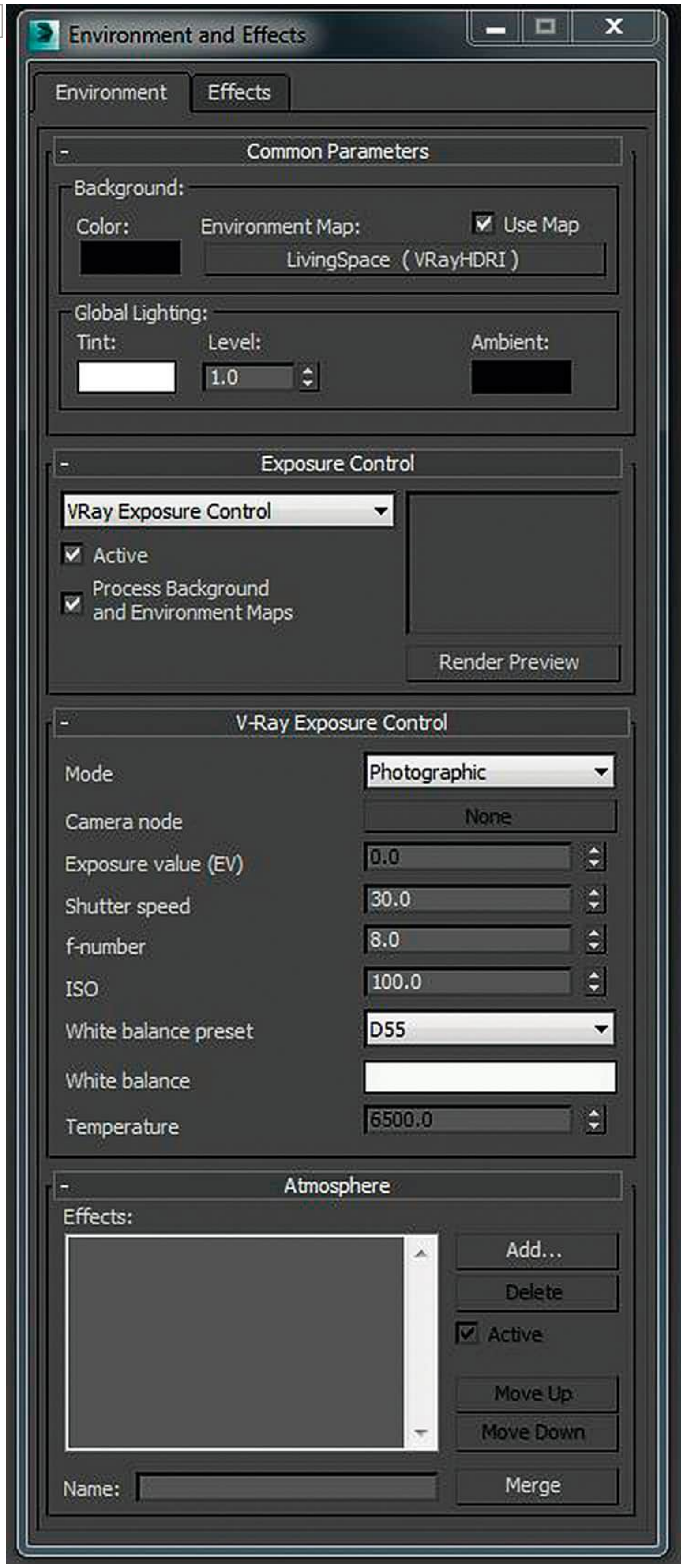
Prior to rendering, Cityscape requires details from the architect regarding the proposed materials (e.g. type of glass, steel, aluminium etc.) to be utilised. Cityscape also use high resolution photographic imagery of real world material samples, supplied by the client or the manufacturer, to create accurate photorealistic textures for use in all our images. This information is used to produce the appearance and qualities in the image that most closely relates to the real materials to be used (as shown in Figures 24 and 25).

6.3 Lighting and sun direction
The next stage is to light the 3D model to math the photographic environment. The date (including the year) and time of the photograph and the latitude and longitude of the city are input (see Figure 23) into the unbiased physically accurate render engine. Cityscape selects a 'sky' (e.g. clear blue, grey, overcast, varying cloud density, varying weather conditions) from the hundreds of 'skies' held within the 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 (see Figure 27) 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 (as shown in Figure 26). The selection of the matching sky is the only subjective input at this stage.

[7] 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.

23



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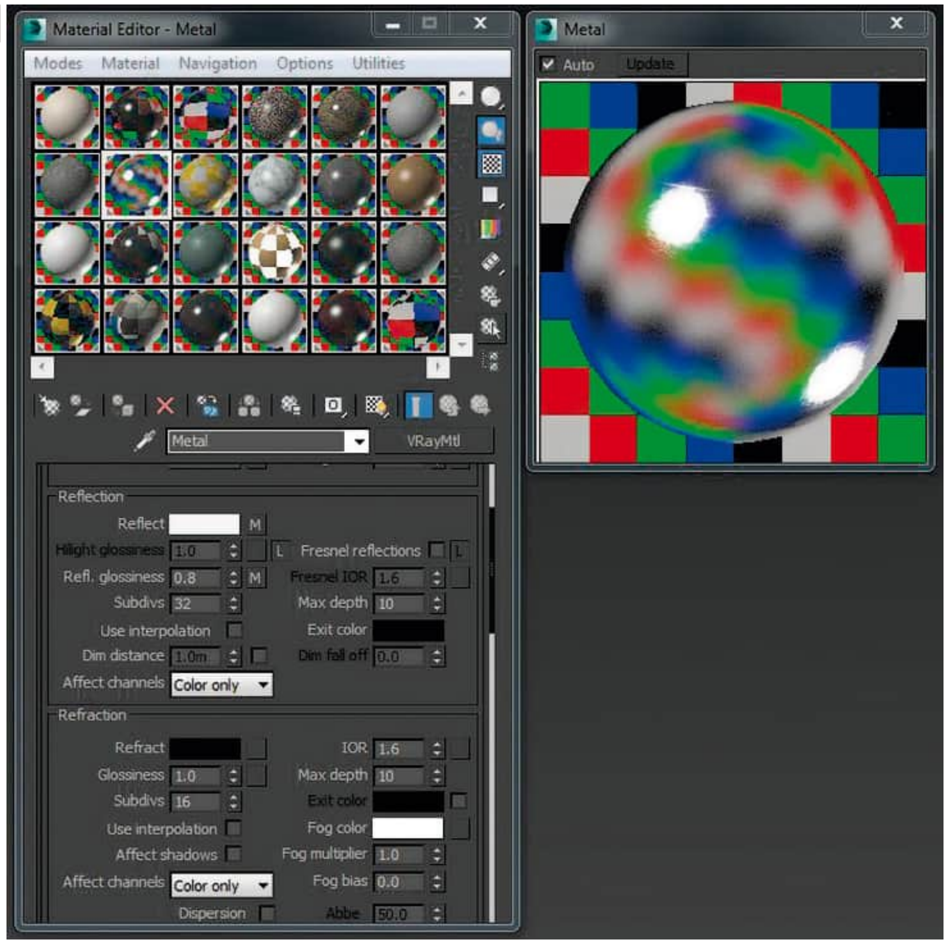

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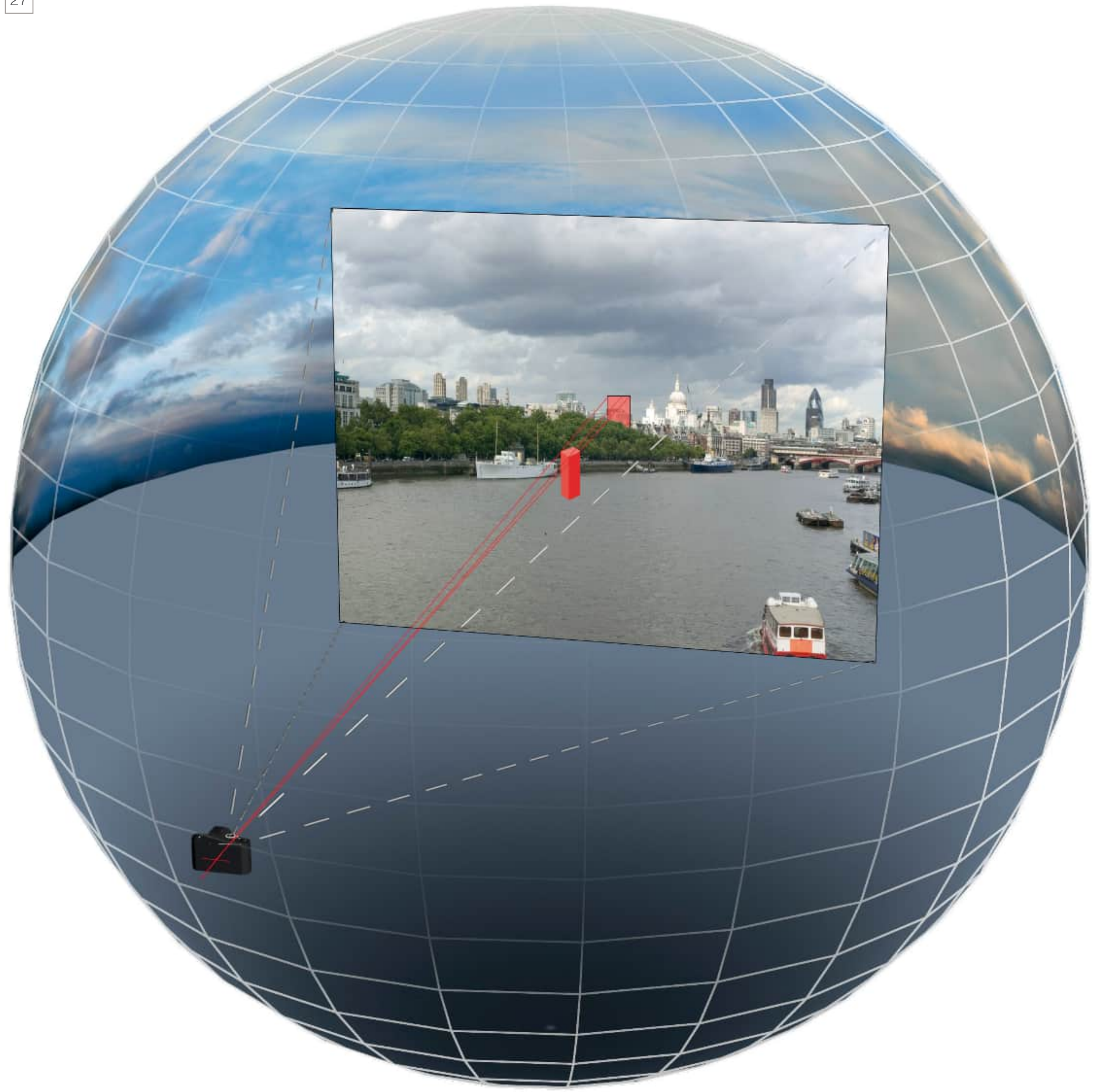

23 Screenshot of environment information (time, date and year) entered to locate the sun correctly (see section 7.3)

24 Screenshot of some materials in the 3D rendering package

25 Screenshot of material and surface properties

26 Example of rendered scheme using High Dynamic Range Imaging

27 Example of a proposed scheme highlighted in red within the selected sky and rendered onto the background plate

7.0 POST PRODUCTION

7.1 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®[8]. Masks are created in Photoshop where the line of sight to the rendered image of the proposed scheme is interrupted by foreground buildings (as shown in Figure 29).

The result is a verified image or view of the proposed scheme (as shown in Figure 30).

[8] Adobe Photoshop® is the industry standard image editing software.

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28 Background plate

29 Process Red area highlights the Photoshop mask that hides the unseen portion of the render

30 Shows a photo-realistic verified image

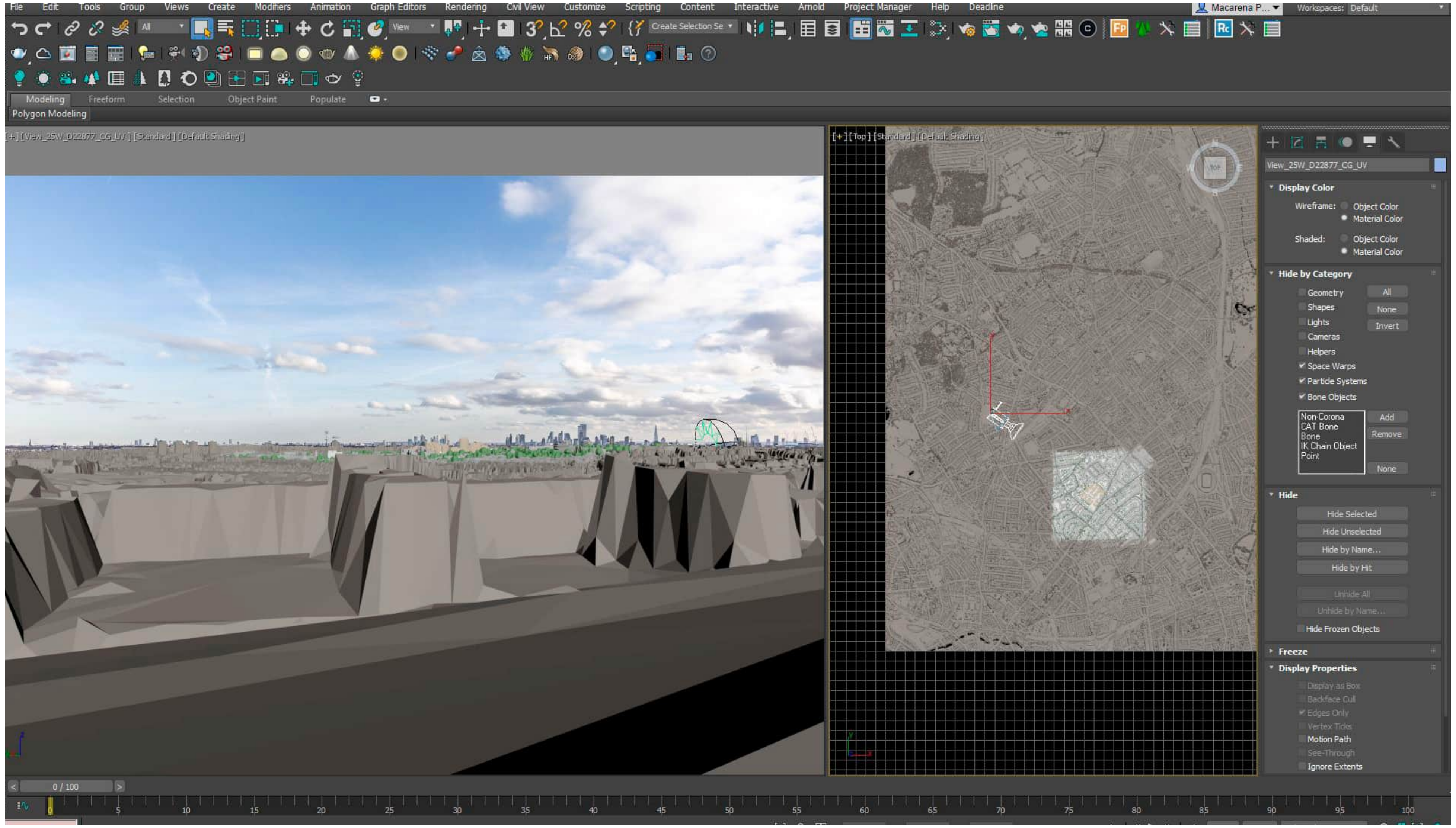
8.0 CAMERA MATCHING

8.1 Un-verified Camera Matching Process

The following information is required for the uv-camera matching process

- Camera viewpoint location
- Geospatial data (DSM model, Zmap, LIDA) from Cityscape's database
- The adjusted or corrected digital image i.e. the 'background plate" (see section 2); as background reference
- Selected models from Cityscape's database;
- A 3D model of the proposed scheme (see section 4).

A 3D model scene with the context model is opened on computer screen the information listed above is then used to situate Cityscape's virtual camera such that the 3D model aligns exactly over the background plate (as shown in Figure A) i.e. a 'virtual viewer' within the 3D model would therefore be standing roughly on the same viewpoint from which the original photograph was taken. The proposed model is then imported into the camera matched scene and rendered, obtaining an un-verified wireline (Fig B).



A Background plate, 3D context model & selected 3D models as seen by the computer camera.

B Un-verified wireline

9.0 ZVI

9.1 Methodology statement

ZVI (Zone of Visual Influence) analysis has been run using the proposed model provided by the architect set within the context model surrounding. The context model is made up of a combination of zmapping and DSM data. All models are accurately aligned to OS positioning.

Based on information from the zmapping website the accuracy of their models are - "Our 3D models are produced using the technology of photogrammetry – the method of deriving vertical and horizontal co-ordinates from ste-reo aerial photographs. Photogrammetry is superior to other technologies in producing accurate, detailed, mod-els, which again enable the creation of photorealistic interfaces for the public.We will only claim an accuracy of around 25 - 50cms. This is because the accuracy of any model depends on the data supplied. This will come in the form of aerial photographs taken at a particular resolution. The higher the resolution, the better the accuracy. In addition, GPS ground control points can be taken, which will also boost accuracy."

For the analysis the zmapping trees have been turned off due to the fact these do not represent the correct scale of the real life equivilant versions. Therefore the analysis in these areas shows the visibility of the proposal based on the built form of the environment only, not taking into account trees or foliage.

The DSM contect model has been created using Environment Agency LiDAR data. Digital Surface Models (DSMs) provide a topographic model of the earth's surface. They measure the height values of the first surface on the ground as seen from above, including terrain features, buildings, vegetation and power lines. The data collection method is a combination of photogrammetry and LiDAR. The resolution used for this analysis is 50cm with a stated vertical accuracy of +/- 15cm.

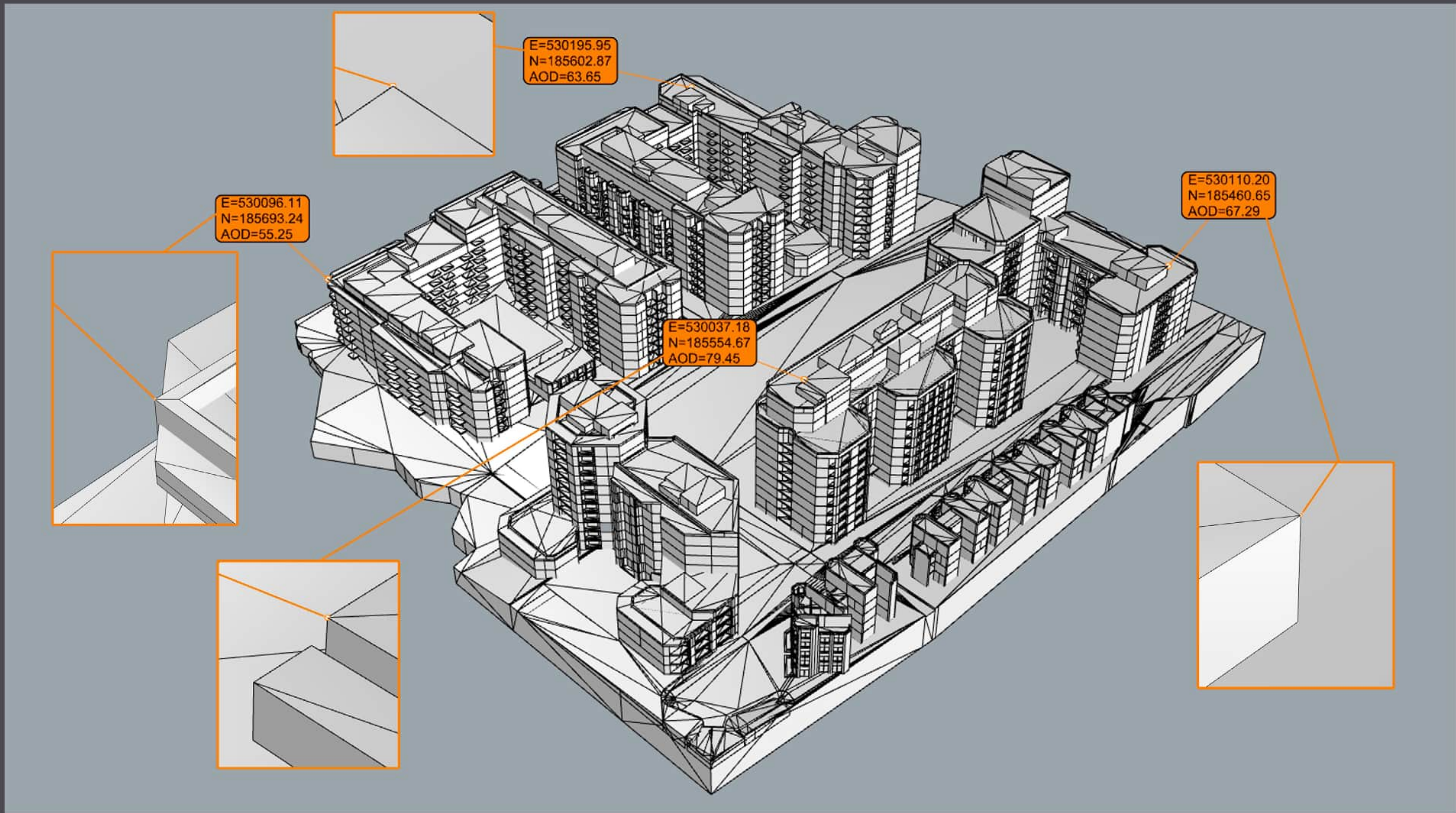
As stated above the DSM zone features foliage so in the areas where this has been used tree coverage is impact-ing visibility.

The visibility zone is based on a viewing height of 1.60m AGL.

The aim of the ZVI is to provide an initial guide on visibility for further detailed analysis to take place.

model used for zvi - 10/06/2020

3D MODEL VERIFIED ALIGNMENT PROJECT NAME: 2976_Holloway_Project_Osprey PROJECT NUMBER: 2976 DATE: 10-06-20



REVISION SCHEDULE

VERSION	DATE	DESCRIPTION
01	10-06-2020	First Issue

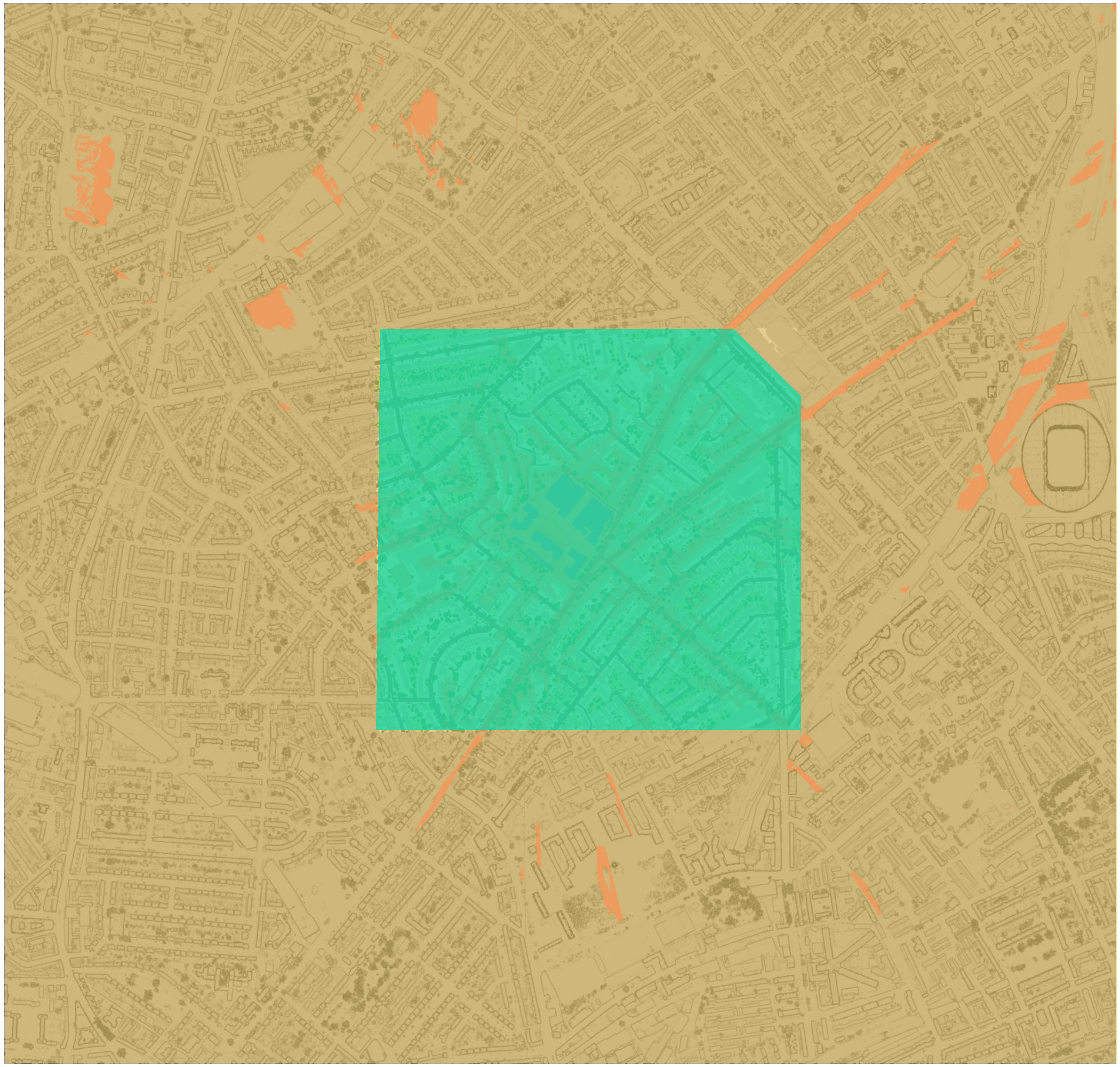
E - Easting
N - Northing
AOD - Above Ordnance Datum
UNITS - Metres

NOTES

This 3D Model Verified Alignment highlights the AOD (Above Ordnance Datum) and the easting/northing coordinates of the building based on the OSGB36 datum associated with the Ordnance Survey National Grid. The model is positioned based on the given information from the architect such as drawings/ context models.

CITYSCAPE DIGITAL
69-85 Tabernacle Street
London EC2A 4BD
Studio: 020 7566 8550

zmapping/ dsm context model - coverage guide



Cityscape Digital Ltd
7 Bermondsey Street
London, SE1 2DD

020 7566 8550

www.cityscapedigital.co.uk