

**APPENDIX 6.7
VERIFIED VIEW METHODOLOGY**



Richmond College, Twickenham

**Photomontage methodology
and supporting evidence**

April 2022

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1.0 Overview

This document has been prepared by Realm Communications to explain the methodology used to create accurate visual representations (AVRs) of the proposed development at Richmond College, Twickenham. The visual assessment of the proposed development reflects current best practice in relation to the verification of images, a process which is constantly being refined and improved with advances in technology and industry experience.

The purpose of the photomontages is to present an accurate overview of the proposed development which enables its effect on the landscape and views to be objectively evaluated. Every image contained within this document is verified unless otherwise stated. Final images should not be used as a standalone tool to assess the suitability of a development, but should be used in conjunction with a site visit.

This audit trail demonstrates the key stages of production (that can, if required, be checked by a third party) including photography, surveying, 3D modelling and camera matching processes - all critical to ensuring the accuracy of the final photomontages. These methodologies are in accordance with current best practice and follow recommendations from The Landscape Institute's Technical Guidance Note (TGN 06/19) : Visual Representation of Development Proposals.

The entities responsible for the preparation of the views that are set out in the following pages comprise:

Selection of viewpoints

Barton Willmore
7 Soho Square
London W1D 3QB
Phone: 020 7446 6888

Photography

Arcminute Ltd
25b Pall Mall Deposit
124-128 Barlby Road
Ladbroke Grove
London W10 6BL
Phone: 07774 857627

Survey of existing views and camera locations

Datum Survey Services
Brickfield Business Centre, Brickfield House
High Road, Thornwood, Epping CM16 6TH
Phone: 07977 111935

Production and checking of verified images

Realm Communications
The Workshop, Old Barn Cottage, Down Lane
Compton, Guildford GU3 1DQ
Phone: 01483 813888

Supply of building model and spot height information

BPTW
40 Norman Road,
Greenwich
London SE10 9QX
t. 020 8293 5175

2.0 Methodology

2.1 Photography

The professional architectural photographer employed on this project was briefed by Realm to work to a methodology which conforms to the principles specified in section 1.0 Overview.

The following methodology statement has been supplied by Arcminute:

Photography brief The following methodology applies to the production of photographic images originated in March 2021 which form the pictorial basis for visual impact assessment photomontages for 9 views for Richmond College, Twickenham.

Overview The Arcminute system is designed to create geometrically accurate photography and verifiable data for all its associated parameters and is fully compliant with all guidelines covering images required to be aligned with survey data for use in planning applications.

Equipment Images are captured on a 36mm x 24mm 61 megapixel digital sensor in combination with the following lenses: 17mm, 24mm, 35mm, 52mm and 80mm with shift capability (specially selected for best in class resolution and customised to conform to the high precision focal length and optical axis settings required in the process). Re camera mounts, custom made designs for both single frame and panoramic capture are used to obtain high precision camera positioning and orientation tolerances.

Choice of lens We prefer to replicate (as far as possible) what may have already been provided in terms of preliminary view studies as typically these would have been generated using pre-considered factors as to what each view would need to illustrate e.g. context, key visual receptors etc. In the absence of a definitive steer, we will generally use a 74° HFOV lens for medium to close views in an urban environment and a 40° HFOV lens for long distance views. However, the actual size and nature of a scheme (single building or large multibuilding development) and its location will also be considered before lens selection. The Landscape Institute's latest guidelines have been relaxed with regard to lens choice and they are no longer insistent that a 'standard' lens be used wherever possible.

Photography The camera is set up at eye level (1.55-1.75m) and orientated to within 0.02 deg of pitch and roll to the horizon. The point on the camera that coincides with the origin of perspective is positioned in relation to a survey marker to within 2mm in XYZ. The scene is then captured in a RAW format using standard high quality architectural photographic practice.

For every view, a photographic record is made of the tripod location, the survey mark and the height reading of the camera above it.

Post production Standard image processing for dealing with RAW files is undertaken to create a TIFF image that honestly represents the scene in terms of tonality and colour. This image is then processed to remove lens distortion and identify the XY position on the image of the optical axis. Using an image that is fully corrected for distortion enables all the survey points in the image to be used for alignment and not just those confined to the so-called central 'safe area'.

The following data is recorded on a text layer:

- Date and time
- Lens focal length (to nearest 0.001mm)
- Image size in pixels and mm
- Height above survey point (to nearest 0.001m)
- Lens shift (nominal figure to nearest mm)

The survey points are marked up on a separate layer by the survey team. This layer can be set in a blending mode so that the precise point on the image below the marked dot can be seen.

Issued files The following files were issued to Realm:

- A layered TIFF containing the image and all of the above data.
- A flattened JPEG showing the survey points for use in the alignment process
- A photo of the tripod setup
- Any other supporting evidence deemed relevant to the end user such as a KMZ file of camera locations and other supplementary photography.

2.2 Survey

All of the baseline photographs were taken by a professional architectural photographer. 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 have also been recorded as Ordnance Survey grid and level datum and their accuracy has been checked relative to the fixed camera position. The survey points for each view provide an effective check for ensuring that the 3D model and existing views are accurately merged together.

The following methodology statement has been supplied by Datum Survey Services:

Survey brief We were commissioned to survey and record co-ordinates (Eastings, Northings and AOD Height) of known points of detail located around the study site known as Richmond College, Twickenham. Digital files of the 9 views together with camera point locations were provided by the photographer.

Date of surveys March 2021.

Camera point positioning Network RTK solutions were established using a Leica GPS + GLONASS SmartRover receiver. The equipment was set-up directly over the camera position (survey nail) and multiple observations

were recorded. A second (reference) point was taken approximately 100m away from the camera position using the same method.

Data capture Traditional survey techniques were employed to record the points of detail within each view. A Leica TCRA TS15 Total Station with long range reflector-less distance measurement capabilities was set-up directly over the camera point and orientated to Ordnance Survey National Grid using the two sets of co-ordinates determined by the SmartRover receiver.

Deliverables The completed survey data was issued as follows:

- Excel Spreadsheet comprising point numbers, coordinate data and descriptions
- PDF copies of each photo with point locations and view specific point numbers clearly marked
- AutoCAD DWG file containing 3D survey points with view specific point numbers.

2.3 3D building model

The 3D building model of the proposed development (which is superimposed upon the 'existing' views) was supplied by BPTW. The 3D digital model was located into OS space (the survey used for the camera matching is in this coordinate system) using a combination of OS extracts, local site surveys and the site plans as provided by the architects. Spot height information from the architect's CAD was used to set the model's Z position in metres Above Ordnance Datum (AOD).

2.4 3D landscape

There was no landscape supplied or modeled for these views.

2.5 Camera matching

The verification process confirms the accuracy of the 3D model in relation to each view. The camera matching process involves accurately matching the position of the virtual camera with the real world camera in OS space, and the location of the 3D model of the proposed development within each (existing) view. This is achieved through aligning the imported 3D cloud of survey points within the base photo and 3D environment, creating a virtual camera that replicates the exact position and height of the real world camera to produce an image where the rendered survey points match in visual location those recorded by the survey team and photographer.

The specifications of the lens type relating to each existing view are also entered into 3DS Max to help guide with alignment. An alignment is deemed correct only when all survey points sit exactly over the pixel in the photo that corresponds with the marked-up survey photo. If all points match, the virtual camera must therefore be correctly aligned.

For each view we measure the distance from camera to target and apply respective equations to establish the potential adjustment necessary to compensate for both curvature of the earth and light refraction. Typically, when the real world camera is positioned within 1.5km from the target, the effects of curvature of the earth and light refraction are deemed to be

negligible in terms of their visual impact and therefore no adjustment is made to the Z axis of the building model within the view.

2.6 Lighting and rendering

To accurately light the 3D model, 3DS Max's 'daylight system' is set to replicate the solar time, date and geographic location (longitude and latitude) as recorded in the base photograph. The settings used for each base photograph (F stop, shutter speed etc) are replicated in both this 'daylight system' and the virtual camera set-up. This process mimics the virtual sun so that the lighting falls upon the 3D model as it would in real life at the point when the photograph was captured. Fine tuning is sometimes necessary to better match the resultant lighting and shadows to the base photograph.

Once the camera matching and lighting processes are complete, the render of the 3D model is output to the same pixel resolution as per each respective base photograph.

2.7 Post production

Wireline views These photomontages show the outline of the maximum envelope of built form in accordance with development parameters as a red line for the building (a solid line where visible, a dotted line when obscured by foreground objects).

2.8 Recommended viewing distances

It is recommended that final images are viewed at an optimum viewing distance (in relation to the size of printed photomontage) to give a correct sense of scale. We recommend that images are printed to a size that creates a comfortable viewing distance of between 300 to 500mm. The recommended viewing distance for each image is specified within Section 4.0 of this document.

2.9 Caveats

None.

3.0 Supporting evidence

Ordance survey co-ordinates			
View Ref	Eastings	Northings	AOD Height
4	515635.6199	173761.5868	10.477
6	515555.764	173671.9862	10.5888
7	515605.9097	173544.2298	9.6052
9	515494.1184	173523.3002	10.1504
10	515305.5718	173448.366	10.9301
12	515297.2151	173603.3343	15.2459
13	515253.5611	173783.8524	11.2827
18	515306.3568	173671.1176	15.1437
19	515393.2385	173994.5583	10.4066





3.4 Screen grab of camera location in 3DS Max software



3.5 Screen grab of calculated horizon line



3.6 Screen grab of camera matching to survey data



3.7 Screen grab of model matched to photograph



3.8 Final camera matched photomontage

View 6

3.1 Ordinance survey co-ordinates

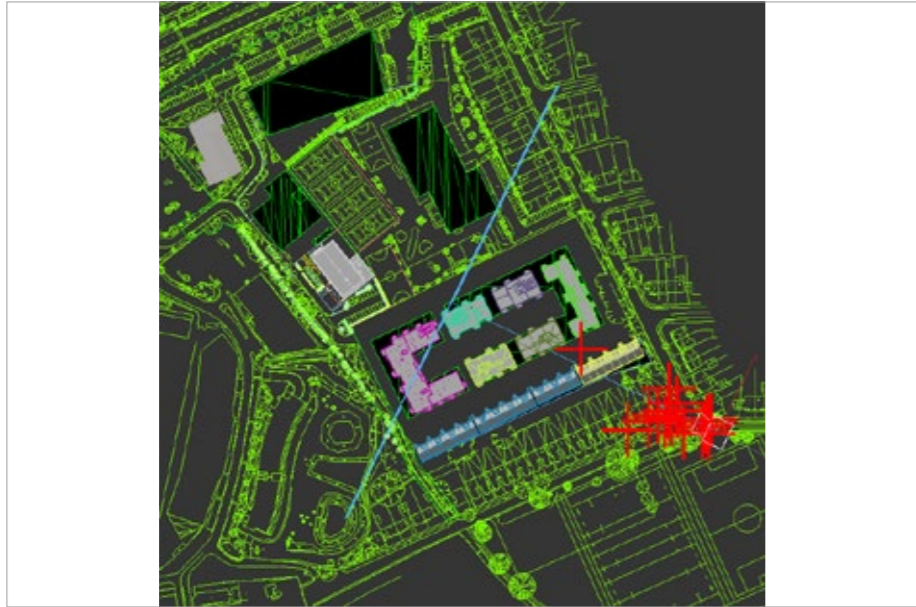
Point Ref	Eastings	Northings	AOD height
601	515532.666	173671.779	12.374
602	515545.153	173672.797	11.456
603	515463.335	173728.479	30.546
604	515527.886	173691.696	10.075
605	515545.111	173672.522	13.187
606	515549.624	173671.418	9.043
607	515550.918	173680.289	9.06
608	515548.905	173679.666	11.389
609	515522.987	173701.519	11.144
610	515528.713	173686.648	9.949
611	515522.814	173686.336	14.519
612	515515.543	173683.045	14.477
613	515508.873	173679.958	14.439
614	515524.1	173681.066	10.202
615	515519.817	173679.377	9.927
616	515495.18	173673.742	11.63
617	515547.543	173676.329	9.086



3.2 OS survey points marked on base photograph

3.3 View 6 camera location

Eastings 515555.764m
 Northings 173671.9862m
 AOD height 10.5888m
 Approx distance to centre of site 165m
 Approx bearing from North 296°



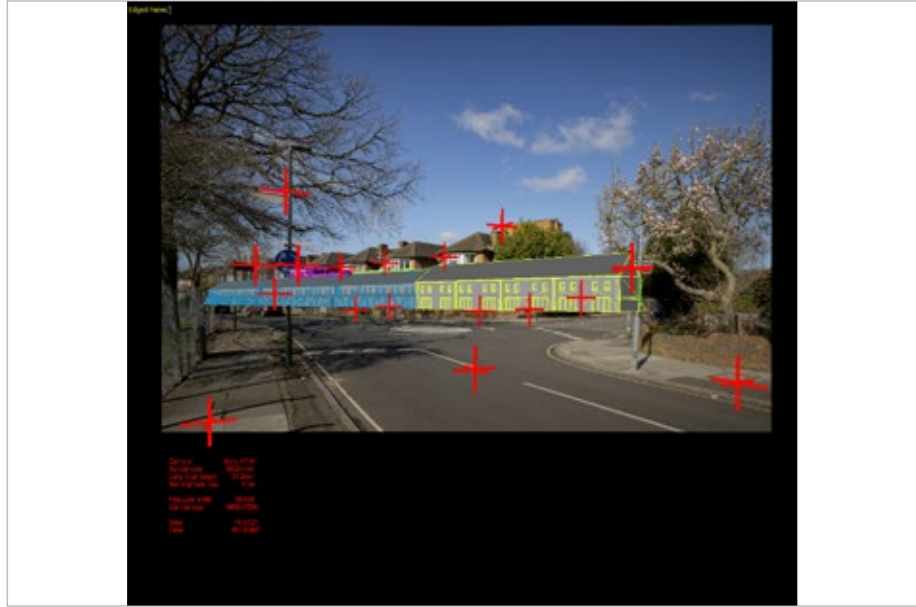
3.4 Screen grab of camera location in 3DS Max software



3.5 Screen grab of calculated horizon line



3.6 Screen grab of camera matching to survey data



3.7 Screen grab of model matched to photograph



3.8 Final camera matched photomontage

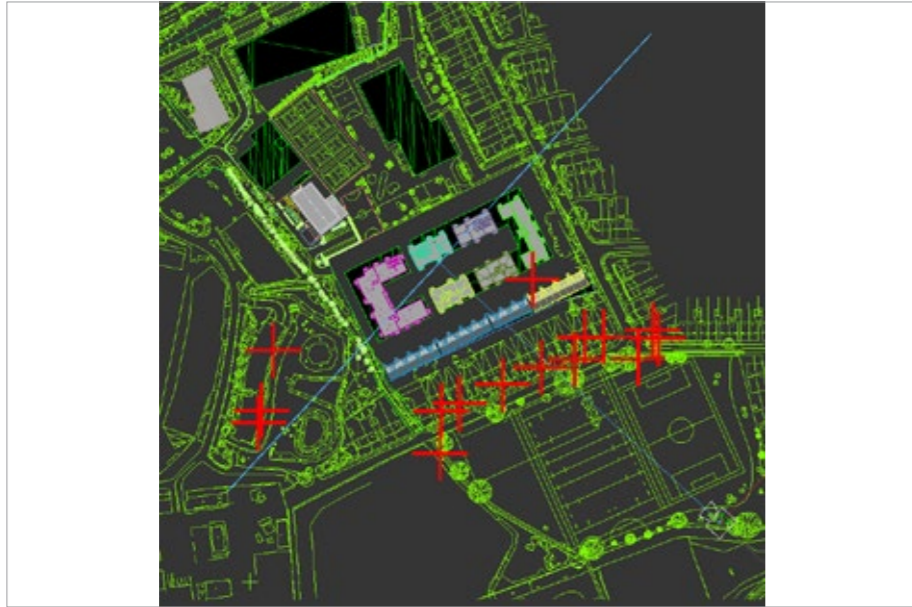
View 7

3.1 Ordinance survey co-ordinates			
Point Ref	Eastings	Northings	AOD height
701	515558.385	173683.696	14.247
702	515554.147	173690.047	17.905
703	515463.337	173728.584	30.528
704	515517.544	173685.039	13.595
705	515503.029	173684.924	13.097
706	515495.316	173668.285	10.443
707	515469.648	173662.206	11.957
708	515440.558	173648.959	14.464
709	515408.188	173634.806	14.574
710	515394.342	173628.955	14.626
711	515267.737	173674.796	21.435
712	515258.788	173629.409	21.71
713	515256.622	173619.983	21.428
714	515393.473	173597.064	11.265
715	515543.093	173668.55	11.413



3.2 OS survey points marked on base photograph

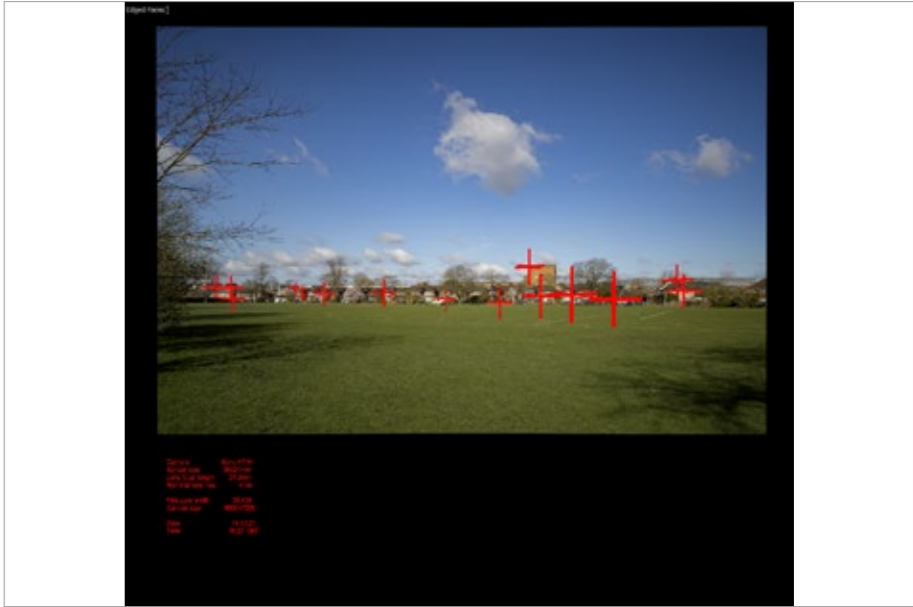
3.3 View 7 camera location
 Eastings 515605.9097m
 Northings 173544.2298m
 AOD height 9.6052m
 Approx distance to centre of site 279m
 Approx bearing from North 313°



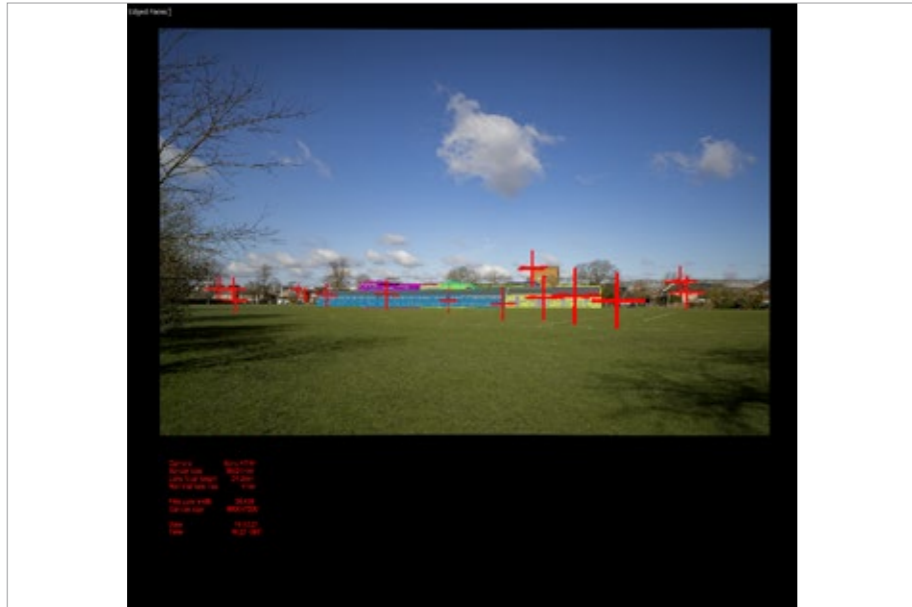
3.4 Screen grab of camera location in 3DS Max software



3.5 Screen grab of calculated horizon line



3.6 Screen grab of camera matching to survey data



3.7 Screen grab of model matched to photograph



3.8 Final camera matched photomontage

View 9

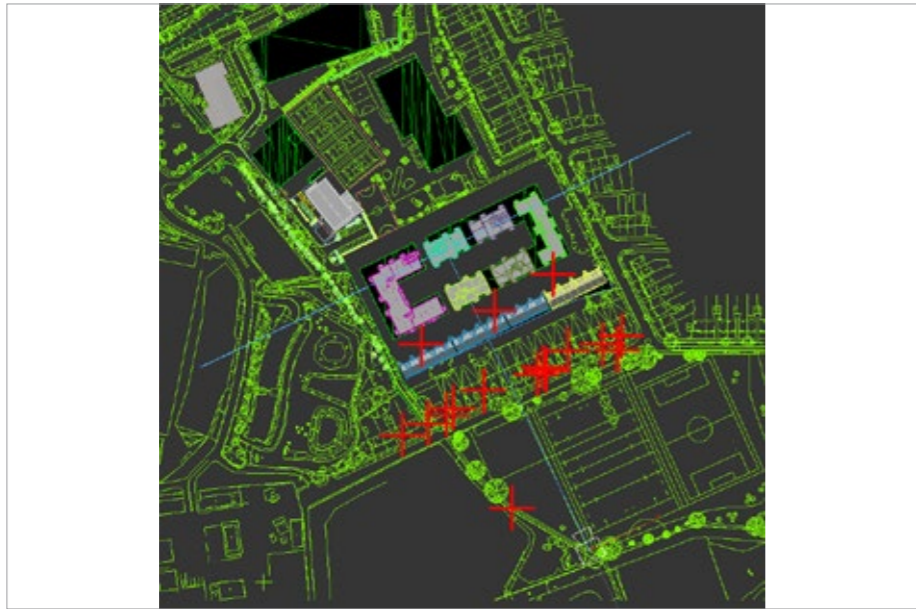
3.1 Ordinance survey co-ordinates			
Point Ref	Eastings	Northings	AOD height
901	515435.623	173555.34	13.961
902	515386.757	173625.577	11.646
903	515367.585	173677.655	18.495
904	515414.426	173642.703	14.516
905	515422.596	173702.937	18.972
906	515454.193	173655.244	11.981
907	515458.989	173660.707	16.804
908	515476.921	173673.092	14.52
909	515466.589	173730.128	25.68
910	515503.262	173677.495	11.987
911	515514.017	173673.572	12.205
912	515517.367	173683.947	14.491
913	515372.85	173618.916	10.776
914	515353.489	173610.148	13.139
915	515391.83	173630.517	17.07
916	515461.233	173658.441	11.867



3.2 OS survey points marked on base photograph

3.3 View 9 camera location

Eastings 515494.1184m
 Northings 173523.3002
 AOD height 10.1504m
 Approx distance to centre of site 233m
 Approx bearing from North 334°



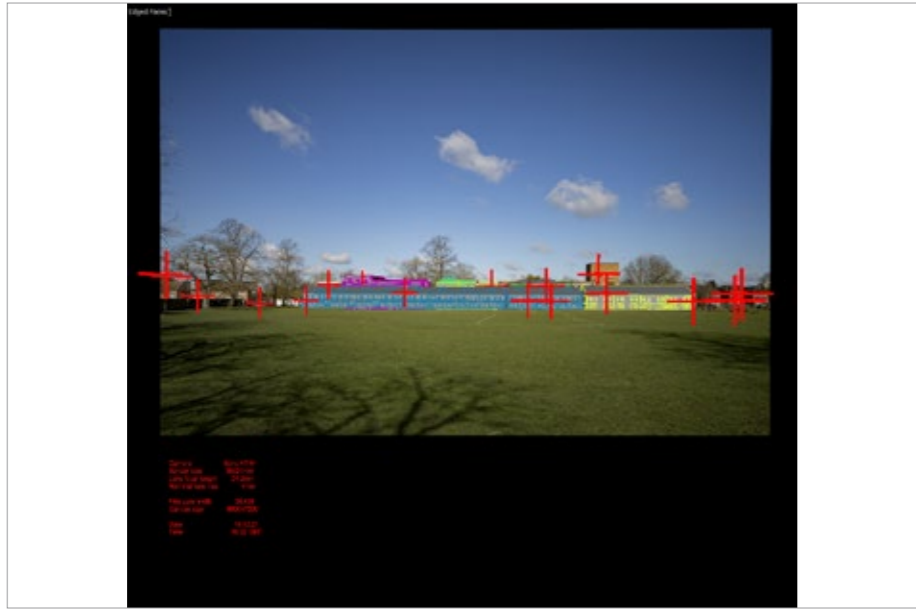
3.4 Screen grab of camera location in 3DS Max software



3.5 Screen grab of calculated horizon line



3.6 Screen grab of camera matching to survey data



3.7 Screen grab of model matched to photograph



3.8 Final camera matched photomontage

View 10

3.1 Ordinance survey co-ordinates			
Point Ref	Eastings	Northings	AOD height
1001	515273.479	173684.776	23.271
1002	515307.536	173578.964	12.755
1003	515333.007	173601.973	14.46
1004	515346	173606.814	14.406
1005	515344.288	173609.193	17.216
1006	515294.4	173573.247	12.955
1007	515366.726	173617.394	13.734
1008	515387.792	173633.52	14.7
1009	515475.656	173734.656	30.563
1010	515403.041	173701.479	22.278
1011	515436.832	173550.216	15.952
1012	515385.744	173578.189	10.888
1013	515595.772	173691.654	18.696
1014	515490.098	173671.518	14.489
1015	515362.8	173579.664	9.753

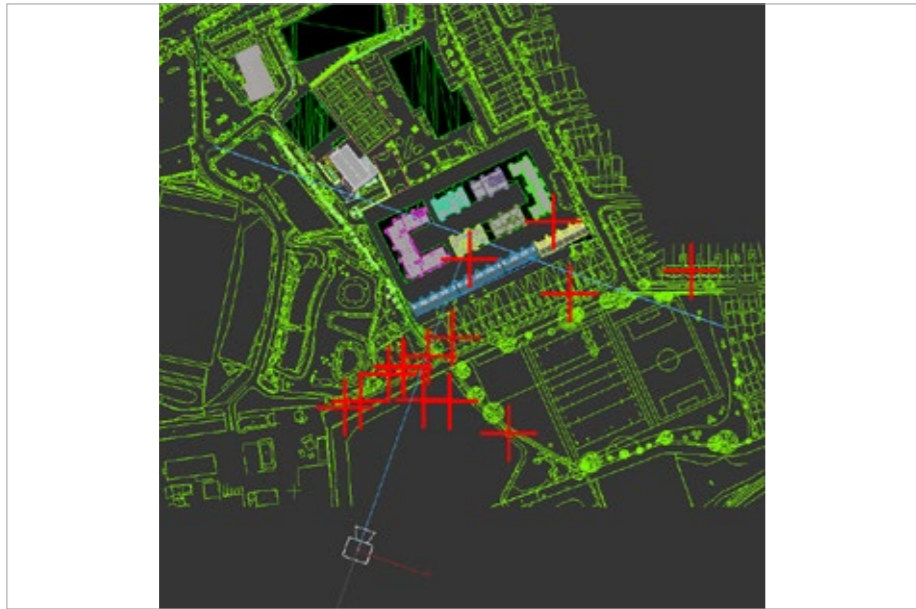


3.2 OS survey points marked on base photograph



3.3 View 10 camera location

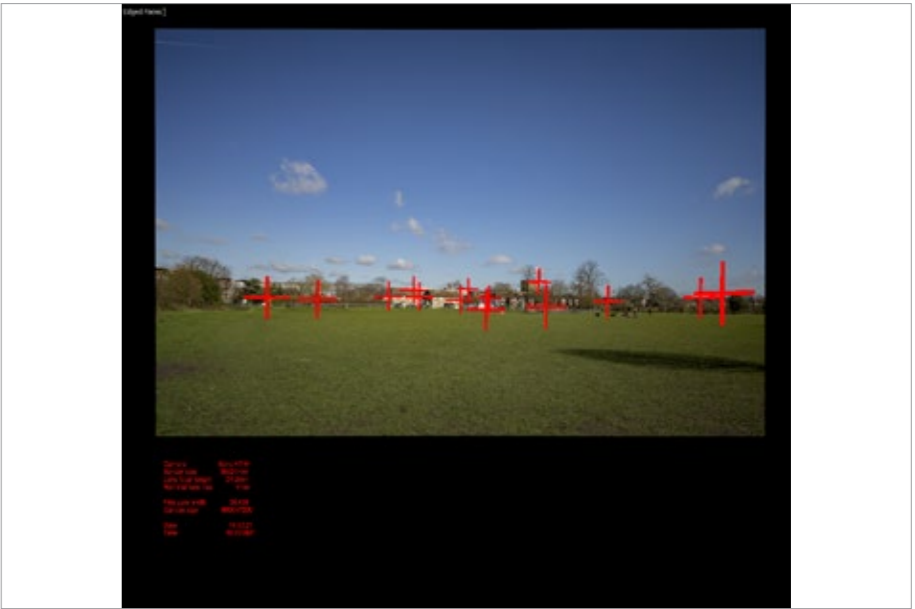
Eastings 515305.5718m
 Northings 173448.366m
 AOD height 10.9301m
 Approx distance to centre of site 307m
 Approx bearing from North 20°



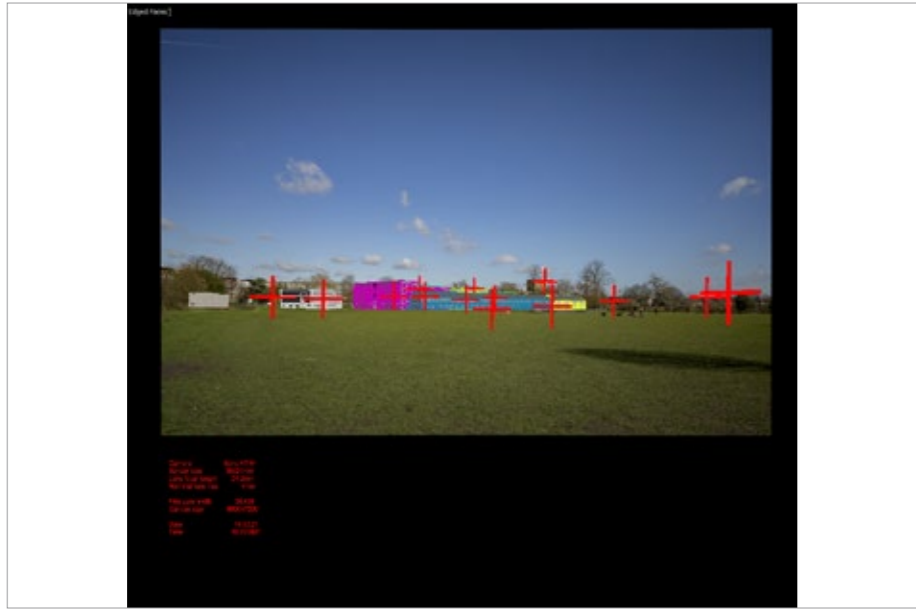
3.4 Screen grab of camera location in 3DS Max software



3.5 Screen grab of calculated horizon line



3.6 Screen grab of camera matching to survey data



3.7 Screen grab of model matched to photograph



3.8 Final camera matched photomontage

View 12

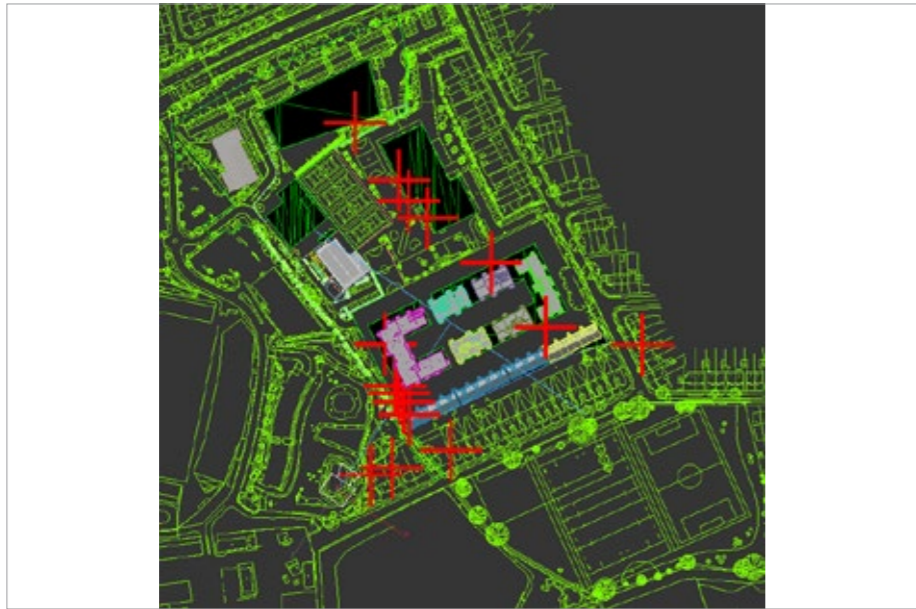
3.1 Ordinance survey co-ordinates			
Point Ref	Eastings	Northings	AOD height
1201	515340.914	173620.755	11.379
1202	515538.32	173718.096	16.908
1203	515461.858	173732.229	28.302
1204	515387.076	173635.05	14.68
1205	515354.467	173662.862	19.013
1206	515346.124	173679.844	18.509
1207	515418.752	173783.025	29.847
1208	515323.79	173615.098	11.775
1209	515311.527	173893.513	20.905
1210	515349.803	173672.619	18.566
1211	515335.544	173718.689	15.308
1212	515353.932	173831.739	21.912
1213	515345.933	173848.142	20.039
1214	515368.727	173818.085	20.038
1215	515343.218	173685.459	20.291



3.2 OS survey points marked on base photograph

3.3 View 12 camera location

Eastings 515297.2151m
 Northings 173603.3343m
 AOD height 15.2459m
 Approx distance to centre of site 173m
 Approx bearing from North 34°



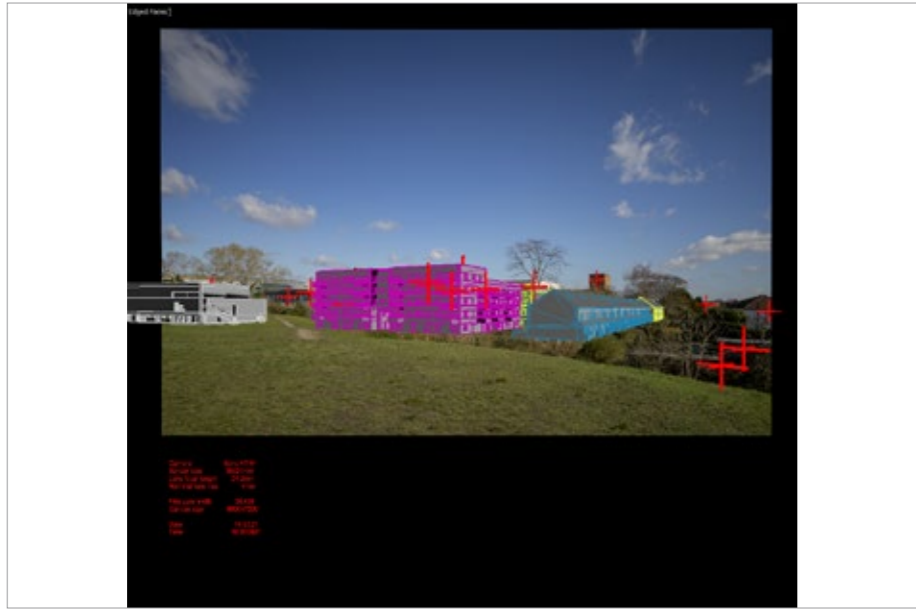
3.4 Screen grab of camera location in 3DS Max software



3.5 Screen grab of calculated horizon line



3.6 Screen grab of camera matching to survey data



3.7 Screen grab of model matched to photograph



3.8 Final camera matched photomontage

View 13

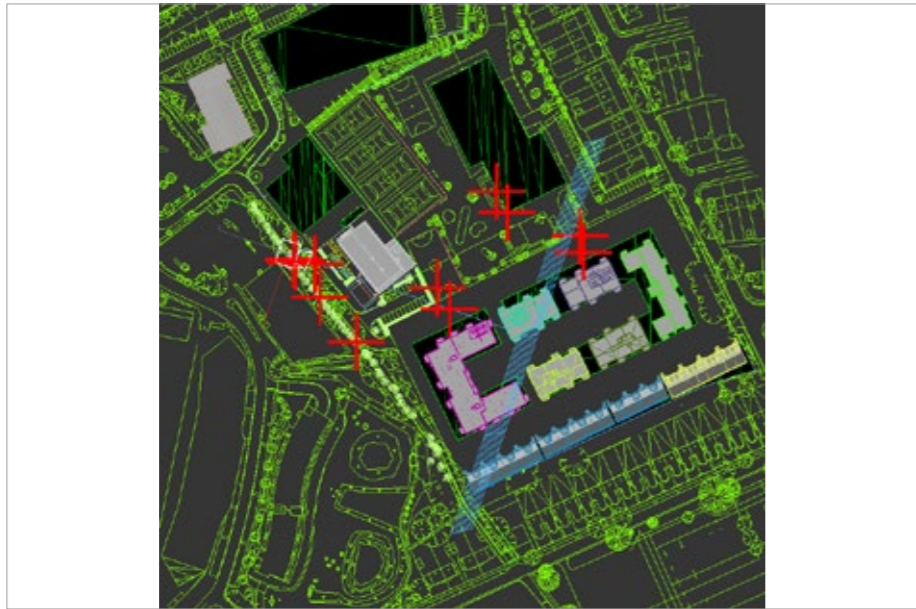
3.1 Ordinance survey co-ordinates			
Point Ref	Eastings	Northings	AOD height
1301	515254.555	173783.737	11.3
1302	515374.354	173806.61	22.002
1303	515257.855	173779.429	13.025
1304	515271.279	173760.089	14.651
1305	515268.509	173778.224	12.358
1306	515291.211	173735.288	14.679
1307	515414.495	173793.657	20.101
1308	515335.745	173765.007	14.019
1309	515256.757	173780.894	11.309
1310	515342.722	173753.396	14.665
1311	515416.341	173784.648	29.852
1312	515368.741	173818.192	20.078



3.2 OS survey points marked on base photograph



3.3 View 13 camera location
 Eastings 515253.5611m
 Northings 173783.8524m
 AOD height 11.2827m
 Approx distance to centre of site 158m
 Approx bearing from North 102°



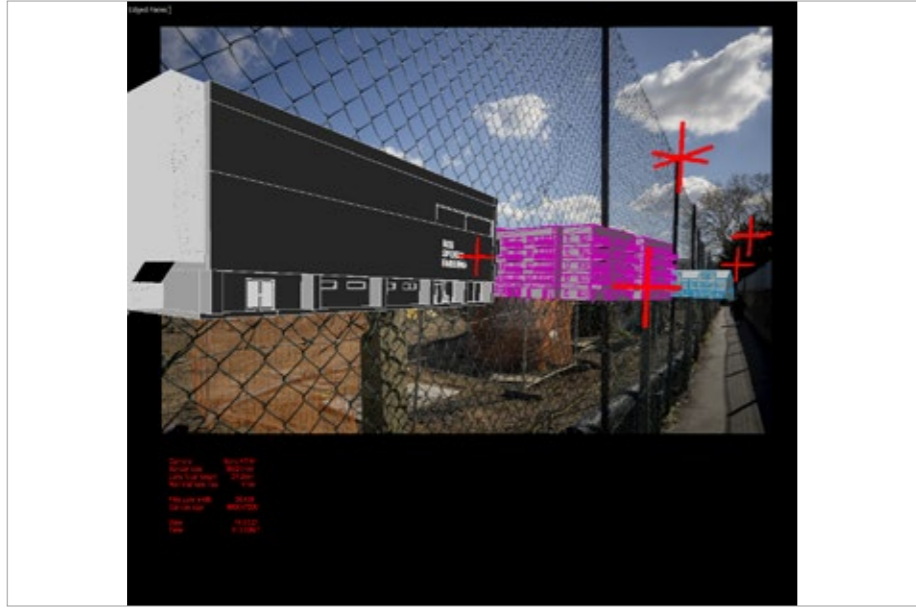
3.4 Screen grab of camera location in 3DS Max software



3.5 Screen grab of calculated horizon line



3.6 Screen grab of camera matching to survey data



3.7 Screen grab of model matched to photograph



3.8 Final camera matched photomontage

View 18

3.1 Ordinance survey co-ordinates

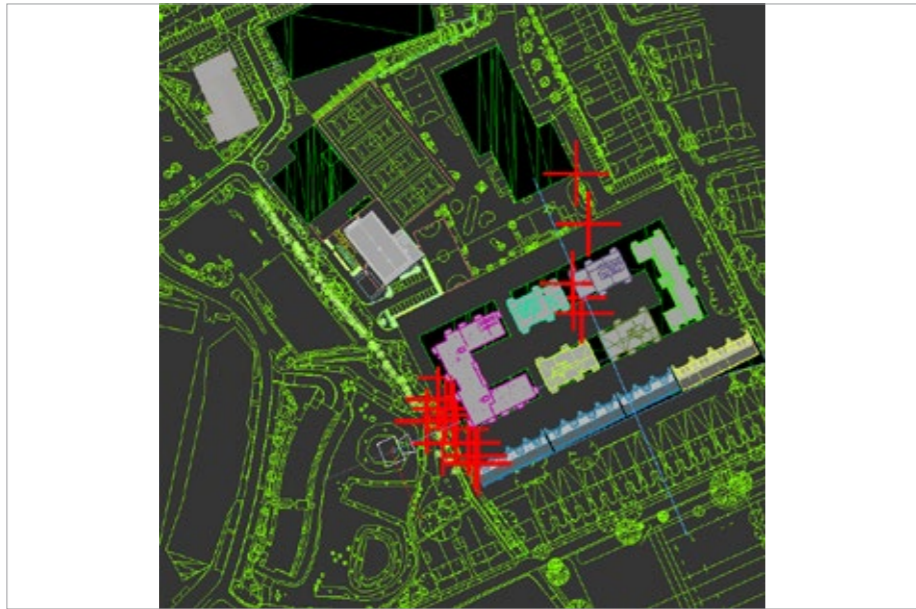
Point Ref	Eastings	Northings	AOD height
1801	515407.034	173822.439	22
1802	515413.679	173795.136	20.114
1803	515404.889	173762.596	21.818
1804	515335.959	173694.568	11.392
1805	515340.504	173691.032	10.611
1806	515410.066	173746.269	19.795
1807	515348.189	173675.89	18.571
1808	515351.694	173668.563	18.517
1809	515353.693	173664.527	18.522
1810	515326.022	173687.5	11.342
1811	515338.914	173711.632	16.21
1812	515332.008	173699.614	12.139
1813	515334.685	173675.496	10.994
1814	515405.885	173754.639	19.613
1815	515341.841	173683.166	10.349



3.2 OS survey points marked on base photograph

3.3 View 18 camera location

Eastings 515306.3568m
 Northings 173671.1176m
 AOD height 15.1437m
 Approx distance to centre of site 120m
 Approx bearing from North 67°



3.4 Screen grab of camera location in 3DS Max software



3.5 Screen grab of calculated horizon line



3.6 Screen grab of camera matching to survey data



3.7 Screen grab of model matched to photograph



3.8 Final camera matched photomontage

View 19

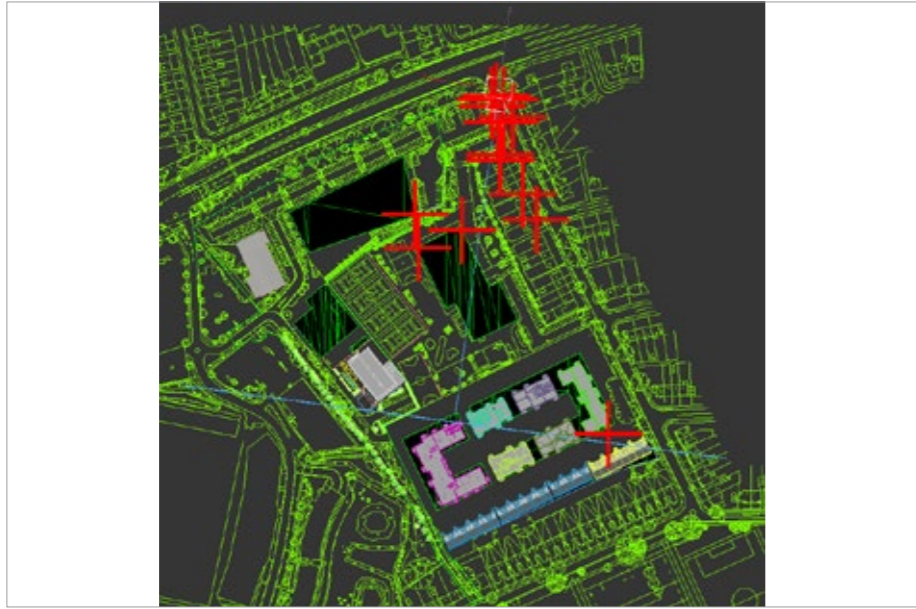
3.1 Ordinance survey co-ordinates			
Point Ref	Eastings	Northings	AOD height
1901	515397.249	173985.855	12.19
1902	515403.308	173973.444	9.53
1903	515391.478	173988.388	8.789
1904	515397.408	173969.328	9.44
1905	515474.341	173737.919	31.201
1906	515421.059	173896.974	15.88
1907	515411.009	173916.099	13.981
1908	515394.008	173944.986	12.297
1909	515394.336	173941.289	17.569
1910	515365.83	173889.227	19.97
1911	515388.019	173981.616	11.986
1912	515333.218	173876.42	19.967
1913	515330.763	173901.38	20.493
1914	515392.445	173969.589	10.741
1915	515387.453	173986.328	8.912



3.2 OS survey points marked on base photograph

3.3 View 19 camera location

Eastings 515393.2385m
 Northings 173994.5583m
 AOD height 10.4066m
 Approx distance to centre of site 256m
 Approx bearing from North 188°



3.4 Screen grab of camera location in 3DS Max software



3.5 Screen grab of calculated horizon line



3.6 Screen grab of camera matching to survey data



3.7 Screen grab of model matched to photograph



3.8 Final camera matched photomontage

4.0 Final verified photomontages

View 4 existing

Single frame image | Focal length 24.2mm | Camera height above survey point 1650mm | Nominal lens rise 4mm | Date 19.03.21 | Time 10:04



View 4 proposed



To achieve the optimum viewing distance of between 300-500mm (as per The Landscape Institute's guidelines), we recommend printing this image edge to edge on A2 landscape and viewing it on site from a distance of 307mm. Please refer to section 2.8 on page 4 of this document for further information.

View 6 existing

Single frame image | Focal length 24.2mm | Camera height above survey point 1650mm | Nominal lens rise 4mm | Date 19.03.21 | Time 10:19



View 6 proposed



To achieve the optimum viewing distance of between 300-500mm (as per The Landscape Institute's guidelines), we recommend printing this image edge to edge on A2 landscape and viewing it on site from a distance of 307mm. Please refer to section 2.8 on page 4 of this document for further information.

View 7 existing

Single frame image | Focal length 24.2mm | Camera height above survey point 1650mm | Nominal lens rise 4mm | Date 19.03.21 | Time 10:27



View 7 proposed



To achieve the optimum viewing distance of between 300-500mm (as per The Landscape Institute's guidelines), we recommend printing this image edge to edge on A2 landscape and viewing it on site from a distance of 307mm. Please refer to section 2.8 on page 4 of this document for further information.

View 9 existing

Single frame image | Focal length 24.2mm | Camera height above survey point 1650mm | Nominal lens rise 4mm | Date 19.03.21 | Time 10:32



View 9 proposed



To achieve the optimum viewing distance of between 300-500mm (as per The Landscape Institute's guidelines), we recommend printing this image edge to edge on A2 landscape and viewing it on site from a distance of 307mm. Please refer to section 2.8 on page 4 of this document for further information.

View 10 existing

Single frame image | Focal length 24.2mm | Camera height above survey point 1650mm | Nominal lens rise 4mm | Date 19.03.21 | Time 10:45



View 10 proposed



To achieve the optimum viewing distance of between 300-500mm (as per The Landscape Institute's guidelines), we recommend printing this image edge to edge on A2 landscape and viewing it on site from a distance of 307mm. Please refer to section 2.8 on page 4 of this document for further information.

View 12 existing

Single frame image | Focal length 24.2mm | Camera height above survey point 1650mm | Nominal lens rise 4mm | Date 19.03.21 | Time 10:56



View 12 proposed



To achieve the optimum viewing distance of between 300-500mm (as per The Landscape Institute's guidelines), we recommend printing this image edge to edge on A2 landscape and viewing it on site from a distance of 307mm. Please refer to section 2.8 on page 4 of this document for further information.

View 13 existing

Single frame image | Focal length 24.2mm | Camera height above survey point 1650mm | Nominal lens rise 4mm | Date 19.03.21 | Time 11:03



View 13 proposed



To achieve the optimum viewing distance of between 300-500mm (as per The Landscape Institute's guidelines), we recommend printing this image edge to edge on A2 landscape and viewing it on site from a distance of 307mm. Please refer to section 2.8 on page 4 of this document for further information.

View 18 existing

Single frame image | Focal length 24.2mm | Camera height above survey point 1650mm | Nominal lens rise 4mm | Date 19.03.21 | Time 12:03



View 18 proposed



To achieve the optimum viewing distance of between 300-500mm (as per The Landscape Institute's guidelines), we recommend printing this image edge to edge on A2 landscape and viewing it on site from a distance of 307

View 19 existing

Single frame image | Focal length 24.2mm | Camera height above survey point 1650mm | Nominal lens rise 4mm | Date 19.03.21 | Time 11:53



View 19 proposed



To achieve the optimum viewing distance of between 300-500mm (as per The Landscape Institute's guidelines), we recommend printing this image edge to edge on A2 landscape and viewing it on site from a distance of 307mm. Please refer to section 2.8 on page 4 of this document for further information.



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