AVR / VVM Methodology Statement

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Visually Verified Montages (VVM's)
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1. Overview

The methodology applied by Glass Canvas Productions Limited to produce verified images and views contained within this document is described in detail below.
This document describes the methods, equipment and processes used in the production of Accurate Visual Representations (AVR's) or sometimes referred to as Verifiable Photomontages and have been produced in accordance with the standards proposed to in The London View Management Framework Draft SPG July 2010.

Photography → **Digital Image Correction** → **The Survey** → **Camera Alignment** → **Rendering** → **Post Production**

Digital Formats
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Position, date and time recording

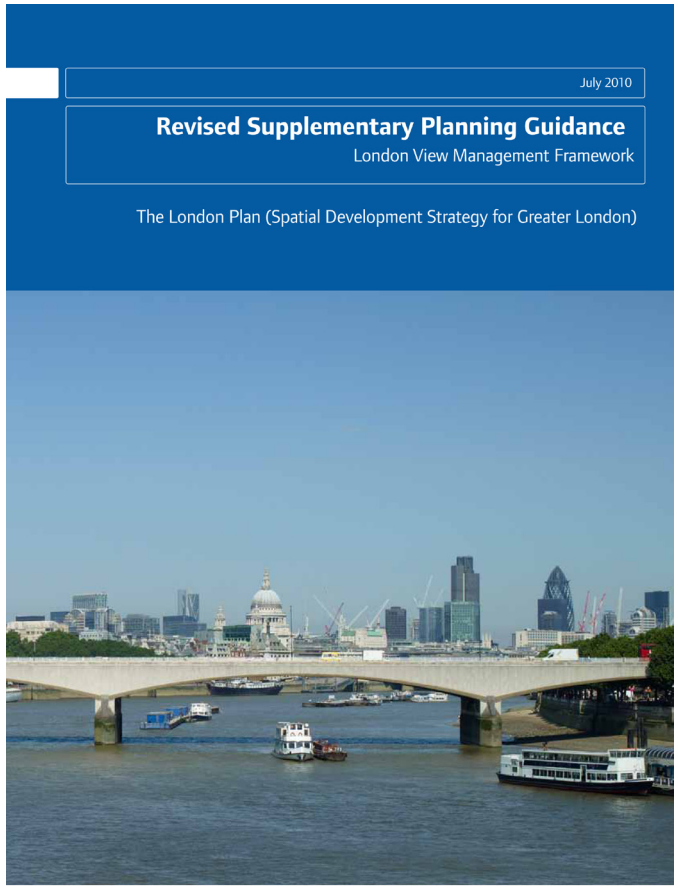
Scene Setup
Background Plate
Survey Information
Camera Adjustment
3D Model

Type of Render
Lighting and Sun Direction
Material & Texturing

Masks
Image
Format

Visually Verified Montages (VVM's)
2. View Selection

The selected views were made in consultation with the architects and the planners taking into account relevant planning policy and guidance.



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3. The Photography

a) Digital Photography

With the advances in digital photography we now have the ability to match the quality of film photography in a digital format. Because of the benefits of time and efficiency digital photography is preferred where possible.

b) Lenses

For local views a wide angle lens is used of 72mm or 90mm film or transposed as 24mm-35mm in digital. This enables the maximum amount of the new development and the surrounding area to be seen. For intermediate distances standard 150mm-210mm or short telephoto lenses are deployed. For longer distances a 210mm-360mm lens is used.

The table below shows the distance lens chart according to subject matter.

Distance to Subject	View	5x4 plate camera lens	Digital Camera
0-800 meters	Local	72mm to 90mm	24mm to 35mm
800-5000 meters	Intermediate	150mm to 210mm	24mm to 70mm
5000+ meters	Distant	240mm to 360mm	70mm to 200mm

c) Cameras

For digital photography Jeremy Young uses:
Camera: Arca Swiss F-Compact 6x9
Digital Back: Phase One P45+
Lens: 35mm Schneider Apo Digital lens

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4. Position date and time recording

The photographer is provided with reference photos of researched viewpoints and an ordnance survey map identifying the position of the viewpoints from which the required photographs are to be taken. All photos are taken from a consistent height of 1.60meters above ground level with the use of a tripod. This height above ground level closely approximates the average eye level of an adult human.

A plumb line is taken from a vertical point directly below the centre of the lens. The point where the plumbline touches the ground is marked and photographed for reference. This point is then located by the survey team and is used for the exact location of where the camera was positioned. The date and time of each photo is recorded by the photographer. This data can be used to set up a world sunlight system in the computer to accurately depict the lighting conditions.

In most situations if a physical point (survey reference point) can be used (corner of a paving slab or curb stone) this then avoids the use of paint markings on the ground. This is especially important when conducting any works within listed buildings or heritage sites.

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5. Image Processing

The digital images are 'Processed' in house. We put the RAW file format through digital imaging software called Capture One. This software enables us to have total control of the colour, exposure,- focus and white balance. The image is also bank corrected which means the horizon in each digital image is precisely horizontal.

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6. Image Correction

The Native digital resolution is too large for standard verified views so we resize it to 5024 pixels across keeping the aspect ratio intact. This process is done in Photoshop.

In spite of the selection of the best photographic equipment, lenses are circular which do result in a degree of distortion at the perimeter of the image. The outer edges of the image are therefore not used for point matching. The area to be used for matching is called the safe zone and will be covered in section 8.

a) Panoramic views

As mentioned above there is an inevitable amount of distortion which is a particular issue in regard to panoramic views, where a series of images are stitched together. For this reason only the central image focusing on the development can be verified. However panoramic views are particularly useful in getting an appreciation of a scheme, with regards to its surroundings.

b) Preparing an image for matching

Once the image has been exported and resized Glass Canvas finds the horizon of the image by extending vanishing point lines until they converge. When the horizon has been aligned it can be used to calculate the height of the image in pixels from the horizon to the top of the image. The same number of pixels is added to the bottom of the image. The reason for doing this is so that the cameras target in 3DMax needs only to be adjusted in the x and y axis. By employing this method we are able to produce more accurate alignments.

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7. The Survey

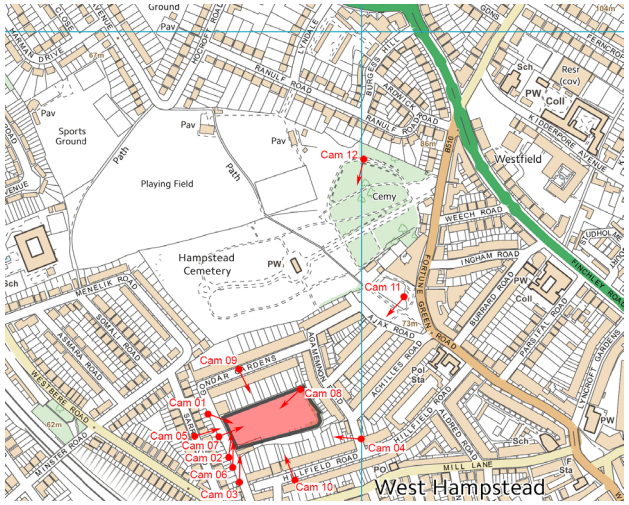
Glass Canvas use EDI to provide the neccessary GPS survey data information.

The survey is calculated in the Ordnance survey national grid (OSGB36) format by the use of global positioning system. The ordnance survey national grid (OSGB36) was chosen because it is the most widely used and because it also allows the captured data to be incorporated into other available digital products such as OS maps. The height datum is the Ordnance survey Newlyn Datum which is also captured via GPS.

Glass Canvas provides the survey team with a print of the background photograph with marked points which we need surveying. This photograph contains the critical points for survey and also secondary string lines. These 'lines' are two surveyed points that are connected by a vector. The combination of this data allows accurate alignment of the surveyed information with the background plate.

The data from the surveyor is provided to us as a 3D AutoCAD file in Ordnance survey grid coordinates. An excel spreadsheet containing all the Northing, Easting and height information for each surveyed point and camera positions are provided for analysis.

Photo 8	518772.2	178361.09	10.499	Photo Location	
8-1	518729.51	178342.36	20.532	Top of bridge safety barrier	Far centre left
8-2	518729.51	178342.35	19.233	Bottom of bridge safety barrier	Far centre left
8-3	518724.96	178349.61	10.392	Bottom left of column	Near centre right
8-4	518726.13	178350.26	10.386	Bottom right of column	Near centre right
8-5	518655.47	178344.17	15.459	Top left of window	Far centre right
8-6	518656.55	178345.13	15.455	Top right of window	Far centre right



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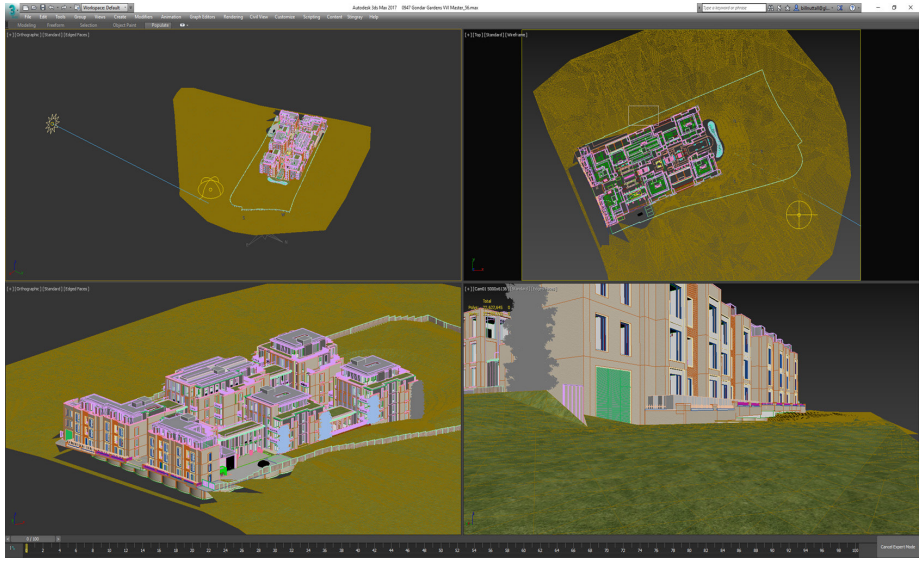
8. Camera Alignment

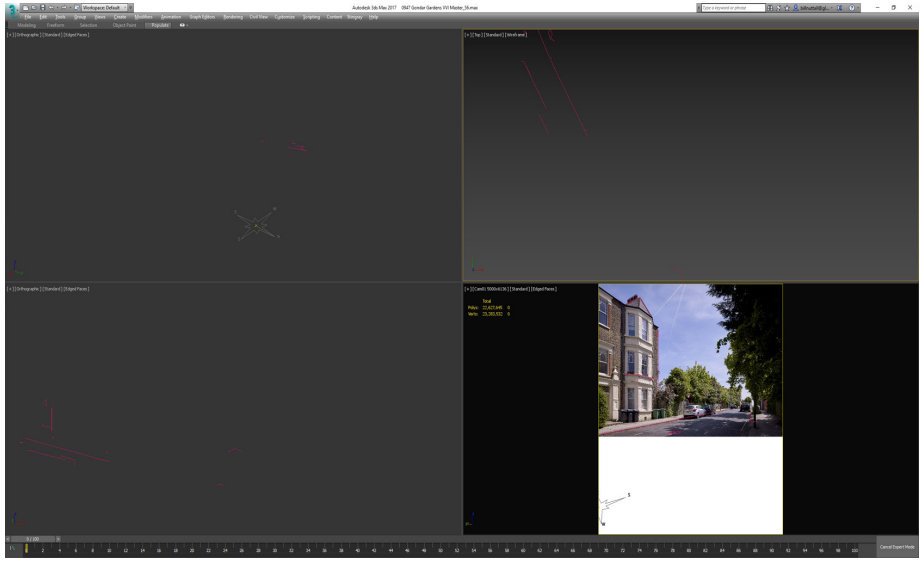
a) Scene setup

For the scene setup the 3D studio max scene is set up in mm. The Ordinance survey map is imported and checked as to its scale and its location in accordance with the OS coordinate system. A 3D model of the proposed scheme is then located within the context. The 3D model has been built in accordance with the architects drawings and instructions. The proposed development is then merged and is positioned with the use of the OS map in its desired location. The architect will have supplied the height of the ground floor datum line so the model can be moved to the exact height.



b) Background plate

In one of the view ports the background plate is loaded and the safe frame turned on. The safe frame shows the aspect ratio of the render in the view port. The render output is then matched to that of the image; this in turn adjusts the aspect ratio.



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8. Camera Alignment

c) Survey information

The survey information is imported into the max scene. The survey points are then accurately located in real world space. The lines that have been drawn between selected points are made render-able so that they can be seen on the render (for matching purposes, they are turned off once the camera is locked), so that the surveyed points can be seen markers are place on the points to aid the matching process.

d) Camera adjustment

The position of the camera is known with a coordinate. Once the camera is positioned on this point it has to be raised by 1.60 meters so as to be in the exact position as the camera that took the photo. The target also has to be lifted 1.6meters as well.
The 3D Max camera has the lens set to that of the physical camera that took the original photo. There is a conversion from a 4x5 lens to a 35mm. See below.

Lens	FL	A65	A75/A22	P30	P45	P25	645	5x4	6x9
Schneider 35XL	35	30	26	29	26	26	n/a	n/a	21
Schneider 58XL	58	49	44	47	43	43	n/a	16	35

When the correct lens information has been entered the target then has to be adjusted on the X and Y axis. This should locate the points on the points of the background plate.

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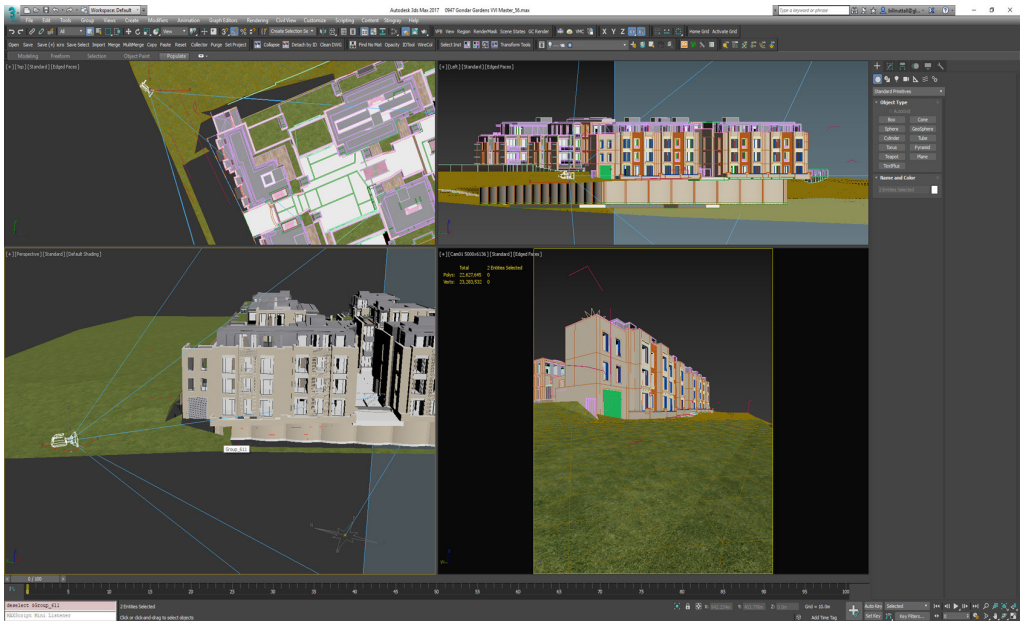
8. Camera Alignment

e) Model

Once the camera is set up the completed model is then ready to have a lighting system set up. Because the time of the photo was recorded it is possible to input the information of the location and time and get an accurate skylight result.



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9. Post Production

Post production is done in Adobe Photoshop CS5. The elements of the new render and the original background plate are put together to create the final image.

a) Masking

Masking is used to put the new verified scheme in the correct place with regard to foreground objects. This is created by making a mask layer and subtracting what is not needed from the rendered image.

b) Image

The rendered layer with the scheme is adjusted to have the correct brightness and contrast as to 'sit' in the image without looking alien.

c) Formats

Once all the elements of the scene are processed the Photoshop file contains multiple layers, one of which is the surveyed points. This layer is turned off when it is saved out as an uncompressed TIFF (without layers). It is there so that if required we at Glass Canvas can prove the validity of the match. The file with all the layers is saved as a PSD which is a Photoshop file format and is stored on our secure servers.