Georgiana Street, London NW1 0QS

Bangor Wharf

Report to accompany planning application:

Accurate Visual Representation (AVR) Methodology Statement: Soluis Studios

February 2016

The purpose of this document is to specify the methodology used by Soluis in the production of an Accurate Visual Representation (AVR). This document will first specify the general principles behind creating such images, then specify the general methodology used by Soluis to produce them. In the third section the project-specific variables will be detailed.

Architectural Visualisation is the process of producing static or moving imagery that represents a proposed development and is typically produced by creating computer models which can be 'rendered' into images. Where photography is used to provide context to these renderings the resulting image is referred to as a montage.

AVR images are dimensionally accurate representations of the proposed development in context. Each AVR is accompanied by a method statement so that the accuracy of the montage is verifiable by a third party. The image production process should be replicable based on applying the steps in method statement.

The detail included in the rendered element of an AVR is variable but the following levels of detail are taken as industry standard:

Level 0 – Location and size of proposal
Level 1 – Location, size and degree of visibility of proposal
Level 2 – As level 1 + description of architectural form
Level 3 – As level 2 + use of materials

The method statement is split into the following headings:

1- Photography
2- Modelling
3- Rendering
4- Post-production
5- Dataset

Section 2 will detail the general methodology applied by Soluis and will identify the key variables across projects. In Section 3 the project-specific variables will be provided.

2.1 - Photography

It is important to note at the outset that no existing photographic method can replicate the richness of detail, dynamic range, angle of view, resolution and perspective that human perception achieves. This means that when capturing a scene there are many competing issues that a photographer must balance to produce the most suitable result. This section is designed to capture as much of the technical information and relevant reasoning behind these choices.

2.1.1 - Photography Register

Each image should be given a unique reference, date, time, GPS location, the ground level elevation of that location, the height of the camera (ideally eye level – 1.6m) elevation.

2.1.2 - Equipment and Exposure

The following information should be documented for each image:

- Make, model and resolution of camera (bespoke modifications should be specified)
- Lens used, including actual and 35mm equivalent focal length and the angle of view produced horizontally and vertically.
- Aperture, shutter speed and ISO of each shot
- Tripod height from ground.
- Whether a specialist tilt shift or perspective correction architectural lens was used.

Many digital cameras capture this information automatically in the metadata of the RAW files produced. Where the camera does not, or an analogue camera is used, this data should be captured manually.

2.1.3 - Selection of View Location

The selection of the views used should be justified. Where these views were specified by the local authority, this should be stated. Where the views were specified by the architect, the client or selected by the photographer a justification of the selection should be provided.

An annotated map indicating viewpoints should be produced.

2.1.4 Verification of Location

The photographer should provide documented details of how the location was verified.

There are various techniques that may be employed to identify the location from which each photograph has been taken. Some key points:

- The camera should be levelled using a spirit level (typically incorporated on the tripod).
- The ground location should be taken from the point plumb with the camera's sensor.
- Where the GPS accuracy is not sufficiently precise, secondary photographs or survey should be taken of the camera set-up to ensure the location accuracy.

2.1.5 Selection of Angle of View

As well as specifying the location of view, the angle of view used should be briefly explained.

In general shots taken at 50mm (on a 35mm camera, or equivalent) are considered 'normal' as they most closely match human perspective. Also, shots taken at 35mm – 75mm should be considered acceptably 'normal' in terms of the minimal perspective effects that they produce. Use of longer or wider lenses should be noted and briefly explained.

In all cases the proposed development should feature as close to the centre of the image as possible to avoid lens distortion towards the periphery.

To produce a wider angle of view it is also possible to merge several photographs into a Panoramic Photograph or 'stitched' image. When used, the stitching process should be carefully documented to demonstrate sufficient overlap between shots, consistent exposure across shots and consistent depth of field. Ideally, a special panoramic tripod head should be used. Stitched images will have a post-production impact (section 2.1.6).

Some important background -

Ideally, all photography for AVR/VVM images would be shot at 50mm equivalent but the view of the context that this produces is extremely limited (40' compared to a human's 180'). To overcome this, the photographer can either use a wide angle lens or take many separate shots with a 50mm lens and 'stitch' them together in computer software to give a broader angle. Wide angled lenses can make the foreground look unnaturally spaced-out and the background seem shrunken. Whilst the stitched solution retains human-like perspective effects, it comes at the expense of forming a cylindrical plane. With one or two shots this is a minor issue, with more it can require artificial correction in post-production.

In any given case the photographer should use their judgement to give the most natural representation.

2.1.6 Post-production of Photography

Post-production techniques and processes can be applied after the photographs have been taken. This should be minimal – such as minor exposure correction. Occasionally stitching or cropping may be required.

All post-production applied to the photographs should be noted.

2.1.6.1 Exposure and colour cast

If applying exposure or colour cast to digital files, correction should be applied to the RAW file in isolation as this creates a separate XMP file containing all of the changes. This way, the RAW file itself remains unchanged and can be viewed with or without the XMP corrections applied.

2.1.6.2 Stitching and Cropping

When stitching a series of photographs together, the original files and the stitched file should both be supplied. The stitched file should be annotated to indicate the position of each shot.

When cropping a photograph, the original and cropped file should both be supplied. The cropped file should be annotated (as per item 429, LVMF-SPG) to indicate the original centre of the view or Optical Axis.

2.2 Modelling

The 3D Computer Model ('the model') can be either supplied to Soluis or can be created from design information given to Soluis. This section should state who produced the model.

When the model is supplied to Soluis, this should be supplied in the dataset (see Section 5)

When the model is created by Soluis the original drawings should be supplied in the dataset.

Whilst the context in the final image will be supplied by the photograph, modelling elements of the context in line with survey information helps verify the accuracy of the camera-match (see Section 2.3.1). We will provide at least two points of match in each shot. Also modelling elements in the context can help provide valuable shadow and reflection information for advanced Level 3 montages (see Post-production Section 2.4).

2.3 Rendering

The render process creates 2D images from the 3D computer model. The primary aim is to give a geometrically accurate representation of the proposed development to the required Level (as stated in Section 1).

For Level 0, 1 and 2 AVRs, visualisers have control over the viewpoint and the angle of view. These results can be verified.

Level 3 AVRs additionally require material and lighting. This introduces a degree of artistic license.

2.3.1 Viewpoint and Angle of View

The Technical 3D Artist ('visualiser') can set up viewpoints or virtual-cameras within the model. Using camera location and lens information from the photographer, the visualiser should set up the virtual-camera in the viewport (on-screen preview). If the model and the GPS data are accurate, this view will be in the correct position.

The angle and position of the view is then separately checked for accuracy. Firstly, the visualiser overlays the photograph with the virtual view, then checks that at least two surveyed points in the photograph match with their correlates in the model. This verifies the accuracy of the position and the angle of the virtual view.

2.3.2 Materials (Level 3 only)

Virtual materials can be applied to the model in line with the design specification. How well the virtual materials match their real world counterparts is variable: well-specified materials are more easily matched and Soluis have an extensive database of common or branded materials that are highly realistic. Some materials require more artistic interpretation on the part of the visualiser.

2.3.3 Lighting (Level 3 only)

Soluis can use highly realistic lighting systems to match the exact sun position at a given point on a given day. Unfortunately there remain other variables that cannot be so easily mimicked: clouds, pollution and humidity can all alter the light levels in the scene.

Other virtual lighting techniques or render settings (calculating light physics) can then be used to help replicate the light levels from the photographs. Some techniques are better applied in post-production (see Section 2.4). This is open to some artistic interpretation.

2.4 Post-production

Once the photographs have been taken and prepared, and once renders have been created, these elements need to be combined in post-production. Once combined, some post-production tweaks may be required to fully integrate the renders in terms of colouring and lighting. This should be minimal.

The integration process involves placing the photograph on a base layer and superimposing the render. This is all that is required for Level 0 AVRs.

For Level 1, 2 or 3 AVRs, the render layer should further be placed in the scene so as to make it appear behind those items in the photograph which will partially or wholly obscure it in reality. The process of bringing certain elements in the photograph to the foreground and allowing others to be obscured by the development in the background is known as 'masking'. Masking should always be done in reference to O.S mapping data to ensure accuracy.

Given the lighting and materials used in Level 3 AVRs, these may require some minor additional tweaks to blend the new render element into the photograph.

[Optional: For more advanced images, it is possible to include the shadows or reflections cast by/on to the render component by elements in the existing photograph. If this applied, lighting study information should be supplied to verify the shadow position/intensity. Reflections may have been produced using the model – this should be specified.

2.5 Data Set

The dataset should include all of the base files used in the creation of the AVR and a file register.

Required:

- Final AVR methodology and images (specifying their AVR Level).
- Original information used to create the model (or originally supplied model).
- Annotated map of viewpoints.
- Original photography (RAW + XMP).
- Photographer’s survey and methodology statements.

Optional:

- Final model.
- Material and lighting information.
- Final post-production files (.psd).
- Render settings.
- Individual renders.

3.0 Project Details

Soluis Studios: 20 South Frederick Street, Glasgow, G1 1HJ www.soluis.com
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Project: Bangor Wharf, Camden

Client: Philip Morris BSc (Hons) MRICS
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Client: Phil Smith
Contact: 020 70606221 PhilS@rund.co.uk
Rund Partnership Limited
14 Buckingham Street
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WC2N 6DF

Architect: Moll Linehan
Contact: 020 35671508 M.Linehan@tmarchitects.co.uk
Tranter McManus Architects
102 Screenworks
22 Highbury Grove
London
N5 2EF

Photographer: Jeremy Young Photography. www.jeremyyoung.co.uk tel. 07860715369

Surveyor: CADmap Studio - http://www.cadmapstudio.co.uk/ simon@cadmapstudio.co.uk

Brief: 2 x Level 5 AVR montages of the proposed development at Bangor Wharf, Camden.

Image 1 - Camera equipment.

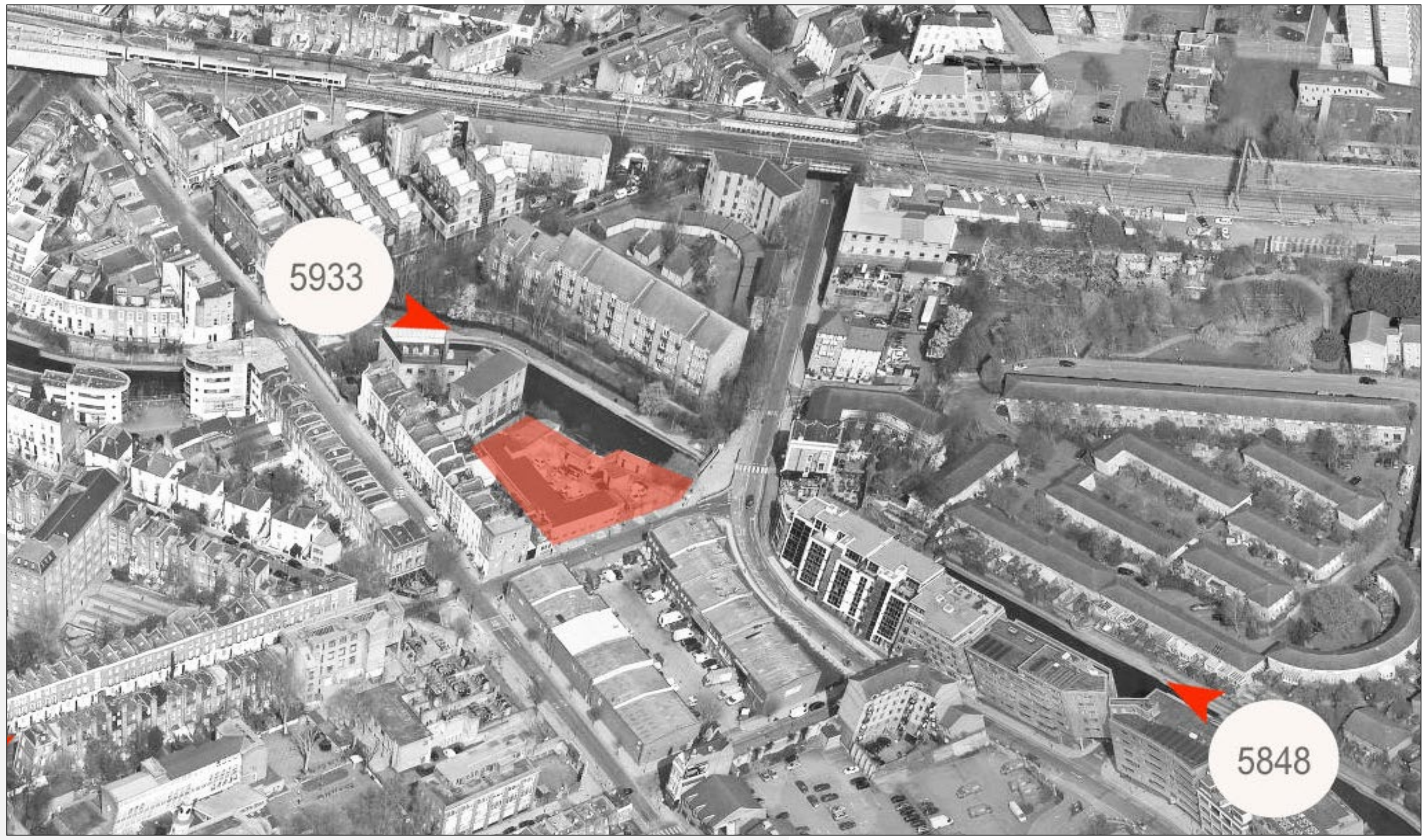


Image 2 - Map with camera locations.

3.1 Photography

3.1.1 Photograph Register

Image Ref	Date	Time	Easting	Northing	Elevation (Ground)	Elevation (Eye-Level)
AVR_001	11.11.15	11:35	529513.321	183930.256	23.5095	1600
AVR_002	11.11.15	11:20	529302.166	184092.162	23.78	1600

3.1.2 Equipment and Exposure

Camera used: Arca Swiss 69 F-Line Metric, Architectural camera with Schneider Apo-Digitar XL 5.6/35mm, high-resolution, digital lens and a Phase One P45 digital back. (see image 1)

Image Ref	Tripod Height (m)	Lens Used	HFOV	VFOV	Shutter Speed	Aperture	ISO	Tilt-Shift
AVR_001	1.6	35	70	52.5	N/A	16.5	50	5mm
AVR_002	1.6	35	70	52.5	N/A	22	50	5mm

3.1.3 Selection of Location

Views 5933 and 5848 were as specified by the client.

Image 3 - Pin position in the ground.

Image 4 - Camera set up over said position.

Image 5 - Theodolite to survey required points.

Image 6 - Theodolite set up over said position.

3.1.4 Verification of Location

Each scene was photographed using a survey pin to accurately identify the view location.

A plumb line is used to ensure that the centre of the camera lens is directly over the surveyed viewing position at a height of 1.6 m.

The metadata of each image records the exact time and date of each image.

Two site photographs are taken at each viewpoint:

(1) a photograph of the pin position in the ground. (see image 3)

(2) A photograph of the camera set-up over said position, showing adequate context. (see image 4)

Soluis use Cadmap Studio to provide the required GPS data information. The survey is calculated by use of a global positioning system (see image 5/6) based upon Ordnance Survey Grid, [OSGB36] Soluis provide the survey team with a background image which we require surveyed along with the exact positioning of the camera from which the shot was taken.

The data from the surveyor is provided to Soluis as a set of documents with points overlaid on the photographs (see image 7), a list of all points accurately taken (see data log for details) and also a 3D AutoCAD drawing file in ordnance survey grid coordinates.

Image 7 - Co-ordinate points overlaid on the photograph.


Image 8 - Original photograph.

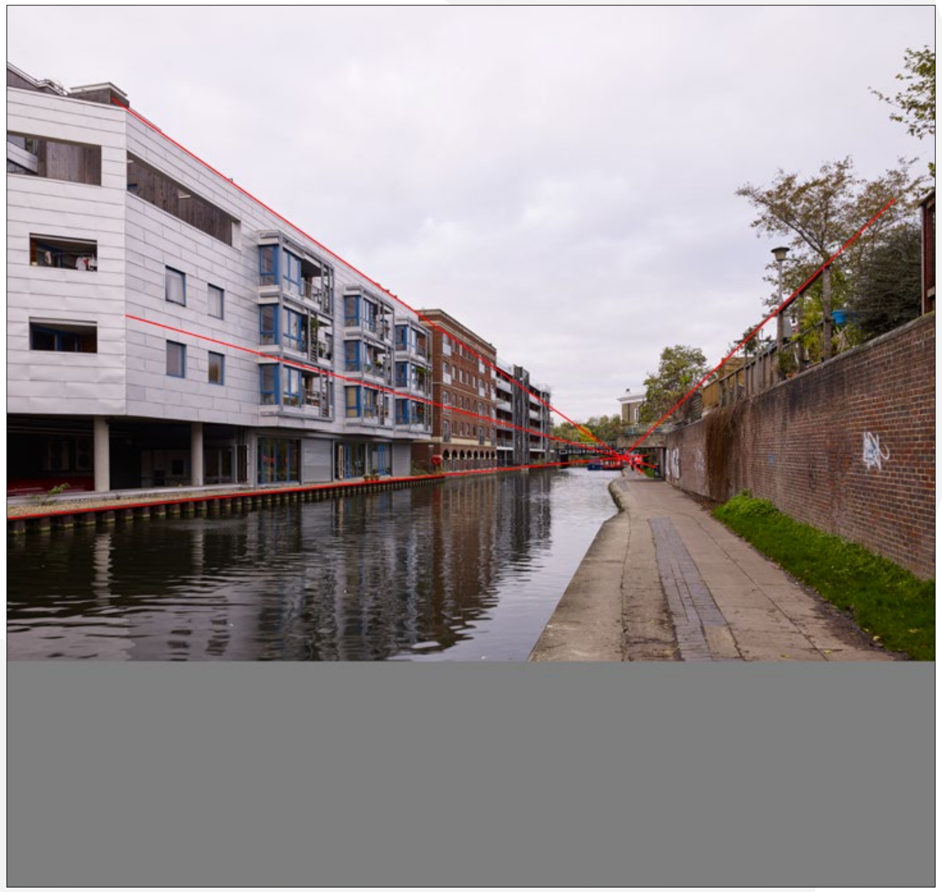


Image 9 - Extended image to provide accurate horizon line.

3.1.5 Selection of Angle of View

The angle of view was selected as this allowed sufficient width in the frame to provide the required context. Given the camera being used, and the tilt-shift mechanism employed, the typical drawbacks of using such wide-angle photography can be mitigated. This equipment has been used on multiple AVRs in the past.

3.1.6 Post-production of Photography

Minor exposure correction was applied – see RAW file and associated XPM.

To prepare the images for matching Soluis finds the horizon of the image by extending vanishing point lines until they converge, the horizon line is also supplied by the surveyor as confirmation.

Once the horizon has been aligned we can calculated the height of the image in pixels from the horizon to the top of the image. The same number of pixels are added to the bottom of the image. The reason for doing this is so that the cameras target in 3ds Max needs to be adjusted in the x and y axis only. By employing this method we are able to produce more efficient alignments (see images 8 & 9).

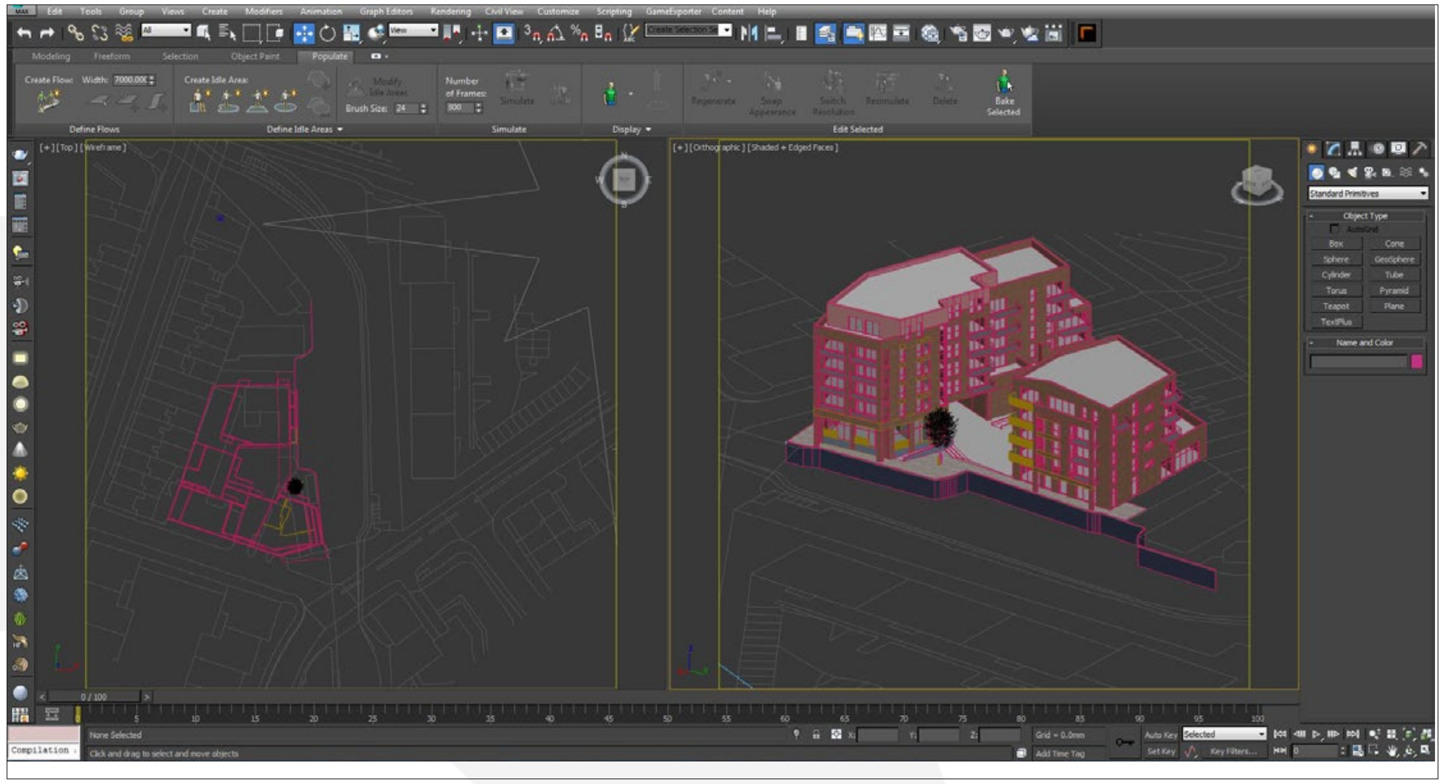


Image 10 - Building modelled to architects specification.

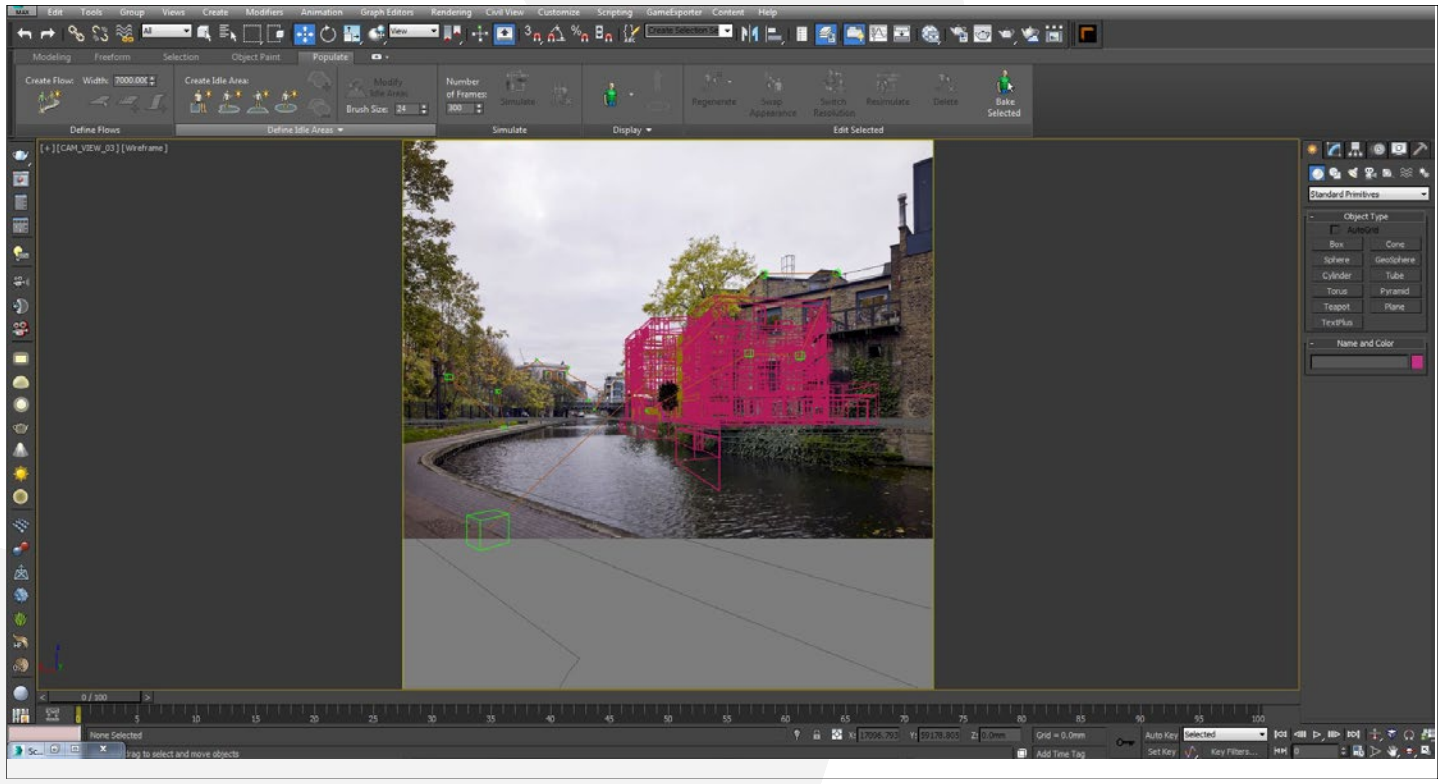


Image 11 - Background image placed in scene to ensure an accurate match.

3.2 Modelling

DWG information was provided by TM Architects and the modelling was undertaken by Soluis using 3ds Max (See image 10). A full schedule of drawings can be found in the data log.

Soluis set up the 3ds Max scene in mm and the ordnance survey data is imported to confirm it is the correct scale and that it matches the location in accordance to the OS coordinate system. The 3D building model was then imported into the context and matched to the OS data and information supplied by the architect, specifically the ground floor datum line.

In one of the 3ds Max viewports the background photography is loaded with the safe frame turned on to ensure the aspect ratio is the same as that of the render. The render output is then matched to that of the image, this in turn confirms and adjusts the aspect ratio (See image 11).

The survey information points are then imported into the same 3d scene and are already in the correct OS space. The connecting points are then made renderable so as to ensure an accurate visible match is made.

We locate the VRay camera into position through known knowledge of its real world coordinate points. Once in position the camera is raised 1600mm to match the height of the real world camera.

The lens information is then transferred to the VRay camera so as to match exactly the data supplied by our photographer. Once the camera is setup we then add an accurate lighting system set to the specific location and time of when the original image was taken.

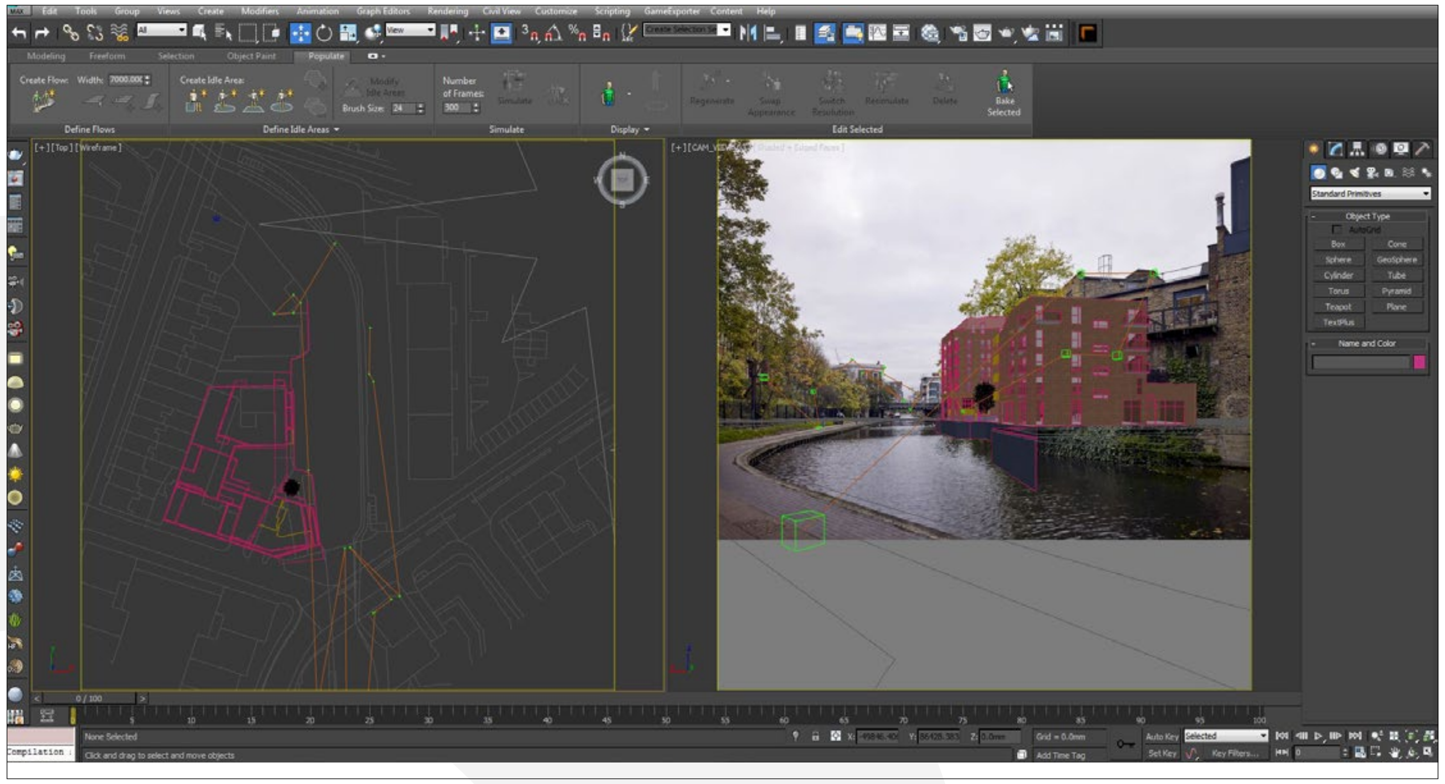


Image 12 - The camera is located specific to the coordinates supplied by the survey team.

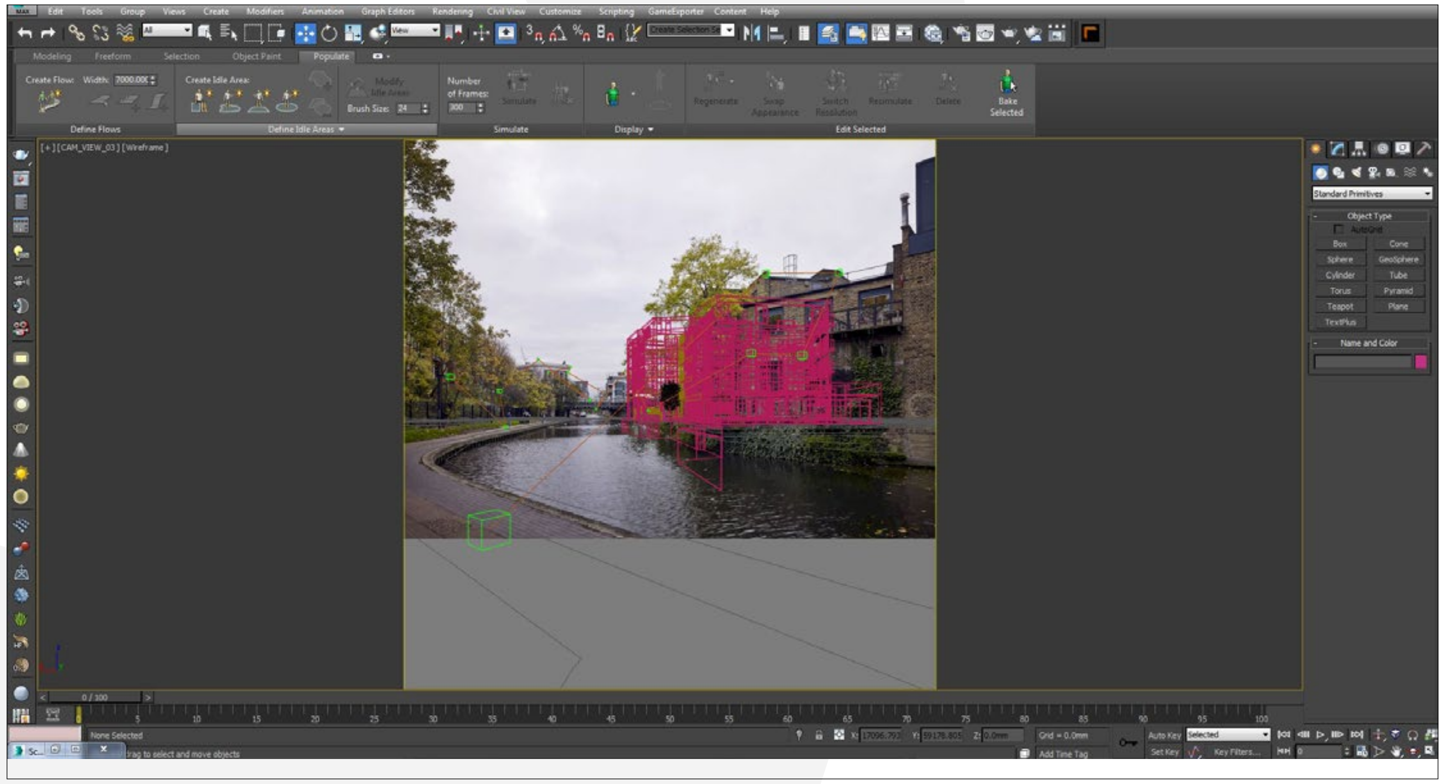


Image 13 - A match is confirmed by overlaying the rendered survey points onto the photograph

3.3 Rendering

3.3.1 - Viewpoint and Angle of View

The survey information points are then imported into the same 3d scene and are already in the correct OS space. The connecting points are then made render-able so as to ensure an accurate visible match is made (See images 12 & 13).

We locate the VRay camera into position through known knowledge of its coordinate points. Once in position the camera is raised 1600mm to match the height that the photography was originally taken.

The lens information is then transferred to the VRay camera so as to match exactly the data supplied by our photographer.

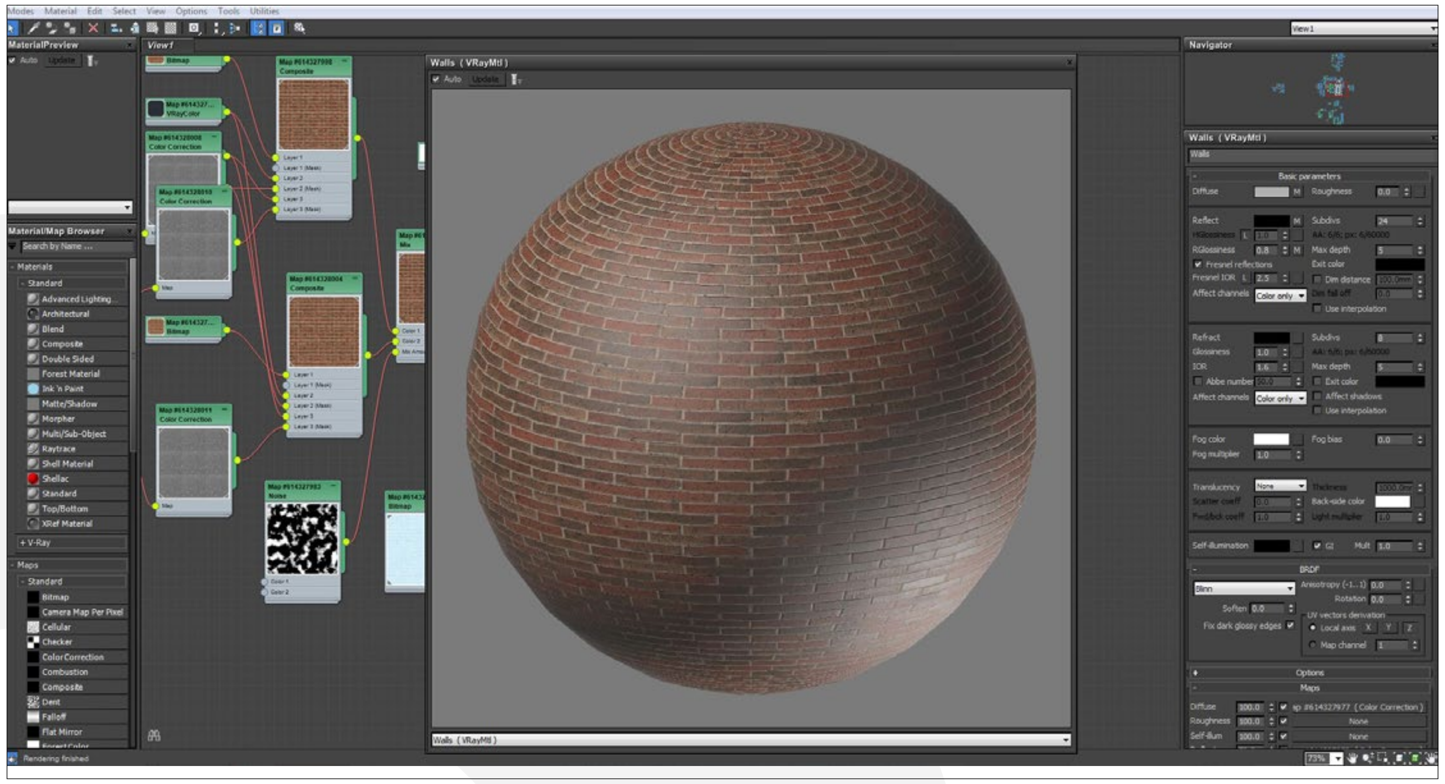


Image 14 - Realistic materials specified by architect.

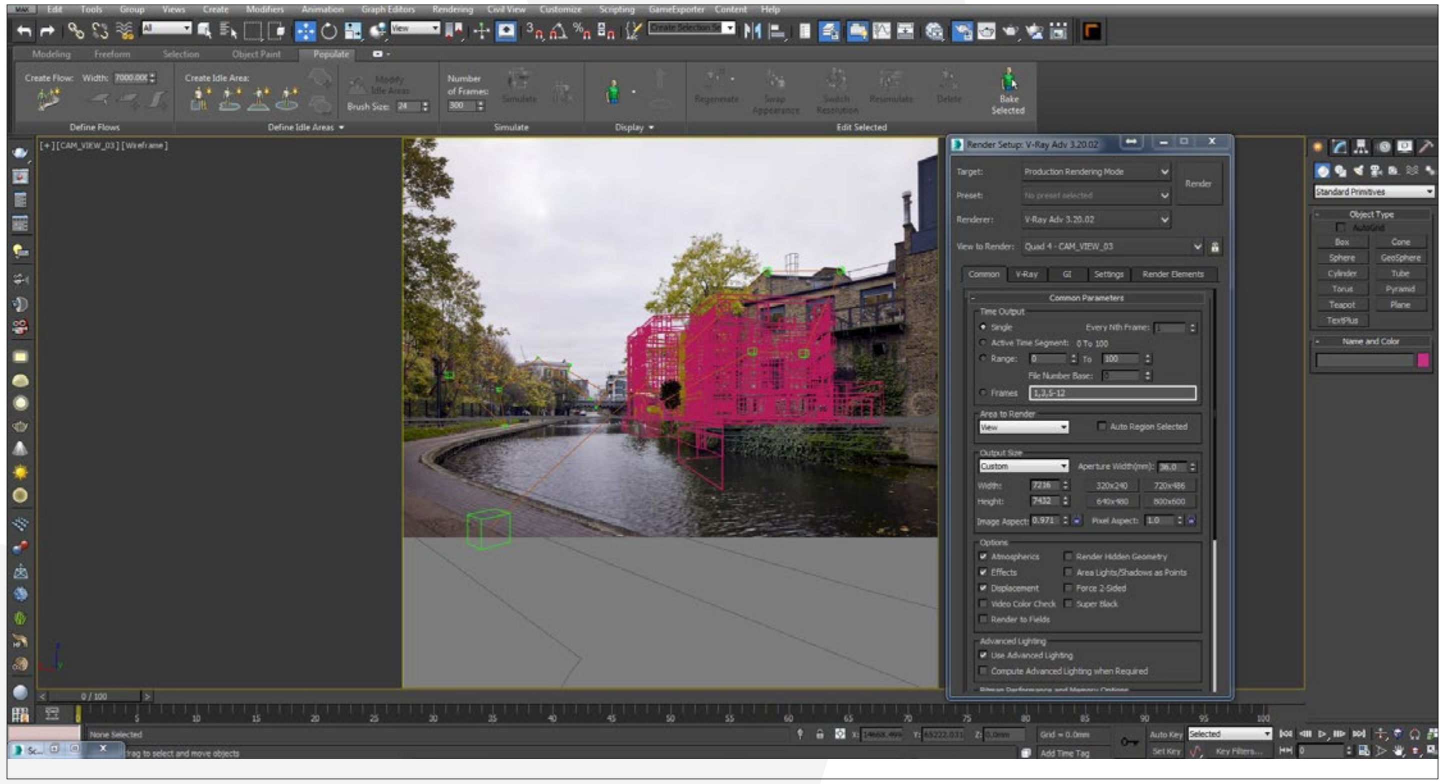


Image 15 - Scene setup in place and ready to render.

3.3.2 - Materials

Material specification was provided by TM Architects. The materials were referenced from the existing current building.

3.3.2 - Lighting

A global lighting system was used to produce accurate shadow detail. Ambient light was supplemented by a reflection plane with photos taken from the site opposite the proposed buidling to match the weather conditions and street reflections in the photography.

With the 3D model fully textured with realistic surface materials specified by the architect and the dedicated lighting setup for the exact location and time of day the scene is now ready for rendering.

The scene is rendered using VRay, a professional rendering engine for 3ds Max which converts the 3D data into a 2D i mage. The final image is saved as an HDR file format with an additional alpha channel which will enable accurate masking in the post-production phase.

To ensure the same level of detail is captured when rendering we render the image at the same size as the base image plus the additional proportion at the base of the image to compensate for the horizon line (See image 15).

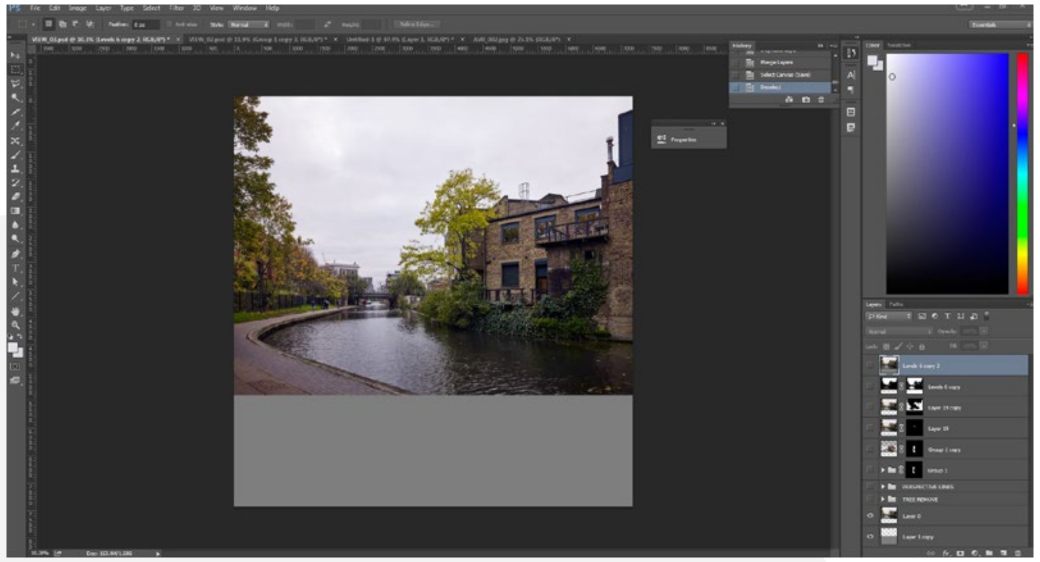


Image 16 - The original photograph as it was shot.

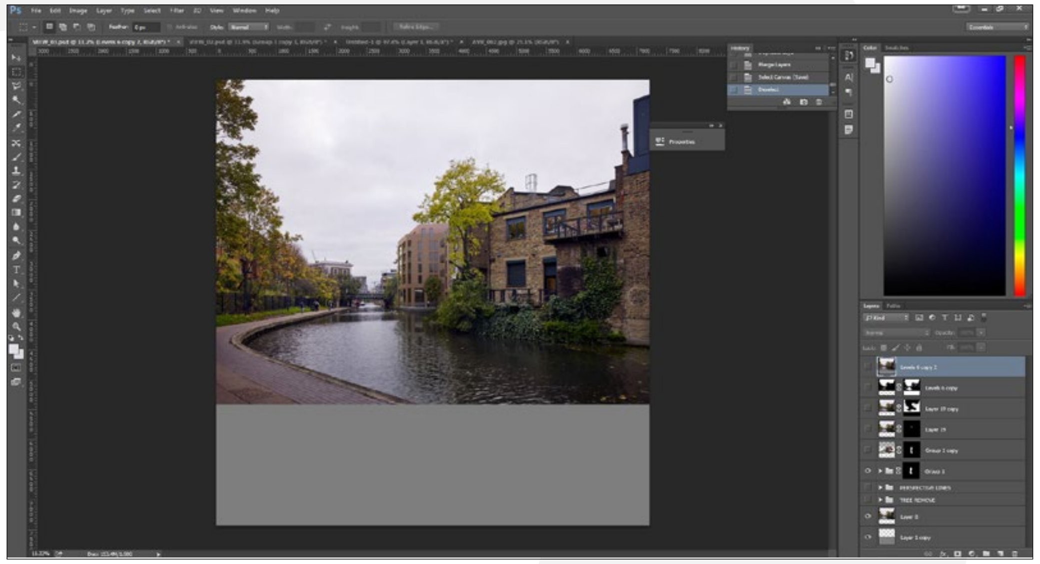


Image 17 - The building render is merged and the foreground is masked out

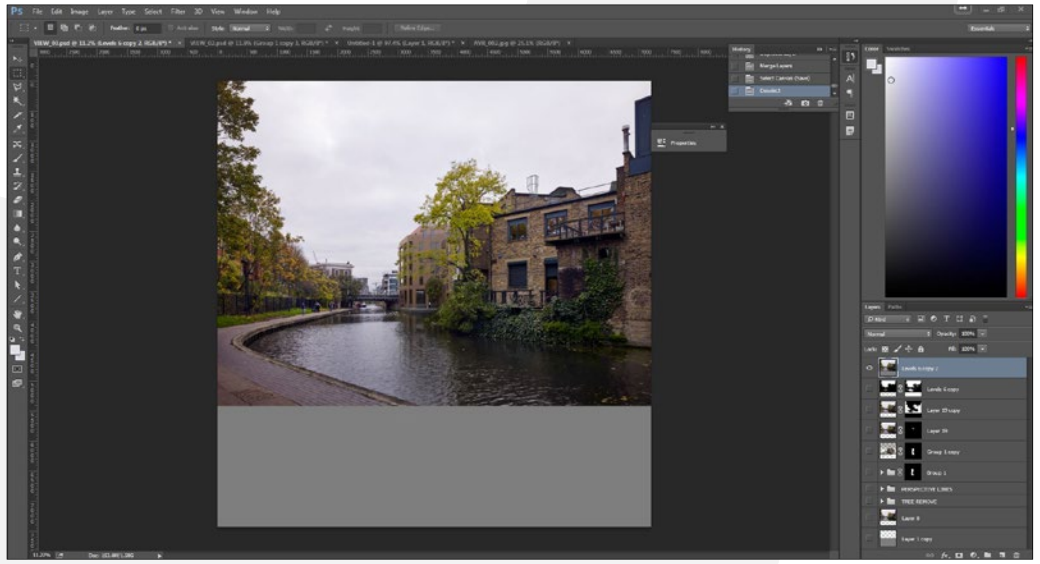


Image 18 - The final image with the proposed development blended in.

3.4 Post Production

The post production was carried out using Adobe Photoshop. Some minor colour matching and contrast was applied to the rendered elements to blend with the photographic scene.

The existing Willow tree was removed from the images as its representative of the proposed development.

Soluis uses a series of masking techniques to blend the rendered image into the photography by allowing the foreground elements to sit in front of the background and subsequent render (See images 16, 17 & 18).

Once this process has been completed the Photoshop file is saved as a compressed Jpeg without the layers. The PSD document is then stored on our own secure network so that, if required, Soluis can prove the validity of the match.

3.5 Data Set

File	Type	Author	Company	Description
AVR_001	JPEG	Guan Hill	Soluis	Looking north west.
AVR_002	JPEG	Guan Hill	Soluis	Looking south east.
AVR_001_RAW	TIFF	Jeremy Young	Jeremy Young Photography	Looking north west.
AVR_002_RAW	TIFF	Jeremy Young	Jeremy Young Photography	Looking south east.
Camera Info	EXCEL	Jeremy Young	Jeremy Young Photography	Excel spreadsheet showing all relevant camera details.
Architectural Drawing Package	DWG	Moll Linehan	TM Architects	Full set of architectural drawings of the building design supplied by the arhcitect.
Bangor Wharf, Camden, all views.	EXCEL	Simon Cheeseman	Cadmap Studio	Full set of survey coordinate points supplied and taken by Cadmap Studio Surveys.
Bangor Wharf, Camden, all views.	PDF	Simon Cheeseman	Cadmap Studio	All views with coordinate overlay.
OS Map	DWG	Moll Linehan	TM Architects	DWG of ordnance survey data.

Existing View

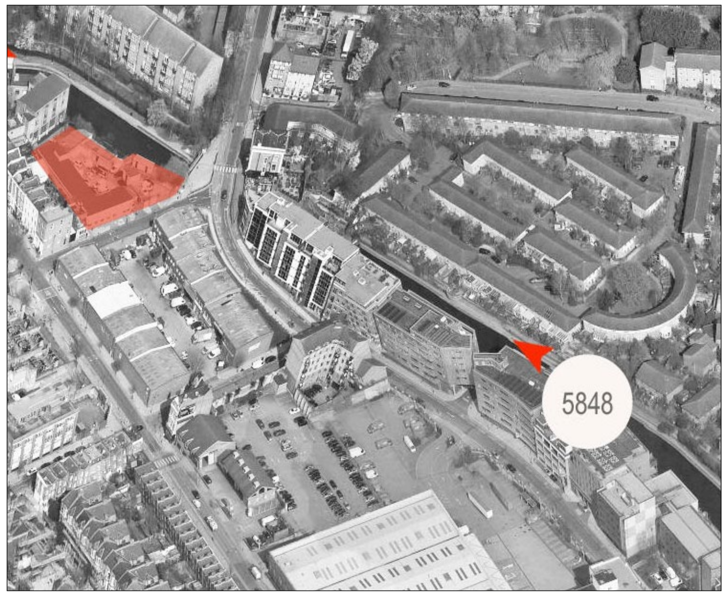
Proposed View Showing Level 3 Detail

Viewpoint Location

Location:	Looking north west.
National Grid reference:	529513.321E 183930.256N
Height of viewing position:	23.5095

Photography Details

Height of camera:	1600mm
Date of photography:	11.11.15
Time of photography:	11:35 (BST)
Lens:	35mm



Existing View

Proposed View Showing Level 3 Detail

Viewpoint Location

Location:	Looking south east.
National Grid reference:	529302.166E 184092.162N
Height of viewing position:	23.78

Photography Details

Height of camera:	1600mm
Date of photography:	11.11.15
Time of photography:	11:20 (BST)
Lens:	35mm

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