Haweswater Aqueduct Resilience Programme - Proposed Bowland Section

Volume 6

Proposed Ribble Crossing

Appendix 6.6: Photomontage Methodology

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1. Photomontage Methodology

1) A photomontage is the superimposition of a rendered, photorealistic image of the proposals onto a base photograph, to visually represent the scheme. This document provides a description of the methodology proposed for the production of the photomontages.

2) The methodology has been produced to provide transparency of the process to produce photomontages to inform the landscape and visual impact assessment in line with the core guidance document: The Highland Council, July 2016: *Visualisation Standards for Wind Energy Developments*[1] (herein referred to as the Highland Council Guidelines) as supported by other industry guidelines[2].

3) The final figure for each viewpoint comprises a series of sheets to reflect the existing views along with photomontages to reflect the first year of operation of the haulage route in winter. The full list of sheet sets per viewpoint are listed in Section 1.7 below and are summarised as follows:

Viewpoints RC/06 and RC/10

- Sheet 1 – existing panoramic view
- Sheet 2 – proposed panoramic photomontage
- Sheet 3 – proposed single image photomontage (standard 50mm lens camera)
- Sheet 4 – proposed single image photomontage (equivalent to 75mm lens camera).

Viewpoint RC/13 (Left and Right)

- Sheet 1 – existing panoramic view (left)
- Sheet 2 – existing panoramic view (right)
- Sheet 3 – proposed panoramic photomontage (left)
- Sheet 4 – proposed panoramic photomontage (right)
- Sheet 5 – proposed single image photomontage (standard 50mm lens camera) (left)
- Sheet 6 – proposed single image photomontage (standard 50mm lens camera) (right)
- Sheet 7 – proposed single image photomontage (equivalent to 75mm lens camera) (left)
- Sheet 8 – proposed single image photomontage (equivalent to 75mm lens camera) (right).

4) These sets of figures are as prescribed within the Highland Council Guidelines to enable both desk top and site-based viewing, as described in more detail below.

1.1 Viewpoint Location Consultation

5) Viewpoints were chosen to reflect the worst-case changes in views from what were considered the most sensitive receptors. The locations of viewpoints have been selected through consultation with the Landscape Specialist working on behalf of the Local Planning Authorities within the Proposed Bowland Section through a Planning Performance Agreement (PPA). The locations were identified and described via email and telephone correspondence with Steven Brereton of Lancashire County Council (LCC) between 09 February 2021 and 03 March 2021. During this discussion viewpoints were agreed as representative and suitable. The final list of viewpoints were accepted on 18th March 2021.

[1] The Highland Council (2016) *Visualisation Standards for Wind Energy Developments [Online] Available from:* https://www.highland.gov.uk/downloads/file/12880/visualisation_standards_for_wind_energy_developments *[Accessed: 20 July 2020]*

2 The Landscape Institute and Institute of Environmental Management and Assessment (2013) *Guidelines for Landscape and Visual Impact Assessment Third Edition (GLVIA3).*

1.2 Key Assumptions and Limitations

6) Whilst every effort has been made to ensure a suitable level of accuracy is maintained throughout the production of photomontages, no final image is 100% accurate. Therefore, the following assumptions and limitations have been identified at this stage:

- When the need for the Ribble Crossing Haulage Route was recognised the timescales to undertake the photomontages meant that only winter photography was able to be captured from site. This approach was agreed prior to commencement, with the LPA Landscape Specialist during consultation as detailed in Section 1.1 above
- Furthermore, the adoption of visualising a single scenario (winter of the first year of operation) was proposed, based on the assumption that limited mitigation would be required as on completion of the scheme, the haulage route would be removed and the landscape returned to existing. This was agreed with the LPA Landscape Specialist during consultation as detailed above
- Mitigation has been modelled based on the assumption that in operation of the haulage route, only advance hedgerow planting would be undertaken at this stage and all other proposals (replacement tree planting and hedgerow reinstatement along the route) would be undertaken after the removal of the road and earthworks
- It is assumed that on completion of the haulage route construction, all acoustic barrier along West Bradford Road to the north of the northern compound will be removed to allow for a visibility splay for the haulage route junction
- The baseline photographs that form the basis of the photomontage are a flattened 2D representation of what the eye would see (planar projection)
- All design information has been provided in both a 3D and a 2D CAD format and interpreted and modelled following detailed confirmation from United Utilities designers. Section 1.5 below reflects the level of additional modelling and interpretation undertaken to provide a proportionately accurate 3D model rendition of the designs
- Accuracy tolerances for survey and existing site data has been determined based on key information (e.g. Ordnance Survey Digital Terrain Mapping (DTM) data, Light Detection and Radar (LiDAR) data and geomatic survey results from Global Navigation Satellite System (GNSS) and total station techniques) used to provide references for fixing camera perspectives
- It is acknowledged that in certain instances, an accurate reading may not be attainable on site due to remote site locations and / or intervening buildings / structures reducing the ability to receive a suitably strong signal from satellites. Therefore, the camera matching process has required further adjustment to align the 3D model and base imagery. These differences are stated along with the level of deviation from survey within Section 1.4, Table 1 below
- Ordnance Survey 2m contour data used for topography terrain is based on DTM mapping generally considered to be accurate to +/- 2m
- Photographs have been taken at 1.6m above ground which is acknowledged as a departure from the prescribed 1.5m within the Highland Council Guidelines, but still represents the viewing height of a person
- The basis for the single 50 mm (and 75 mm equivalent) focal length photomontages for visual impact assessment focus on the worst-case impact of the scheme proposals in each view for both the Construction Phase and Operational Phase scenarios. Therefore, in certain circumstances the location of this extract may differ between Construction and Operational Phase scenarios as a result of mitigation and residual impacts (see sections 1.6.2 & 1.6.3 below for more details).

1.3 Survey, Photography and Baseline Information

7) Viewpoints were verified on site to maximize views of the scheme and, where possible, avoid any obstructions that limit views. The selected viewpoints are shown on Figure 6.2: Representative Viewpoint

and Photomontage Locations. Winter photographs were taken in March 2021, in clear conditions where even light levels would prevail. At each viewpoint location, the following survey data was collected:

- GPS reference noting the location of the camera in National Grid coordinates as well as the ground elevation
- The height of the camera above ground level
- Direction of the view (compass bearing)
- Date and time the photograph was taken
- Weather conditions at the time of photograph.

8) The baseline photographs were taken using a Canon EOS 5D digital SLR camera with a fixed 50 mm focal length lens set to the maximum resolution, including recording the metadata. All photographs were taken on a tripod mounted and levelled to the vertical and horizontal axes.

9) Camera locations were recorded in winter and summer by a land surveyor using a Global Navigation Satellite System (GNSS) with the location, where possible, noted using additional photography of tripod location to enable ease of retake during the summer visit.

10) The panoramic photography was undertaken using a series of photographs taken in a landscape orientation. with a minimum of 60% (15 o increments) overlap between frames to reduce barrel distortion.

1.4 Existing site 3D modelling, references and 3D camera matching

11) To assist the process of matching the baseline photograph with the 3D model of the proposals, reference points were identified at each viewpoint location. Reference points are features within a photograph that can be identified from Ordnance Survey (OS) and aerial photographical data. Examples include telegraph poles, field boundaries and pylons.

12) The existing site 3D model was produced at a local grid with a common global shift from OS National Grid [-362472.640, -452158.874]. This was produced using information from 2D and 3D OS DTM and LIDAR contour information as converted using Autodesk Civil3D software and exported to Autodesk 3DS Max Design. This model has been used to vertically place reference objects as extracted from the same working Civil3D CAD model.

13) From the baseline panoramic images, single 50 mm focal length images for use in the camera matching process were cropped to match the 4:3 ratio of a 50 mm lens image. These frames were then used as backdrops to the equivalent 50 mm 3D camera within Autodesk 3DS Max Design software.

14) The surveyed locations of the viewpoints were added to the base 3D model (with the global shift applied) via export from Civil3D and used as a starting point for fixing the 3D camera. This was undertaken through matching terrain, reference points and other information in the model to the corresponding features in the background image (the 3D camera backdrop).

15) Following detailed camera matching of photography and reference points, minor adjustments to the location of the 3D camera location were required to accurately fix the 3D environment to the photo. The deviation from surveyed points are summarised in Table 1 below:

Table 1: Survey information and 3D modelling deviations

Viewpoint S=summer W=winter	Surveyed GNSS GPS Coordinates	3D camera match coordinate equivalent	Surveyed GNSS GPS Elevation (m AOD)	3D camera elevation (m AOD plus 1.6m height of camera above ground)	Maximum horizontal deviation (m)
RC/06 (W)	373242.130, 444019.115	373236.938, 444018.614	80.201 m	81.921 m	5.215 m
RC/10 (W)	374467.515, 443972.180	374468.655, 443973.591	61.870 m	63.47 m	1.813 m
RC/13 L&R (W)	374089.813, 443501.812	374086.912, 443507.215	59.003 m	59.864 m	6.133 m

16) Once the correct aspect, orientation and any camera roll was confirmed, checked and recorded above; the locations were locked for use in rendering.

1.5 Construction of the 3D scheme design models

1.5.1 Operation Year 1 3D model

17) The model has been created using 3D and 2D CAD design information supplied by the United Utilities designers for the Ribble Crossing haulage route, road bridge and boundary fencing. The environmental mitigation proposals were also used to model all proposed advance planting with all sizes of proposed planting and associated materials agreed with the Landscape Architect to reflect newly planted hedgerow and tree stock.

18) The final materials and finishes (e.g. concrete, tarmac, fences, planting and grass etc.) were then matched to the relevant models and environment lighting and atmospheric effects set to mirror the conditions as recorded for each viewpoint as closely as possible.

19) All proposed mitigation planting has been modelled to represent trees and hedgerow planting for the first year of the Ribble Crossing haulage route operation as follows :

- Hedgerow: A double staggered row of 450 mm tall x 40 mm diameter shelters at 300 mm centres
- Individual native trees: 2.5 - 3 m tall selected standard trees at each identified location.

1.6 Compilation of Images

20) The following set of images produced for the final output are as prescribed within the Highland Council Guidelines to enable both desk top and site-based viewing. Instructions and health warnings for each set and their use are further described in this section.

1.6.1 Panoramic baseline and photomontage images for landscape context (Figure sheets 1 to 2 or 1 to 4 for RC/13)

Existing baseline view panoramic images

21) Panoramic photographs are presented for the existing baseline view and photomontages for landscape context. These are not be representative of scale and distance (see Section 1.6.3: 75 mm recalibrated photomontages below).

22) The 50 mm lens photographs has been manually stitched together in Adobe Photoshop software to produce a 65.5o wide panoramic image (390 mm x 157.26 mm) to a reflect a 65.5o horizontal x 27o vertical field of view.

23) During this process only minor improvements have been made to the photographs to balance brightness, contrast etc. where necessary. None of the photographs have been distorted.

24) Once all layering and final adjustment to brightness and contrast levels were complete, all landscape context photomontages were resized to 390 mm x 157.26 mm for inserting to scale into AutoCAD to complete the figure sheets.

Panoramic photomontage images

25) Photoshop software has been used to remove features in the baseline photograph that would be removed by the scheme using additional photography undertaken at the same time as the viewpoint photograph. Furthermore, additional layers taken from the base photograph have been used as retained foreground elements which were layered over the top of the rendered layers.

26) The fixed 3D cameras have been used to render the Proposed Bowland Section from 3DS Max as an image file. This was then imported into Adobe Photoshop as a layer over the existing panoramic image.

27) Once all layering and final adjustment to brightness and contrast levels were complete, all landscape context photomontages were be resized to 390 mm x 157.26 mm for inserting to scale into AutoCAD to complete the figure sheets 3 and 4.

1.6.2 Single 50 mm focal length images for visual impact assessment (Figure sheet 3 or 5&6 for RC/13)

28) The panoramic photomontage images were used as the basis for the single 50 mm focal length photomontages for visual impact assessment, which reflect the central section of the view focused on the main impact of the scheme proposals. This process has been undertaken for both the Construction Phase and Operational Phase scenarios.

29) The 50 mm single frame extract has been cropped from the panoramic photomontage image (235.89 mm x 157.26 mm) and then resized to 390 mm x 260 mm for inserting to scale into AutoCAD to complete the figure.

1.6.3 Single 75 mm focal length photomontages for visual impact assessment (Figure sheet 4 (or 7&8 for RC13)

30) The final 50 mm photomontage was imported into a recalibration template in Photoshop (see Illustration 1 below), whereby the "zone of permissible offset" has been used as a guide to crop out the 75 mm focal length equivalent image (260 mm x 174 mm). A verification template is provided (see Appendix A – Verification Template) for verification of image sizes.

31) The recalibrated image has then been resized to 390 mm x 260 mm (300 ppc) for insertion into the A3 AutoCAD frames.

Illustration 1: 75 mm recalibration template illustration

1.7 Final output summary

32) The following A3 figure set is provided for each viewpoint. All survey information as well as other important information is provided on figure sheets:

Viewpoints RC/06 and RC10

- Sheet 1 – EXISTING VIEW – WINTER 2021
- Sheet 2 – OPERATIONAL YEAR 1 PHOTOMONTAGE
- Sheet 3 – OPERATIONAL YEAR 1 50 mm PHOTOMONTAGE
- Sheet 4 – OPERATIONAL YEAR 1 75 mm PHOTOMONTAGE

Viewpoint RC/13 (Left and Right)

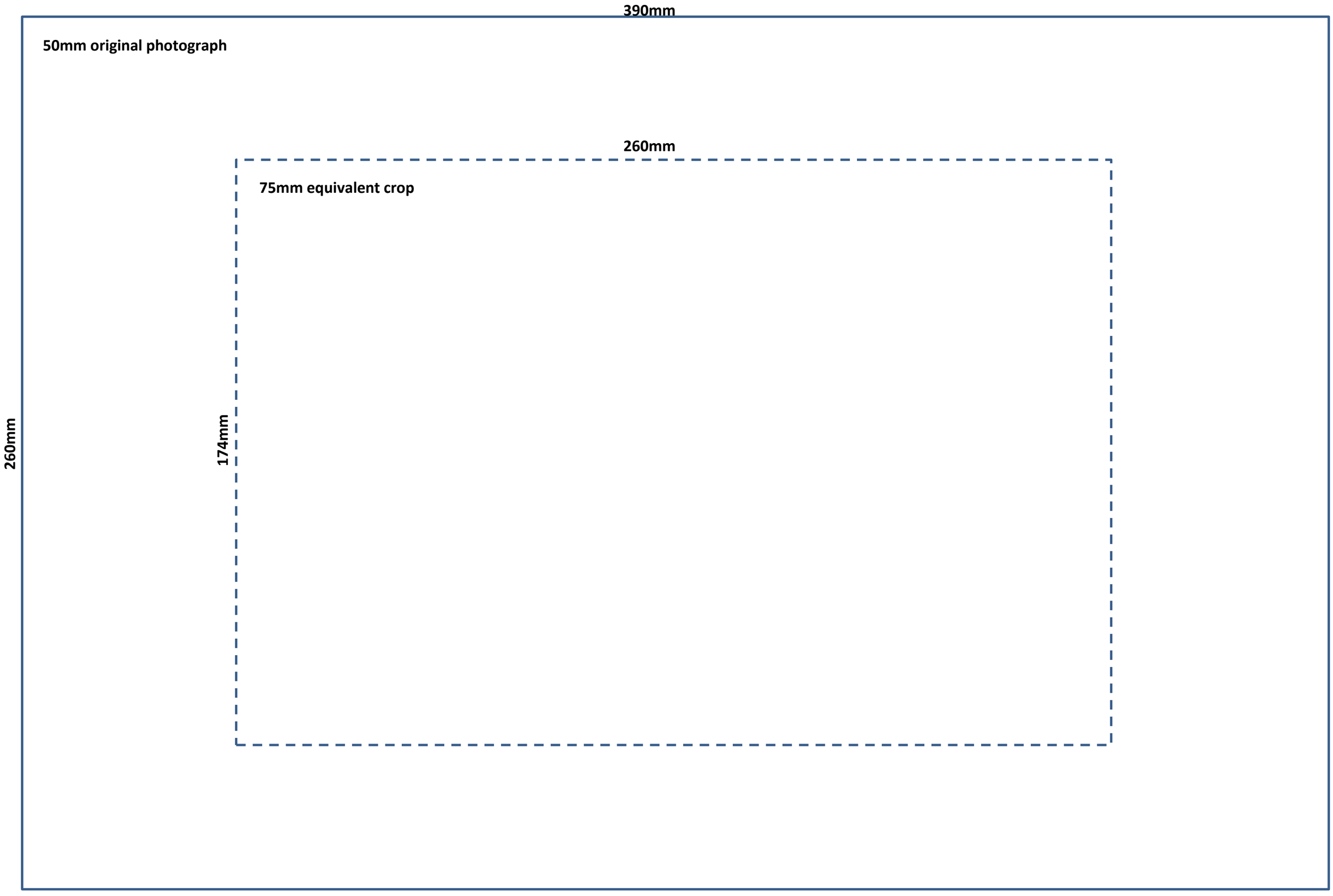
- Sheet 1 – EXISTING VIEW (LEFT) – WINTER 2021
- Sheet 2 – EXISTING VIEW (RIGHT) – WINTER 2021
- Sheet 3 – OPERATIONAL YEAR 1 PHOTOMONTAGE (LEFT)
- Sheet 4 – OPERATIONAL YEAR 1 PHOTOMONTAGE (RIGHT)
- Sheet 5 – OPERATIONAL YEAR 1 50 mm PHOTOMONTAGE (LEFT)
- Sheet 6 – OPERATIONAL YEAR 1 50 mm PHOTOMONTAGE (RIGHT)
- Sheet 7 – OPERATIONAL YEAR 1 75 mm PHOTOMONTAGE (LEFT)
- Sheet 8 – OPERATIONAL YEAR 1 75 mm PHOTOMONTAGE (RIGHT)

33) The final display of the finished photomontage figures should be printed at high resolution on a good quality printer. Custom margins of 3 mm to all edges of A3 paper (reduced from 5 mm) will be required on some printers to allow full print at a 1:1 ratio.

34) The recalibrated 75 mm photomontage sheets of the figure sheet set will be representative of scale and distance if viewed on site at a comfortable arm's length (approx. 500 mm) – see Illustration2 below.

Illustration 2: Illustration of site use of 75 mm recalibrated photomontage.

Appendix A. Verification Template



Verification template