View 30 | proposed

Overview / Background

Each of the views in this study has been prepared as an Accurate Visual Representation (AVR). LVMF SPG (March 2012) defines an AVR as:

"An AVR is a static or moving image which shows the location of a proposed development as accurately as possible; it may also illustrate the degree to which the development will be visible, its detailed form or the proposed use of materials. An AVR must be prepared following a well defined and verifiable procedure and can therefore be relied upon by assessors to represent fairly the selected visual properties of a proposed development. AVRs are produced by accurately combining images of the proposed building (typically created from a three-dimensional computer model) with a representation of its context; this usually being a photograph, a video sequence, or an image created from a second computer model built from survey data. AVRs can be presented in a number of different ways, as either still or moving images, in a variety of digital or printed formats."

In preparing AVRs of this type certain several key attributes need to be determined, including:

- The Field of View
- The representation of the Proposed Development
- Documentation accompanying the AVR

An AVR is broadly classified in terms of the visual properties it represents. This classification is a cumulative scale in which each level incorporates all the properties of the previous level

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

In practice the majority of photography based AVRs are either AVR 3 (commonly referred to as "fully rendered" or "photo real") or AVR 0 or 1 (commonly referred to as "wire-line").

The purpose of a Level 3 AVR is to represent the likely appearance of the Proposed Development under the lighting conditions found in the photograph.

The purpose of a wire-line view is to accurately indicate the location and size and for AVR 1 the degree of visibility of the Proposed Development in the context of the existing photograph. In AVR 0 and AVR 1, each scheme is represented by a single line profile, sometimes with key edges lines to help understand the massing. The width of the profile line is selected to ensure that the diagram is clear, and is always drawn inside the true profile. The colour of the line is selected to contrast with the background. Different coloured lines may be used in order to distinguish between proposed and consented status, or between different schemes.

Field of View and Field of View Selection

The term 'Field Of View' (FOV) or Horizontal Field of View (HFOV) or Angle of View, refers to the horizontal angle of view in degrees visible in an image or a photograph. Using (HFOV) facilitates comparison between photographs taken with different lens types/sizes. It also allows the comparison between computer renderings and photographic images.

Choice of Camera Lens

The choice of which lens to use - telephoto, standard or wide-angle lens - which will determine the Field of View, is made on the basis of the requirements for assessment and this will vary from view to view. In the simple case the lens selection will be that which provides a comfortable Viewing Distance. This would normally entail the use of what is referred to as a "standard" or "normal" lens, which in practice means the use of a lens with a 35mm equivalent focal length of between about 40 and 58 mm. For close up views, a 24mm lens can be used to allow us to capture sufficient context.

Appendix C of the LVM Framework: Supplementary Planning Guidance (March 2012) states that:

'*Creators and users of AVRs need to be aware of issues that arise from the inevitable approximations between the rich human perception of the environment and the relatively low resolution, generally static media used to represent buildings in their context. Many of these limitations are shared with photography and cinematography and arise from the need to approximate the three-dimensional environment that surrounds the viewer using the flat rectangle of a perspective drawing, photograph or screen. As we experience a scene, our perception is built from a sophisticated visual process that allows us to focus onto individual areas with remarkable clarity whilst remaining aware of a wider overall context. When recording a scene as a photograph or video sequence much more finite decisions must be taken to depict a specific area of interest. In selecting this area of interest, a choice must therefore be made between showing the detail of the proposal in the greatest clarity and placing it into a meaningful context.*'

Framing the view / Area of interest

Typically AVRs are composed with the camera looking horizontally i.e. with a horizontal Optical Axis. This is in order to avoid converging verticals which, although perspectively correct, appear to many viewers as unnatural in print form. The camera is levelled using either a mechanical levelling devices or traditional spirit level to ensure the verticality of the Picture Plane, being the plane on to which the image is projected; the film in the case of large format photography or the CCD in the case of digital photography.

The selection of an area of interest is defined by the choice of lens and any subsequent cropping of the image. To make clear the process that has been followed, Future Realities Studios AVR includes edge markings that indicate the position of the optical axis (red triangles) as well as the position of the horizon line marked with a yellow line. If the point indicated by these marks lies above or below the centre of the image, this indicates either that vertical rise was used when taking the photograph or that the image has subsequently been cropped from the top or bottom edge. If it lies to the left or right of the centre of the image then cropping has been applied to one side or the other, or more unusually that horizontal shift was applied to the photograph.

The vertical and horizontal field of view is indicated using a graticule consisting of lines at one and ten degree increments measured from the optical axis. Using this graticule it is possible to both compare and crop the image with others using the Field of view markings for reference. The blue marks on the left and right side of the image is the calculated location of the horizon line. Where this line is above or below the optical axis, this indicates that the camera has been tilted and where the line on either side is at different heights in relation to each other, this indicates that the camera was not exactly horizontal and there is some "roll" present. Note that a small amount of tilt and roll is usually present in a photograph, mainly due to the practical limitations with levelling the camera equipment on site.

It should be kept in mind that photographic or computer images most closely match our perception of shape at the optical axis, this being the line that passes from the eye point to the target or look-at point, or in photographic terms the centre line of the lens. As angular distances increase away from this line, while the relative positions of objects remains correct, their perceived shape may be less familiar than when we look directly toward them.

Future Realities Studios was commissioned to produce a series of visually verified illustrations of Campus West, Welwyn Garden City. Future Realities Studios carried out the view verification images independently using current best practice with reference to Guidelines for Landscape and Visual Impact Assessment GLVIA3, Landscape Institute Technical Guidance Note 06/19 as well as LVM Framework: Supplementary Planning Guidance (March 2012).

View location and identification

The view locations were identified by the team and were supplied to Future Realities Studios using PDF cad plan as well as photo markups.

Photography

It was established during site visits that a 50mm lens would not convey enough of the relevant field of view and context. A 35mm Lens was chosen to allow us to more fully convey the scene and proposed building. Photographs were taken on site at pre-agreed locations using a high-resolution full frame Canon EOS 6D with a 35 mm lens. For each of the viewpoints, the camera was tripod mounted and with the aid of a plumb bob, positioned centred over the agreed location point and at a height of 1.6m to the centre of the lens.

The orientation of the camera was adjusted so that the optical axis and the horizontal axis of the sensor were aligned with the ‘astronomical’ horizon. (This is the horizon as set by a gravity governed bubble level. It determines a line that passes through the sensor perpendicular to its face which is 90 degree to one that points directly to the centre of the earth. It differs from the visible horizon due to both the earth’s curvature and atmospheric refraction.

Images were taken with bracketed exposure and saved in RAW format to ensure that maximum tonal and colour information is retained for use at the image processing stage. The images were stored with embedded camera/ photo exif data. The location, time, date and camera settings were noted in a log and each view was assigned a unique reference. Choices for aperture and focus distance are designed to render all parts of the scene ‘in focus’ with particular emphasise on the areas covering the proposed development.

Digital Processing

The Photographs were imported into Adobe Lightroom to convert the RAW camera data into a lossless RGB format file suitable for use in 2D image editing and 3D modelling applications. At this stage tonal and colour adjustments are applied which aim to replicate the scene as honestly as possible as it was perceived at the time of capture. Depending on lens used, corrections may also be made for Chromatic Aberration and removal of any barrel distortion using a custom lens profile.

Surveying

For each of the required views, Future Realities Studios identified a number of features in each photograph and requested survey information for those points.

The survey works were undertaken by Mike Worby survey consultancy ltd. Equipment used included: Trimble VRS R9 receiver, Trimble S6 Total Station, 2” angle measuring accuracy, 3mm + 2ppm distance measuring accuracy. The camera positions were surveyed using line of sight surveying and aligned to the Ordnance Survey National Grid (OSGB36) in easting , northing, and in elevation to the Ordnance Survey Datum (OSD). The Ordnance Survey OSNET Active GPS correction service allows the user to capture and transform the data from the WGS84 universal GPS coordinate system to the Ordnance Survey National Grid (OSGB36). A two station baseline was established adopting a scale factor of 1.0000, coordinated and levelled to the OS national grid and level datum. The survey control stations and subsequently the camera positions were then coordinated and linked to the grid and level datum by observations to the baseline control using a Trimble S6 Total Station. The Trimble S6 Total Station (capable of measuring horizontal and vertical angle observations combined with an internal co-axial non contact distance measuring device) was then used to accurately measure and store the three dimensional coordinates of the key features required in the images from each camera position.

The survey points were provided to Future Realities Studios in digital Northing Easting format as both a list of coordinates as well as CAD data files. In addition photos were captured for each of the points surveyed to allow easy identification. Before importing all of the survey points into our 3d computer model, we firstly apply a fixed offset transformation to all the xy values so that the centre of the site is closer to the computers real world origin. This is done to increase accuracy within the 3d program during camera matching. Both the original and locally transformed points are recorded in an excel spread sheet to allow later easy cross checks of levels and points.

Verification process

Before importing all of the survey points into our 3d computer model, we firstly apply a fixed offset transformation to all the xy values so that the centre of the site is closer to the computers real world origin. This is done to increase accuracy within the 3d program during camera matching. Both the original and locally transformed points are recorded in an excel spread sheet to allow later easy cross checks of levels and points.

Future Realities Studios were supplied with a 3d model of the proposed building by Bright Space Architects. The XY location of the proposed scheme was supplied in relation to known OSGB grid reference and levels were also given for heights of floor levels and tops of roofs. Using this information, as well as on site survey data, Future Realities Studios aligned the proposed 3d model with OSGB Grid references to the correct level.
For each of the points surveyed, a 3d marker point was created in our computer model in a position that directly relates to xyz coordinate of the survey point. For each of the views to be verified we selected the corresponding photograph and used it as a background inside our 3d software. At each of the view verification locations a virtual camera was set up in the 3D software matching the surveyed coordinates and also matching the lens/fov of the real camera. Adjustments are made for any camera roll. The scene was verified by matching the newly created 3d points based on the survey information with the corresponding points of the 2d background image.

A renderable reference pointer is aligned with each of the 3d points and a computer render is created at a resolution to match the photograph. This was overlaid onto the background image to compare the image created by the actual camera and its computer equivalent.

For each of the views - in the case of AVR3 views - 3d virtual lighting was set up in our 3d software to match as closely as possible the sunlight conditions at the time that the source photograph was taken. Materials/textures were created for the proposed 3d model based on information supplied and a series of rendered layers were created for later compositing in Photoshop.

Post Production

The rendered layers were composited using Adobe Photoshop. For AVR 1 style renders the rendered images are composited onto the photograph and an outline is created to replicate the outline of the proposal. For AVR 3 style renders the rendered images are composited onto the photograph and the objects in the foreground such as trees are placed in front of the rendered image to replicate the real world situation.

Viewing Distances

Where Future Realities Studios supplied scale representative views are printed by a third party they should always contain the following note.
“To be viewed at comfortable arm’s length”. Recommended viewing distances are calculated using the formula D=W/(2*TAN(A/2)) where ‘D’ is the correct viewing distance in mm, ‘W’ is the actual printed image width in mm (**of the image, not the page**), ‘A’ is the HFOV in degrees and ‘TAN’ is the trigonometric tangent function.

Software Used

3d Studio Max, Adobe Lightroom, Adobe Photoshop

Constraints/Notes

It should be borne in mind that two-dimensional photographic images and photomontages alone cannot capture or reflect the complexity and diversity of an actual visual experience one would have on site. They should, therefore, be considered an approximation of the three-dimensional visual experiences that an observer might receive in the field.