

Accurate Visual Representation (AVR) Method Statement



CONSTRUCT MEDIA

London | Bath | Cape Town

Construct Media Ltd. Registered in England, No. 13013391

Contents

1. Introduction
 - 1.1. Methodology overview
 - 1.2. Viewpoint Selection
2. Photography
 - 2.1. Digital Photography
 - 2.2. Lenses
 - 2.3. Digital Camera
 - 2.4. Position, date and time recording
3. GPS Survey
 - 3.1. Survey
4. Model
 - 4.1. Constructing the 3D Model
 - 4.2. 3D model positioning
5. Camera Matching
 - 5.1. Camera matching process
6. Image production
7. Final Product

1. Introduction

1.1. Methodology Overview

Construct Media are specialist architectural visualisers, producing Accurate Visual Representations (AVRs). These are visualisations that can be used during the planning process to assist in the assessment of the visual effects of proposals from designated viewpoints.

The images are used to explain the location and massing of a proposal as well as properties such as the materiality or degree of visibility from nearby locations.

AVR images are dimensionally accurate representations of proposals accompanied by a method statement. This statement is provided so that the imagery is verifiable by a third party.

Brief Process Overview

1	Selection of required viewpoint through a process of consultation giving regard to relevant planning guidance
2	Photography of required view's ensuring the precise location of the camera and date and time is recorded.
3	The views are then surveyed using the information recorded at the time of the sourcing the photography and also reference points within the photography.
4	Using these points, the appropriate parameters can be calculated to permit a view of the computer model to be generated which exactly overlays the photograph.
5	The Computer model is appropriately lit and textured to allow for a qualitative assessment of the proposed scheme

*For more information about AVR's please visit the Appendix C of the London View Management Framework: Supplementary Planning Guidance (July 2007).

Construct Media offer 4 levels of rendering for AVR images, this is agreed upon by all parties prior to works commencing. The industry standards, for the varying level of detail described in AVR imagery are as follows:

AVR Level 0	Location, size and degree of visibility.
AVR Level 1	Location, size, degree of visibility and architectural form (as a simply shaded render in a uniform opaque material).
AVR Level 2	Location, size, degree of visibility, solid architectural form, no materials
AVR Level 3	Location, size, degree of visibility, architectural form, realistic materiality and accurately simulated lighting.



AVR Level 0



AVR Level 1



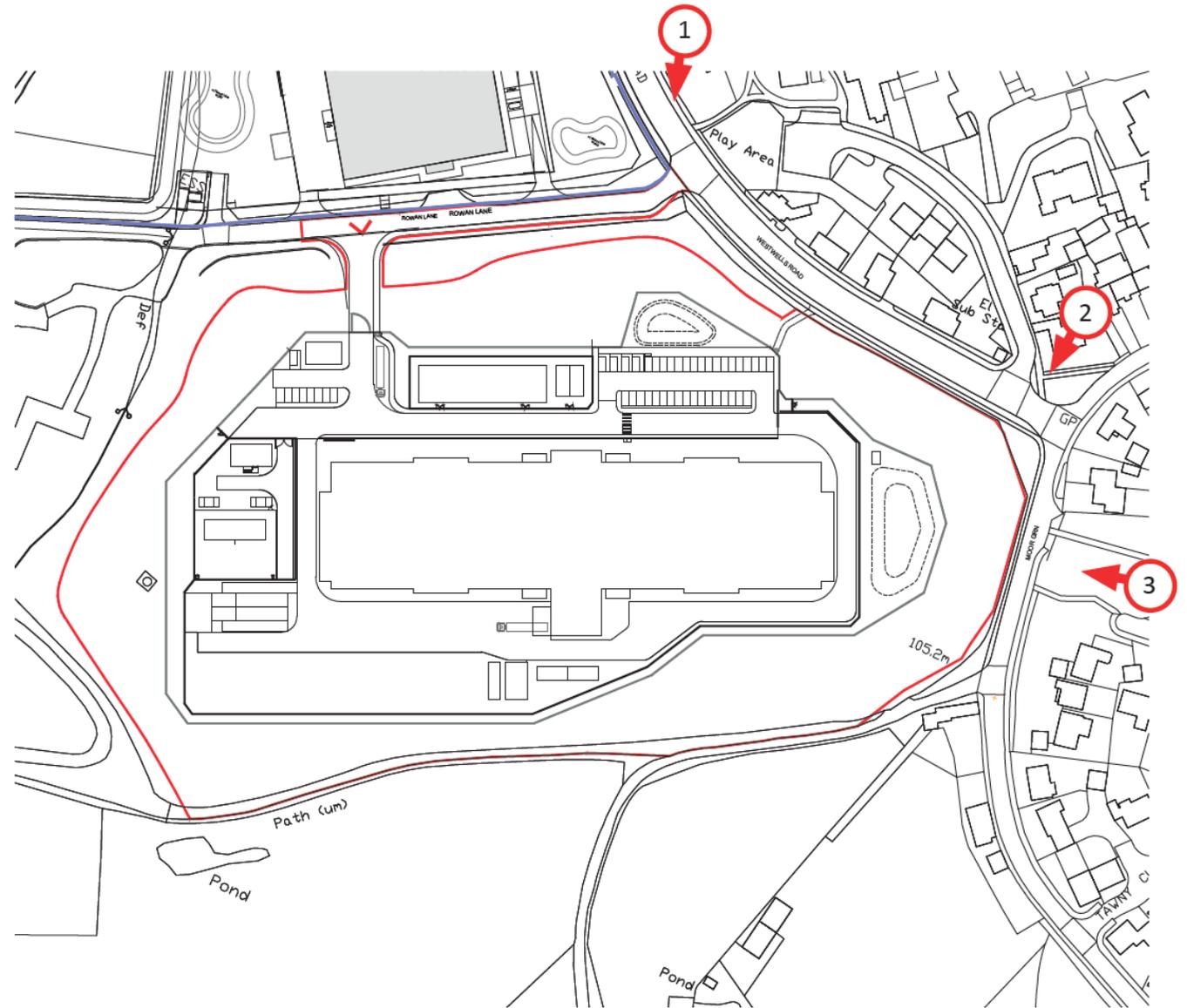
AVR Level 2



AVR Level 3

1.2. Viewpoint Selection

Each viewpoint has been selected by the townscape and heritage consultant. This information usually consists of a photograph from the viewpoint and an Ordnance Survey map showing the approximate location of each selected viewpoint.



1. Predefined viewpoint locations.

2. Photography

2.1. Viewpoint Photography

A series of photographs are taken at each of the predefined locations. For each shot the camera was positioned at a height of 1.60/1.65 metres above the ground level which closely approximates the human eye altitude. The centre point of the tripod is marked on the ground, with either a survey nail or paint marker. A digital photograph is taken showing the tripod setup to allow the surveyors to return to the exact same location.

A sliding mount is used to ensure that the camera sensor is directly over the centre point, this also stops any parallax from occurring if/when panoramic photographs are taken and stitched together. Typically, AVR images are composed with a horizontal camera to avoid converging verticals. For this to be accurate the photographer levels the camera using a mechanical levelling device.

- Note that a small amount of tilt, roll, and lens distortion is nearly always present in a photograph, due to the practical limitations of the levelling devices used to align the camera in the field and the type of lens used.

2.2. Digital Camera, Lenses and Equipment

Camera	Canon EOS 5DS R
Lenses	TS-E17mm f/4L
Tripod	Giottos carbon fibre MTL8271B with Manfrotto 410 Junior Geared Head
Software	Adobe Photoshop CC 2019 Adobe Lightroom Classic CC DxO Optics Pro 10

2.3. Position, date and time recording



3. Camera position and survey reference point.



4. Resulting Photograph.

3. GPS Survey

3.1. Survey

Professional Land Surveys Ltd (PLS) are contracted to provide the necessary survey data information related to Ordnance Survey Grid and Datum.

The survey is co-ordinated onto the Ordnance Survey (OS) National Grid (OSTN15) by using the Global Navigation Satellite System (GNSS) or more commonly known as 'GPS' equipment. The Ordnance Survey National Grid is normally used as it 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.

PLS uses a baseline consisting of two semi-permanent GPS coordinated control stations. These stations are located approximately 100 metres apart where possible and occupied by GPS. This method of GPS SmartRover occupation 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 established GPS baseline is used to orientate the total station which is then used to collect / observe the required 3D survey data. One control station GPS coordinate is held during processing and a bearing calculated between the two GPS coordinates. The points on each building as marked up on the background plate are surveyed using conventional survey techniques utilising a total station and obtaining non-contact distances using reflectorless laser technology. There are two methods used to fix the building details, namely polar observations and intersection observations. The position of the total station is fixed by the rover as described above. In certain circumstances, if the viewpoint is in a position where GPS data cannot be received (i.e. near tall buildings or under tree canopies) the surveyors may need to position a GPS baseline some distance away where there is GPS coverage and traverse to the required survey location with the total station, transferring the OS coordinates in the process.

All data collected on site by GPS and total station is then post-processed in the office using specialist survey software (N4ce). All necessary calculations and adjustments are made in this software and final OS coordinates are produced for all surveyed features.



 Professional Land Surveys Ltd.	Spring Park, Corsham
	Dates of survey: 26/06/23
	Surveyor: M.McGarragh
	Company: Professional Land Surveys Ltd

Co-ordinate List - View 3

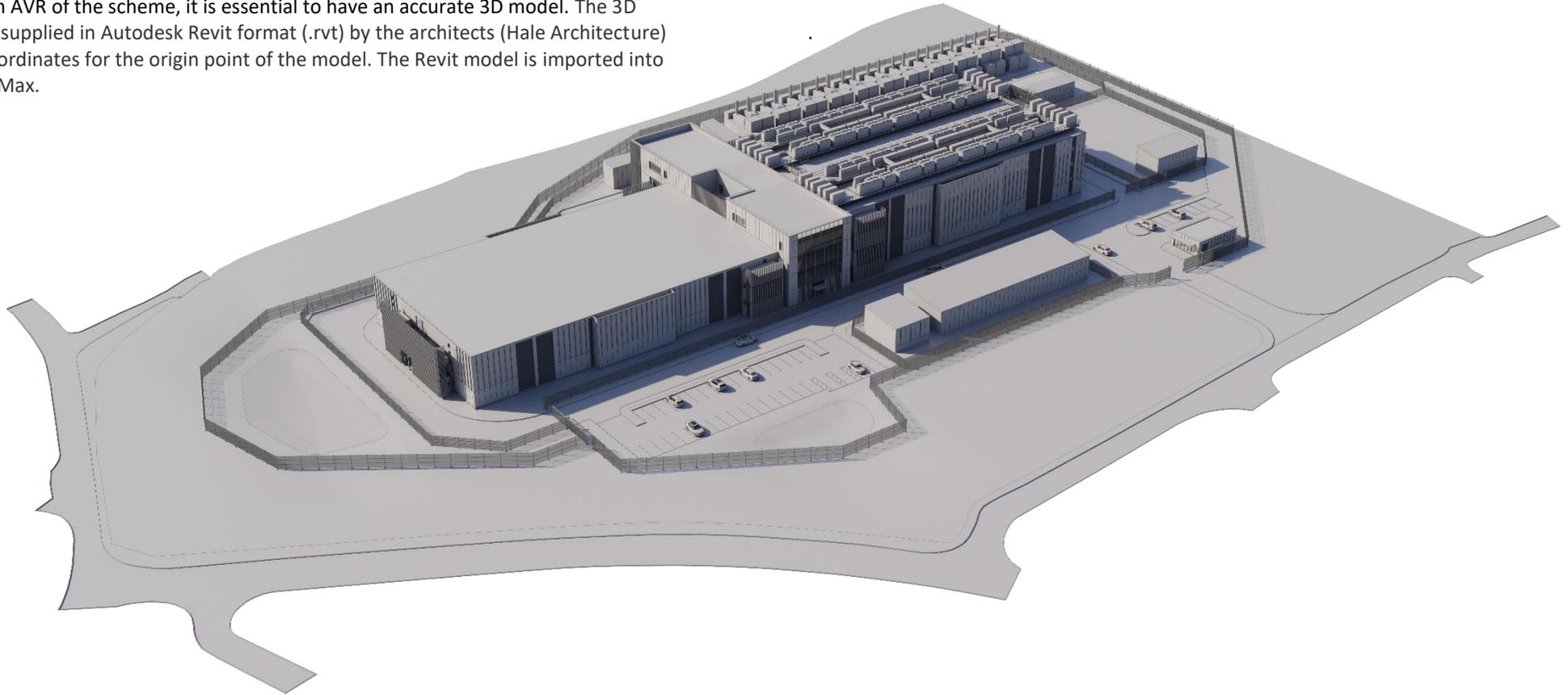
POINT ID	EASTING	NORTHING	LEVEL	ACCURACY	COMMENTS
CAMV3	385427.675	168819.083	105.268	A	Camera Position
305	385417.502	168814.845	106.241	B	Context Point
306	385417.495	168813.595	106.607	B	Context Point
307	385423.49	168818.316	105.291	B	Context Point
308	385421.286	168817.661	105.311	B	Context Point
309	385407.919	168812.724	105.25	B	Context Point
310	385417.87	168815.472	105.779	B	Context Point
311	385417.687	168817.584	105.77	B	Context Point
312	385413.971	168815.692	105.111	B	Context Point
313	385417.582	168820.106	105.55	B	Context Point
314	385418.052	168813.709	105.615	B	Context Point
315	385258.302	168814.349	114.535	D	Context Point
316	385417.437	168823.289	105.55	B	Context Point
317	385420.159	168823.465	109.306	B	Context Point
318	385420.206	168823.339	105.159	B	Context Point

5. Surveyed information supplied by **Professional Land Surveys Ltd** .

4. Model

4.1. Building the 3D Model

To produce an AVR of the scheme, it is essential to have an accurate 3D model. The 3D CAD model is supplied in Autodesk Revit format (.rvt) by the architects (Hale Architecture) along with coordinates for the origin point of the model. The Revit model is imported into Autodesk 3D Max.



6. 3d Revit Model imported in Autodesk 3D Max.

4.2. 3D model positioning

Once the building has been positioned in 3ds Max confirmation of height and position is requested from the architect. Two clear reference points are agreed and used to confirm the site plan and Ordnance Survey. The height is cross checked against the architect's section and given in metres Above Ordnance Survey Datum (AOD). The proposed ground floor FFL of the data centre of +106.650 is set by Hale Architecture.

5. Camera Matching

5.1. Camera matching process

This process is designed to ensure that the 3D computer generated model sits accurately relative to the photograph. This part of the process is technical and quantitative in nature and is therefore objectively verifiable. The virtual camera's *position, direction, angle of view and focal point* within the 3D computer space accurately recreates the equivalent real-world parameters on the day of the photographic shoot. As all these positions are relative to the proposed 3D model of the scheme, a rendered image can be created and accurately superimposed over the digital photograph

Process steps

1	The completed and positioned 3D model is opened within the 3D software
2	The photographic image is placed within the 3D software as a background plate within the software's viewport.
3	The original aspect ratio from the photograph is applied to the 3D software output ratio.
4	All GPS co-ordinate points from the surveyor are added into the 3D software virtual space as point positions. These are input as X axis, Y axis and Z axis co-ordinates.
5	A virtual camera is added correspondingly using the surveyed GPS co-ordinate data.
6	The photographic information (focal length, depth of view and film gate) is entered into the virtual camera's parameters
7	The virtual camera's target is adjusted to align the virtual 3d co-ordinate points to equivalent surveyed points on the background photographic image.
8	The result is a synchronised virtual space where the 3d co-ordinate points match to the actual GPS co-ordinate points depicted on the photograph.



7. GPS points from Surveyor are added to the scene as helpers (red crosses). The viewpoint position (camera) in the 3d software package is adjusted and aligned as all the data points line up with the relevant position points against the photograph.



8. The 3D model of the new building is aligned with the photograph.

6. Image production

6.1. Rendering of 3D model

6.1.1. Rendering

Rendering is a technical term for the computer graphic process of converting a 3D wireframe model into a 2D output image.

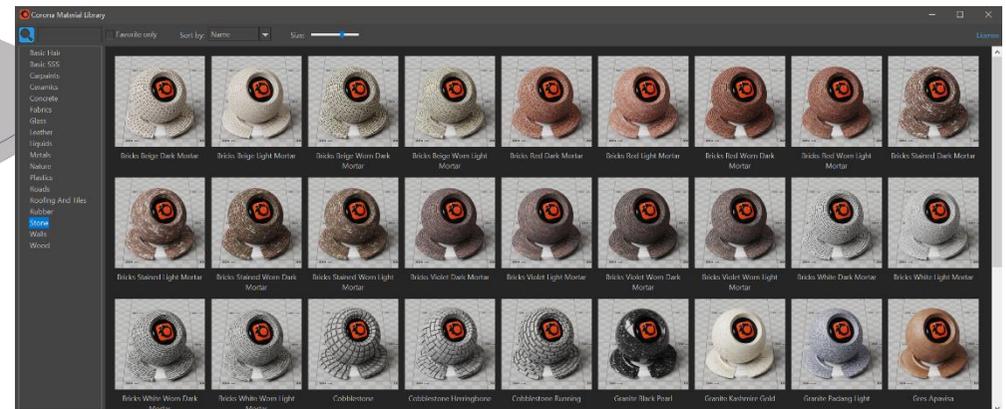
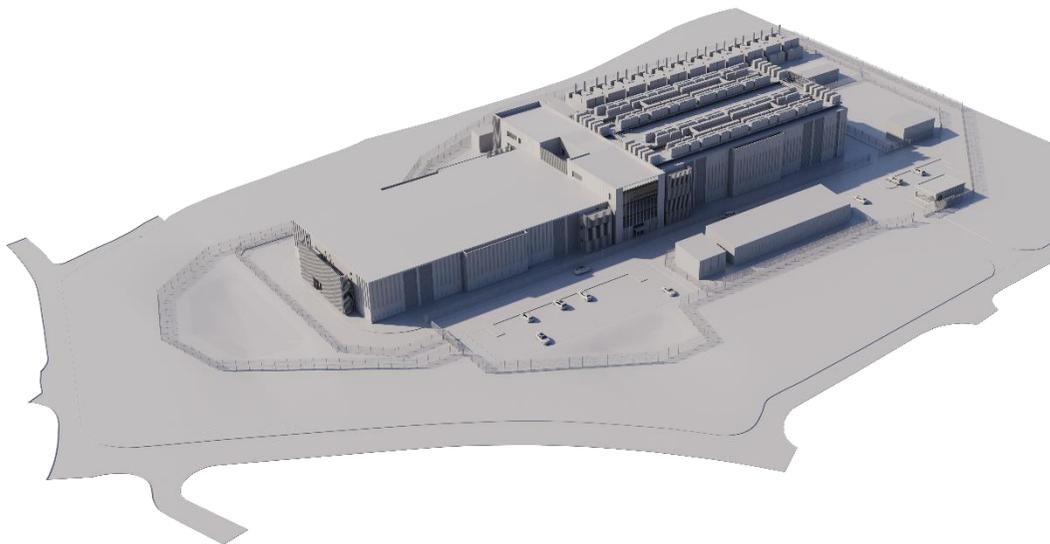
6.1.2. Lighting

For each viewpoint a global lighting system was used to simulate accurate sunlight, ambient light and shadow details at the time the source photograph was taken.

6.1.3. Material Texturing

For the level 3 AVR, the output image needs to be a photo-realistic impression of the proposed scheme. The application of realistic textures and materials to the wireframe 3D model transforms the white box model into a realistic model.

A full material specification was provided by Hale Architecture. The specification of materials is matched to 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.



10.

Lighting system is added to the 3D model to accurately simulate the source photography.

11.

Materials selected and assigned to the 3D model as per specification.

6.1.4. Resulting Render

By creating high resolution renderings of the detailed 3D model, using the coordinated camera locations, approximated lighting scenario and material specification, the operator prepared an image of the building that was indicative of its likely appearance when viewed under the conditions of the photograph. This rendering was combined with the background and foreground components of the source image to create the final study images.



12. Rendered 3D model of new scheme.

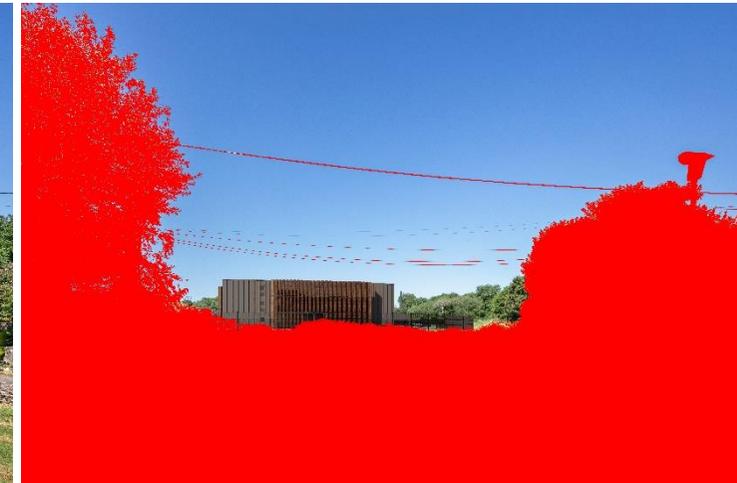
6.2. Photo Composition.



13. Original photograph.



14. Photograph with overlaid render.



15. Foreground of photograph masked in red.

7. Final resulting image

