Landscape Institute Technical Guidance Note

Visual Representation of Development Proposals

Technical Guidance Note 06/19

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This guidance aims to help landscape professionals, planning officers and other stakeholders to select types of visualisations which are appropriate to the circumstances in which they will be used. It provides guidance as to appropriate techniques to capture site photography and produce appropriate visualisations.

Contents

1 Introduction

1.1 Purpose of this Guidance

1.1.1 This document aims to help landscape professionals, planning officers and other stakeholders in the selection, production and presentation of types of visualisation appropriate to the circumstances in which they will be used. In doing so, it follows and amplifies the broad principles set out in The Guidelines for Landscape and Visual Impact Assessment 3rd edition (GLVIA3). Consistent with the Environmental Impact Assessment Regulations (EIA Regs), GLVIA3 advocates proportionate and reasonable approaches to the scope of assessments.

1.1.2 In all instances, the principles of clear, open and transparent communication and fitness for purpose should apply. Visualisations produced in accordance with this guidance should assist in informed decision-making.

1.2 Why Visualisations are Required

1.2.1 The world we live in constantly changes and this affects our visual experience. New development is one of the causes of this change. When people are asked to consider the merits of new development proposals or major changes in the landscape, the information available normally includes images illustrating the likely appearance of the proposals. Developers will often illustrate their proposals in brochures using drawings, photographs and artists impressions. Many other kinds of images are used in the formal planning process.

1.2.2 This guidance focuses on the production of **technical visualisations**, described as Visualisation Types, which are intended to form part of a professional Landscape and Visual Impact assessment (LVIA), Townscape and Visual Impact Assessment (TVIA) or Landscape and Visual Appraisal (LVA) that typically accompany planning applications. It is critical that these visualisations are accurate, objective and unbiased. They should allow competent authorities to understand the likely effects of the proposals on the character of an area and on views from specific points.

1.2.3 In contrast, **illustrative visualisations** may be intended for marketing or to support planning applications by conveying the essence of what a proposal would look like in context. These do not have to be based on specific viewpoints and could, for example, include a colour perspective illustration or an artists impression based on a bird's eye view.

1.2.4 Similarly, context photographs and sketches may be effective ways to communicate to stakeholders, in advance of, or association with, more sophisticated Visualisation Types. Generally speaking, they will not be used to explain design proposals *within the planning process*. They may indicate the appearance or context of a landscape or site, show specific points of detail, or be used for internal design iteration. Such illustrations, sketches and photographs are not, therefore, the subject of this guidance.

1.2.5 Technical visualisations can take a variety of generally 'static' forms, including: annotated photographs, wirelines, photomontages and 3D simulations. Plans and sections are potentially effective ways to communicate to stakeholders, in association with visualisations.

1.2.6 Augmented Reality (AR) and Virtual Reality (VR) are 'dynamic' visualisation techniques which are considered separately in this guidance.

1.2.7 Photographs show the baseline conditions; visualisations show the proposed situation; and both combine to simulate the change, for example as photomontages. Visualisations help to show how a proposed development could give rise to change in the character of a place, or affect the quality and nature of views, for example through introduction of new built elements or structures, changes in ground level, and loss of trees, vegetation or landscape features. Visualisations may also be used to illustrate other forms of landscape change, such as changes arising from landscape management or from influences such as climate change.

1.2.8 Depending upon the nature / type of the development or change, visualisations may need to show the development: during construction (if the construction period is of long duration and a notable element of the proposal's visual impact); at specific points in time during operation to illustrate the effectiveness of landscape mitigation; or possibly at decommissioning and restoration (e.g. as with a quarry or landfill site).

1.2.9 Visualisations should provide the viewer with a fair representation of what would be likely to be seen if the proposed development is implemented and should portray the proposal in scale with its surroundings. In the context of landscape / townscape and visual impact assessment, it is crucial that visualisations are objective and sufficiently accurate for the task in hand. In short, visualisation should be fit for purpose.

1.2.10 Visualisations may be used to illustrate other forms of landscape change, such as changes arising from landscape management or from influences such as climate change.

1.2.11 Some types of visualisation are more readily or quickly produced, but all visualisations share a role as a form of graphic communication, intended to represent the anticipated change in the visual environment, to illustrate key components of the proposed change or to give an indication of how much would or would not be visible from a given location.

1.2.12 As a general principle, any visualisation should reasonably represent the proposal in such a way that people can understand the likely landscape and visual change. The degree of detail shown will typically be relative to the design and / or planning stage that has been reached. Visualisations should assist interested parties in understanding the nature of a proposed development within its context, and its likely effects. Their use as part of an iterative process of assessment and design can help inform sensitive siting, design and primary mitigation, all of which are important considerations in the planning process. Showing the development within its context should help to secure better design at an early stage.

1.2.13 Two-dimensional visualisations, however detailed and sophisticated, can never fully substitute what people would see in reality. They should, therefore, be considered an approximation of the three-dimensional visual experiences that an observer might receive in the field.

1.2.14 Note that this guidance cannot provide a complete manual of techniques. Landscape professionals may need to draw upon the expertise of visualisation specialists, particularly for the most sophisticated forms of photography and visualisation.

1.3 A Proportionate Approach

1.3.1 To maintain a proportionate approach, different types of visualisation may be required, depending on:

- the type and scale of project;
- the aim (Purpose) and likely audience (Users) of the visualisation in the decision-making process; and
- the Sensitivity of the receptors and Magnitude of potential landscape and visual change.

1.3.2 The time, effort, technical expertise and cost involved in producing visualisations should be proportionate to these factors.

1.3.3 Other considerations which influence the scope of required visualisations, which should be reasonable and proportionate in relation to Purpose, are:

- The number of viewpoints to be illustrated photographically, and how many of these require visualisations;
- The Visualisation Type (1-4 in the following guidance); and
- The level of detail illustrated within the visualisation, for example as described in the London View Management Framework (see Appendix 6.4)

1.3.4 This guidance represents current best practice, provides a starting point to identify what types of visualisation may be appropriate and sets out approaches to potential visualisation techniques.

1.4 Relationship to previous LI Guidance

1.4.1 This guidance note replaces Landscape Institute (LI) Advice Note 01/11 (Photography and Photomontage for LVIA) and LI Technical Guidance Note 02/17 (Visual Representation of Development Proposals).

1.4.2 Advice Note (AN) 01/11 has been replaced in order to:-

- reflect other sources of guidance and additional research on the topic (see Section 5 - Further Reading);
- accord with the principles of GLVIA3 (2013) - (especially GLVIA3 paras 8.15-8.34);
- encourage best practice in the presentation of visualisations accompanying LVIAs, LVAs and planning applications; and
- ensure that visualisation techniques are properly explained and easily understood by all Users.

1.4.3 TGN 02/17 has been integrated in this guidance in order to provide a single source of guidance from the LI in respect of visualisations. LI AN 01/11 and TGN 02/17 are now withdrawn.

1.4.4 Further information on related landscape and visual assessment, and visualisation advice, may be found on the LI website: https://www.landscapeinstitute.org

1.4.5 These include:

- Glossary and Abbreviations;
- Earth Curvature;
- Camera Auto Settings and Limitations of Zoom Lenses; and
- Examples of Visualisation Types 1-4.

1.5 Visualisation Guidance by Others

1.5.1 This guidance applies to visual representation of all forms of development. The LI recommends its use to its members and to all parties using visualisations as part of the development process. The LI recognises that, for some types of development, targeted or authority-specific guidance may be appropriate.

1.5.2 The Highland Council (THC) Visualisation Standards for Wind Energy Developments 2016, the SNH Visual Representation of Wind Farms 2017 and the London View Management Framework 2012 (LVMF) are examples of 'authority-specific' guidance.

1.5.3 The LI supports Scottish Natural Heritage Guidance: Visual Representation of Wind Farms v2.2 February 2017 (SNH 2017). This Technical Guidance Note is broadly consistent with SNH 2017, particularly in respect of Type 4 Visualisation (see Sections 3 and 4).

1.5.4 The London View Management Framework provides useful guidance for large-scale urban development, and is particularly useful in identifying what it refers to as 'AVR Types' (0 - 3). See 'Further Reading' and Appendices 6.4 and 11.3.

1.5.5 When regulatory authorities specify their own photographic and photomontage requirements, the landscape professional should follow them unless there is a good reason not to do so. Failure to follow such guidance may risk requests for further information during the planning consultation process. Failure to satisfy stated validation requirements could lead to delays in validating planning applications. Seeking early engagement with the competent authority is recommended.

2 Guiding Principles

2.1 This guidance follows the broad principles set out in GLVIA3. Readers should note should note the comments in the Introduction (para 1.2.13) regarding the limitations of two-dimensional images.

2.2 Baseline photography should:

- be sufficiently up-to-date to reflect the current baseline situation;
- include the extent of the site and sufficient context;
- be presented at a size and relative position, on a corresponding sheet, to allow like-for-like comparison with the visualisation;
- be based on good quality imagery, secured in good, clear weather conditions wherever reasonably possible *(see Appendix 4 and GLVIA3 para 8.22)*;
- avoid foreground clutter; and
- in LVA / LVIA baseline photography, if relying on only existing views with no visualisations, clearly identify the extent of the application site in the view *(see Type 1 Visualisations)*.

2.3 Visualisations should:

- provide a fair representation of what would be likely to be seen if the proposed development is implemented;
- be based on replicable, transparent and structured processes *(Section 4)* and use a reasonable choice of agreed viewpoint locations, view directions, view angles and times of day *(Appendix 4)*;
- be reproduced at a suitable size and level of geometric accuracy relative to the baseline photographs *(Sections 3/4 and Appendices 7/8)*;
- be accompanied by appropriate information, including a Technical Methodology and required data within page title blocks *(Appendix 7.2 and 10)*; and
- where necessary, the photography and visualisation should be capable of being verified *(see Visualisation Type 4, Section 4 and Appendix 11)*.

2.4 The producers of visualisations should:

- refer to GLVIA3 paras 8.15-8.31
- use Visualisation Types 1-4, described further below, selected by reference to Purpose of use and anticipated Users, combined with the indicative overall Degree or Level of Effect (a product of Magnitude and Sensitivity) *(see Section 3)*;
- use techniques and media, with appropriate explanation, that represent the proposed scheme and its setting as accurately as reasonably practicable, proportionate to its potential effect;
- where reasonable within project timescales, include maximum effect scenario *(e.g. winter views - see GLVIA3 paras 6.28, 8.15)*; and
- use appropriate equipment and settings *(Sections 3/4 and Appendices 1-5)*.

3 Taking a Proportionate Approach

3.1 Understanding the Proportionate Approach

3.1.1 This section concerns how to determine which type of visualisation is proportionate to the task in hand. When identifying the need for some form of visual representation, landscape professionals, competent authorities and other stakeholders should use this guidance as the basis for reaching agreement on the appropriate Visualisation Type for the project in question. That does not preclude subsequent preparation of other visualisations, but working this way should help to ensure that public interests are secured in a way that is recognised as proportionate and fit for purpose by all those involved.

3.1.2 The factors which determine the appropriate Visualisation Type are:

- the intended Purpose of the visualisation;
- the anticipated Users;
- the stage in the planning application process;
- the Sensitivity of the context / host environment, having regard to the landscape and visual receptors [1]; and
- the likely overall Magnitude of effect of the development in terms of its 'size and scale', 'geographic extent' and 'duration and reversibility' [2].

3.1.3 Selecting the appropriate Visualisation Type requires a staged approach, described in more detail below in this section, and summarised as follows:

- identifying the Purpose and Users of the visualisation;
- identifying the type and nature of the proposed development and early indications of the likely overall Magnitude of effect it would generate;
- examining the context / host environment in which the development would be placed and assessing its overall Sensitivity;
- using the above to arrive at an indicative overall 'Degree or Level of Effect'; and
- selecting the most appropriate Visualisation Type based on the above criteria; and
- explaining the reason for its selection.

3.1.4 The process of selecting Visualisation Types can be considered in terms of a need for increasing levels of scrutiny of information or evidence required, with Purpose and Users considered alongside the likely overall effect of the proposed development on the host environment.

3.1.5 This guidance proposes four Visualisation Types (1-4), from least to most sophisticated, which are described in more detail in Section 4 and summarised in Tables 1 and 2 below.

[1] GLVIA3, paras 6.31- 6.37

[2] GLVIA3, paras 6.38- 6.41

3.2 Working with the Competent Authority

3.2.1 EIA development may be subject to Scoping, which can be used to help determine the appropriate scope and level of detail for the visual components of the LVIA. For non-EIA development, developers are encouraged to request pre-application ('pre-app') advice. If landscape / townscape and visual issues will be a key issue, submission of the proposed visualisation approach, suggested viewpoints and a Zone of Theoretical Visibility (ZTV), will assist in reaching agreement with the competent authority. Draft visualisations which are not fully worked up can be used for pre-app discussions or scoping requests. This should help reduce risk of requests for further information during the planning consultation period, and consequential further costs and delays.

3.2.2 The landscape professional is likely to need to determine an approach to visualisation before having completed (or possibly started) the LVA / LVIA itself. Therefore, a preliminary judgement on the likely overall 'Degree or Level of Effect' will be required. Whilst this should not prejudice the detailed process or outcome of the LVA / LVIA, the context and likely extent of the proposal will be known at an early stage and should be sufficient to inform the initial assessment.

3.2.3 It may be possible at this stage to anticipate a transition from one Purpose and set of Users to another during the course of the project and, therefore, to determine an approach appropriate to the spectrum of Users involved. A typical example is the transition from Planning Application to Planning Appeal.

3.2.4 Although this guidance is particularly aimed at visualisations prepared for use in the decision making process with competent authorities as the intended main Users, visualisations may also be used iteratively during the design process where the Users will be design / planning professionals and their clients.

3.3 Purpose and Users

Purpose

3.3.1 A principal consideration is the of the visualisation, i.e. the Purpose for which it will be used. For example, does it:

- provide basic contextual information in support of a planning application?
- purport to demonstrate the visual change that will be brought about if the development proceeds? or
- aim to prove or disprove if the development is visible, or demonstrate the effectiveness of a mitigation strategy?

3.3.2 Examples of the potential range of Purposes are:

- the illustration of a project prepared for the client as the project develops;
- the illustration of a development proposal prepared to accompany a planning application; and / or
- to illustrate the likely change in a view that may occur as a result of the development being introduced into that view; to inform an LVA or LVIA, e.g. as part of an EIA.

Users

3.3.3 In addition to being clear about the Purpose of the visualisation, it is important to understand and identify the likely Users. Are they:

- people potentially affected by the development who are being asked to give an early opinion as part of a consultation process?
- clients?
- other consultants communicating with the landscape professional?
- those formally commenting on the planning application?
- planning officers considering the merits of an application?
- participants at public inquiry (including members of the public, expert witnesses, legal advisers, Inspectors and Reporters)? and / or
- decision-makers (Councillors, Reporters / Inspectors, Ministers)?

3.4 Combining Purpose / User and Degree or Level of Effect

3.4.1 Having established the Purpose and Users of the visualisations, it is necessary to consider these in relation to the type of development proposed and the likely overall effect it would have on the host environment, having regard to landscape and visual receptors, in line with GLVIA3 principles.

3.4.2 An assessment of the Sensitivity of the context or host environment, together with a judgement of the likely Magnitude of landscape and visual change that may result as consequence of the development, will establish the indicative overall Degree or Level of Effect. This, considered with the Purpose and Users of the visualisation, will help determine which Visualisation Type would best suit the circumstances of the proposal and aid informed decision making.

3.4.3 Sensitivity and Magnitude, as determinants of Degree or Level of Effect, are extensively discussed in GLVIA3, as amended by GLVIA3 Statement of Clarification 1/13 (10-06-13)[3].

3.4.4 The broad principles of assessment are set out in GLVIA3 Figure 3.5. These principles apply to both landscape and visual effects and have clear contributory factors:

- susceptibility and value for Sensitivity;
- size / scale, extent, duration and reversibility for Magnitude.

3.4.5 When assessing Sensitivity and Magnitude and arriving at a judgement of indicative overall Degree or Level of Effect, consideration should be given to the landscape and visual effects of the project as a whole, rather than against individual viewpoints or receptors.

[3] statements of clarification 3 and 4 clarify and augment GLVIA3 paras 3.32-3.36, p.40-41.

3.5 Selecting the Appropriate Visualisation Type

3.5.1 Drawing these threads together, identifying the Visualisation Type, proportionate to the project under consideration, involves combining its Purpose / Users with the indicative overall Degree or Level of Effect of the proposed development. This, in turn, requires an understanding of:

- the landscape / townscape and visual context within which the development may be seen;
- the type of development proposed, its scale and size; and
- the likely overall landscape and visual effect of introducing the development into the existing environment.

3.5.2 The four Visualisation Types proposed in this guidance comprise the following (from least to most sophisticated, in terms of equipment, processing and presentation):

Type 1 annotated viewpoint photographs;
Type 2 3D wireline / model;
Type 3 photomontage / photowire;
Type 4 photomontage / photowire (survey / scale verifiable).

3.5.3 The most sophisticated Visualisation Types are appropriate when the Purpose / User requires the highest levels of accuracy, and the Sensitivity and Magnitude combine to generate the highest Degree or Level of indicative overall Effect.

3.5.4 The Visualisation Types are summarized in Table 2 and described in more detail in Section 4. Types 1-4 are typically all 'static' visualisations (i.e. capable of being printed).

3.5.5 'Dynamic' visualisations such as Augmented and Virtual Reality (AR / VR) are dealt with separately in Section 4.6.

3.5.6 Table 1 provides a broad indication as to appropriate Visualisation Types for different Purposes and Users. Note that Categories 'A' to 'D' illustrate four convenient levels along a scale, not four fixed interpretations.

Table 1: Relationships between Purpose, User and Visualisation Types

Category	Purpose and Users	Appropriate Visualisation Types
A	Evidence submitted to Public Inquiry, most planning applications accompanied by LVIA (as part of formal EIA), some non-EIA (LVA) development which is contrary to policy or likely to be contentious. Visualisations in public domain.	2 - 4
B	Planning applications for most non-EIA development accompanied by LVA, where there are concerns about landscape and visual effects and effective mitigation is required. Some LVIAs for EIA development. Visualisations in public domain.	1 - 4
C	Planning applications where the character and appearance of the development is a material consideration. LVIA / LVA is not required but supporting statements (such as Planning Statements and Design and Access Statements) describe how the proposal responds to landscape context and policies. Visualisations in public domain.	1 - 3
D	To inform the iterative process of assessment and design with client, and / or pre-application consultations with the competent authority. Visualisations mainly confidential.	1 - 2

3.5.7 The decision as to appropriate Visualisation Type should be based on a proportionate approach, taking account of its Purpose / Users and indicative overall Degree or Level of Effect (based on Sensitivity and Magnitude) of the proposed development. In all cases, professional judgement should be applied, and agreement reached with the competent authority wherever possible.

3.5.8 A combination of simpler and more sophisticated graphics may be appropriate to illustrate specific points. So, for example, 3D models, or annotated viewpoint photos (Types 1 and 2) at less important locations, may usefully support more sophisticated (Types 3 and 4) visualisations at key locations.

3.5.9 However, different interpretations of scale between visualisations should be avoided unless there is a specific reason to do so, which should be explained in the Visualisation Type Methodology, the subject of the next section.

3.5.10 When making a final choice it will be important to consider:

- The contextual Sensitivity and Magnitude of landscape and visual effects of the development overall (rather than that applying to a single location) and the application of a proportionate and consistent approach.

- Cost of the visualisation; several factors are relevant here. Firstly, it depends on what readily available technologies are available to the landscape professional. Secondly, it depends on the nature (type, size and scale) of the development and thirdly, on the degree of realism required. For example, wind farm visualisations are less expensive to prepare than for mixed use or other forms of development, because wind farms consist of a number of single objects of the same size and shape with the same surface finish. However, subject to the proportionality principle, cost considerations should not override the reasonable requirement for appropriate visualisations.

- Available technology – some techniques are dependent on particular technologies / software (e.g. digital photo / panoramic viewers) which not all of those preparing visualisations will have access to. Nor will competent authorities necessarily be able to view particular technologies.

- The nature of the development and how it may best be illustrated. For example, where a development is predominantly screened from view, a photowire image may be more helpful than a photomontage, as it can indicate the position of the development beyond any screening.

3.6 Introducing Visualisation Types 1-4

3.6.1 Table 2 below sets out the general aims of Visualisation Types 1-4, together with indications of appropriate locational accuracy, photographic equipment and presentational approaches.

3.6.2 Note that it is not possible to categorise every possible kind of visualisation into Types 1-4; some inevitably straddle categories. If a visualisation does not fit neatly into one of the four categories, that does not make it unacceptable, provided it is fit for purpose and not misleading, and is clearly explained in the Visualisation Type Methodology.

Table 2 Visualisation Types 1-4		Type 1	Type 2	Type 3	Type 4
		Annotated Viewpoint Photograph	**3D Wireline / Model (non-photographic)**	**Photomontage / Photowire**	**Photomontage / Photowire Survey / Scale Verifiable**
Aim of the Visualisation		To represent context and outline or extent of development and of key features	To represent 3D form of development / context	To represent appearance, context, form and extent of development	To represent scale, appearance, context, form, and extent of development
Photographic Equipment	**Tripod**	Recommended but discretionary	Not relevant	Recommended	Necessary
	Panoramic head	Not relevant		Recommended for panoramas	Necessary for panoramas
	Minimum Camera / Lens	Cropped frame or FFS + 50mm	Not relevant	Cropped frame or FFS + 50mm	Full Frame Sensor (FFS) + 50mm FL lens [1]
Locational Accuracy	**Source of camera/viewpoint location data**	GPS, OS Maps, geo-referenced aerial photography	Varies according to technology	Use good quality data: GPS, OS Maps, geo-referenced aerial photography, LiDAR	Use best available data: High resolution commercial data, LiDAR, GNSS, or measured / topographic surveys
	Survey-verified [2]	Not relevant			When appropriate
Data & Presentation	**Verifiable (SNH) [3]**	Not relevant			Required
	3D model	Not required	Required		
	Image Enlargement [4]	Typically 100%	Not relevant	Typically 100%	100% - 150%
	Form of Visualisation	sketch / outline / arrows	massing / wireline / textured	wireline / massing / rendered / textured to agreed AVR level [5]	
	Viewpoint mapping	Dedicated viewpoint location plan			Dedicated viewpoint location plan, + individual inset maps recommended
	Reporting of methodology and data sources	Outline description of sources and methodology recommended		Data, sources and methodology recommended	Verifiable data, sources and methodology required

Table 2 footnotes:

1 FFS+50mm FL - note exceptions to 50mm lens FL. See Section 4 and Appendices 01 and 06.

2 Survey-verified means the camera position and survey features being recorded by highly accurate survey processes. See Section 4 Locational Accuracy & Appendix 14.

3 Verifiable (SNH) has the same meaning as in SNH 2017 - the photographic process and image scaling is capable of being verified to agreed standards by reference to the original photograph with metadata. See Appendices 6 & 11.

4 Image Enlargement - see 3.8 below.

5 AVR level - see Appendix 6.4.

3.7 Visualisation Type Methodology

3.7.1 For any given project for which visual representation may be required, the proposed approach to visualisation should be set out in a brief description, explaining:

- the anticipated Purpose / Users;
- the indicative assessment of Sensitivity and Magnitude and resulting likely indicative overall Degree or Level of Effect; and
- other factors influencing the selection of the Visualisation Type.

3.7.2 This may be combined with a preliminary selection of proposed viewpoints and submitted to the competent authority and, ideally, agreed prior to submission of any planning application. See also GLVIA3 para 6.18.

Examples

3.7.3 The following are examples of using Tables 1 and 2 to arrive at an appropriate Visualisation Type 1-4. Letters A-D refer to the 'Category' column in Table 1 above.

(1) ***A single house****, submitted as a planning application in a prominent location within a designated landscape, might be regarded as:*

- *Purpose / User C, Planning Application;*
- *High-Medium Sensitivity, Small-Negligible Magnitude;*
- *likely Slight-Moderate Degree or Level of Effect.*

This would suggest ***Type 1*** *visualisations - perhaps an annotated photograph (40° at A3 width) indicating the extent (width / height, or outline) of the proposed development.*

(2) Pre-application discussions with developer over ***proposals to re-work a large clay waste tip*** *on the edge of a National Park, screened as requiring EIA. Accurate output from a 3D model is required to understand the nature and magnitude of visual impacts from key sensitive locations and determine the need for fully rendered photomontage to form part of a formal LVIA.*

- *Purpose / User D, pre-application discussions;*
- *High Sensitivity context, Large Magnitude;*
- *likely Substantial Degree or Level of Effect.*

This would suggest ***Type 2*** *(3D modelling) - outputs required for informed discussion, not determination of planning application.*

(3) ***A small quarry / extension****, submitted as a planning application, in a landscape considered of medium to high sensitivity to the proposed change, might be regarded as:*

- *Purpose / User B, accompanying an LVA;*
- *Medium Sensitivity, Medium Magnitude;*
- *likely Moderate Degree or Level of Effect.*

*This would suggest **Type 3** - photowires or photomontages (40° at A3 width or 90° at A1) indicating the appearance of the proposed development.*

(4) ***A large housing site**, submitted as a planning application with potential implications on a local designation (e.g. Conservation Area or Important Landscape Area) might be regarded as:*

- *Purpose / User B, accompanying an LVA;*
- *High-Medium Sensitivity context, Large-Medium Magnitude;*
- *likely Substantial Degree or Level of Effect.*

*This would suggest **Type 3** photowires or photomontages, or possibly **Type 4** (surveyed) if close-proximity sensitive views were required.*

(5) ***A large wind farm** in a locally-designated landscape area, the subject of a public inquiry, might be regarded as:*

- *Purpose / User A, part of an EIA;*
- *High-Medium Sensitivity, Large Magnitude;*
- *likely Substantial Degree or Level of Effect.*

*This would suggest **Type 4** visualisations, where surveyed locational accuracy is not necessary but image enlargement, to illustrate perceived scale, would be appropriate.*

(6) *Planning application for **a very large energy from waste plant** building with 90m twin stacks and plume emissions on an edge of town industrial estate, within potential visual range of important views from a Grade 2 Registered Historic Park (designated heritage asset):*

- *Purpose / User A / B (Planning / Public Inquiry);*
- *High Sensitivity, Large-Medium Magnitude;*
- *likely Substantial Degree or Level of Effect.*

*This would suggest **Type 4** visualisations, where surveyed locational accuracy may not be necessary but image enlargement, to illustrate perceived scale, would be appropriate.*

(7) ***A proposed new tower block** with potential implications on a designated landscape / townscape, subject to a planning application, might be regarded as:*

- *Purpose / User A / B (Planning / Public Inquiry);*
- *High Sensitivity, Large Magnitude;*
- *likely Substantial or Very Substantial Degree or Level of Effect.*

*This would suggest **Type 4** visualisations. In addition, if the precise visual relationship between the tower block and other buildings is of particular importance, surveyed locational accuracy may be appropriate.*

3.7.4 The preceding examples are just that - examples - and should not be regarded as templates. This approach can be used in preparing a Visualisation Type Methodology. It is not a sophisticated LVA / LVIA, but a review of basic criteria, known early in the project, to inform selection of appropriate Visualisation Types.

3.7.5 The selected Visualisation Type (1-4) should be clearly stated on all visualisation pages, such that recipients can understand the approach being taken.

3.8 Viewing Distance and Image Enlargement

3.8.1 Table 2 introduces the concept of 'image enlargement', which is carried forward into the detail of Visualisation Types 3-4 , described in the next section.

'Monocular' and 'Binocular' viewing

3.8.2 Printed photographic images have a theoretical viewing distance at which the scale of the view is reconstructed, although this assumes that cameras and humans have similar optical systems, which they do not. The essential difference is that cameras (for this purpose) are monocular, and humans are generally binocular. In addition, the fact that reality is viewed as a 3D space, whereas photographs are viewed as 2D projections, combine to alter perceptions of 'scale' and 'depth' between reality and photography. See Section 5 'Further Reading' for more information.

3.8.3 Whilst mathematical viewing distances have historically been quoted alongside visualisations, it is generally regarded that viewing distances of between 500mm – 550mm (approximately arm's length) are the most practical and widely used. All scale-representative views should, therefore, be accompanied by a note: "To be viewed at comfortable arm's length".

100% Reference Image

3.8.4 A 'mathematically correct' image is established for a 50mm FL approximately 39.6 Horizontal Field of View (HFoV) image, printed at a size of 390mm x 260mm on an A3 sheet, and held at 542mm[1] from the eye. This 'monocular view' represents a reference point of 100% in this guidance note, against which enlargements, such as 150%, can be described. For example, a 50% increase in image size can be described as a 150% enlargement.

3.8.5 Changes in the relative size of printed images are described in other documents as the 'Effective Focal Length' (EFL) at which an image is presented. 50mm EFL equates to 100% and 75mm EFL equates to 150%. For simplicity, this guidance describes the enlargement by percentage, related to the 100% reference image.

150% Enlargement Factor

3.8.6 Whilst presenting a 50mm FL image (39.6° HFoV) at A3 size is a straightforward use of the camera image, this approach has been found to be lacking in respect of expansive projects in open landscapes or seascapes, such as windfarms. This is because, for a 50mm FL image printed at A3 and held at comfortable arm's length, the scale of the viewed image is smaller than reality.

3.8.7 As a result of research in Scotland over the last decade (see Section 5 - Further Reading) there is a consensus that increasing the printed image size by 150% (as if a 75mm FL lens had been used) provides a better impression of scale for most viewers using two eyes (binocular vision). This is particularly appropriate for projects such as windfarms, whether viewed on a desktop or on site.

3.8.8 The approach of this guidance is, therefore, to recognise that, for larger-scale projects with more distant components such as windfarms, the approach taken in SNH 2017 (put simply, a 150% enlargement) is appropriate.

3.8.9 This brings with it some issues:

a) Paper size or constrained Field of View

Adding 50% to the image size increases the presentation size (digital or paper). Conversely, the site can only be represented

[1] Note that 542mm simply establishes a mathematical reference point. Generally, there is no need to hold the image at such a specific distance.

if it can be accommodated within an A3 sheet (27°HFoV x 18.2° VFoV) or A1 sheet (53.5°HFoV x 18.2°VFoV). If it occupies a greater vertical or horizontal FoV, then alternatives must be considered.

This is accounted for in the SNH Guidance, in that exceptions to its standard can be discussed and agreed with SNH.

b) Appropriateness in all situations

Whilst the 150% enlargement overcomes the scale issues for the expansive projects for which it was designed, it may over-compensate for projects in more constrained environments, such as urban or small-scale enclosed landscapes. In these situations, less enlargement may be appropriate.

3.8.10 Research by the LI Working Group in the preparation of this guidance, carried out across several cities, suggests that, in mid- to smaller-scale landscapes / townscapes, an enlargement around half-way between 100% and 150% results in a binocular relationship between the presented image and reality.

3.8.11 In addition, there will be situations - for example very close urban contexts or developments of considerable height or width - where scaling at less than 150% may provide more flexibility to fit an image on the page.

3.8.12 In these instances, the landscape professional should present the logic, behind opting for a particular enlargement factor, to the competent authority.

3.8.13 Notwithstanding the above, SNH considers that consistent use of 150% enlargement is beneficial.

Other means of achieving enlarged images

3.8.14 An A3 (50mm FL, 39.6° HFoV) sheet, when printed at A2 size, is enlarged by 141%. This provides a basic way to create a printed page with improved image scaling, simply by printing an A3 figure, enlarged to fill an A2 sized sheet. This will, however, result in some loss of resolution compared to an image which is created to be placed in an A2 sheet at full resolution. It should not, therefore, be used in the more rigorous context of Visualisation Type 4.

3.8.15 A 35mm FL lens on a FFS camera will capture a HFoV of 54.4°, which is very close to the requirements of an SNH 2017 planar A1 panorama (53.5° HFoV). Whilst it will not satisfy SNH 2017 Guidance (which requires the 50mm / FFS combination) a 35mm FL image of sufficient resolution and clarity may, therefore, provide an A1-width planar panoramic image, without stitching and re-projecting of multiple 50mm images.

3.8.16 In either case, the practitioner should ensure that image quality is appropriate for the Purpose, and set out the approach in the Visualisation Type Methodology (3.7) and Technical Methodology (Appendix 10).

4 Description of Visualisation Types 1-4

4.1 Visualisation Types 1-4

4.1.1 The main characteristics of Visualisation Types 1-4 are introduced below. More detail on these 'static' visualisations is provided in the sections which follow, including a separate subsection on 'dynamic' visualisations, namely AR / VR.

Type 1 Annotated Viewpoint Photograph:

Reproduced at a size which aids clear understanding of the view and context, these simply show the extent of the site within the view, and annotate any key features within the view.

Type 1 is the most basic form of visual representation with a focus on the baseline information.

Type 2 3D Wireline / Model:

This covers a range of computer-generated visualisation, generally without a photographic context. Wirelines and other 3D models are particularly suited to graphically describing the development itself.

Type 2 visualisations use basic graphic information to assist in describing a proposed development and its context.

Type 3 Photomontage / Photowire:

This Type encompasses photomontages and photowires which will commonly be produced to accompany planning applications, LVAs and LVIAs. They provide a reasonable level of locational and photographic accuracy, but are not suitable for the most demanding and sensitive of contexts. Type 3 visualisations do not need to be accompanied by verification data, nor is a precise survey of features and camera locations required. Although minimum standards are set for image presentation, the visualisations do not need to be reproduced with scale representation.

Type 3 visualisations offer an appropriate level of detail and accuracy for a range of EIA and non-EIA projects.

Type 4 Photomontage / Photowire (survey / scale verifiable):

Type 4 photomontages and / or photowires require the use of equipment and processes which provide quantifiable verification data, such that they may be checked for accuracy (as per industry-standard 'AVRs' or 'Verified Views'). Precise survey of features and viewpoint / camera locations may be included where warranted. Type 4 visualisations are generally reproduced with scale representation.

Type 4 visualisations represent the highest level of accuracy and verifiability for use in the most demanding of situations. See also Appendix 11, Verified Photomontages.

4.1.2 In providing flexibility across Visualisation Types 3 and 4, there is inevitably some degree of overlap between them, for example in terms of image scaling or presentation size. Whilst Type 3 will be acceptable in many situations, only Type 4 methodology and equipment can provide the levels of verifiable accuracy which are appropriate to high Sensitivity contexts and Purposes.

4.2 Type 1: Annotated Viewpoint Photograph

4.2.1 Viewpoint photographs are often used in LVIAs and LVAs and may usefully be annotated to show the extent or position of the site and other features. 3D-modelling is not required - the annotations of site extent (horizontally) may be estimated by reference to site features such as field or plot boundaries.

4.2.2 Single images will be planar (i.e. as captured by the camera). Alternative lens types may be considered - see Appendix 1. Where single images can capture the site (e.g. 39.6° x 27°) and be presented at A3, they may be supported by two baseline panoramic images (maximum 60° HFoV) presented on an A3 sheet. This is purely to show the location of the full-size single image frame in its context and, as such, should be noted as being 'for context only'. Wide panoramas on an A3 sheet are too small to provide a representation of the proposed development.

4.2.3 Where panoramic images are required to capture the site, they may be presented as cylindrical panoramas of up to 90° HFoV at A1 width with an image size of 820mm x 250mm (see Appendix 8). This sizing equates to around 96% image 'enlargement'.

4.2.4 Locational accuracy is moderately important, and reasonably precise locations can be determined from GPS data, OS maps or aerial photography.

4.2.5 Refer also to the Technical Methodology, Appendix 10.

Table 3: Suitable photographic / print formats (Type 1):

Camera / lens	FFS + 50mm lens	Cropped frame + 28 or 35mm lens
Sheet size	A3	
Image size (mm)	390 x 260	
Presented Field of View (H x V)	39.6° x 27°	Either 35mm = slightly narrower than FFS+50mm, or crop 28mm image to match FFS+50mm
Sheet size	Cylindrical Panoramic image @ A1 width	
Presented Field of View (H x V)	90° x 27° (VFoV as appropriate)	
Image size (mm)	820 x 250 minimum (height as appropriate)	

Type 1 Summary

Type 1 visualisations are simple, annotated photographic illustrations which often accompany LVAs.

- Use a Full Frame Sensor camera with 50mm lens, or cropped-frame sensor camera with 35mm or 28mm fixed lens. See Appendix 1.
- Images will typically be presented with a single frame on an A3 sheet.

4.3 Type 2: 3D Wireline / Model

4.3.1 This Type covers the use of 'static' presentation of 3D models which are visual representations distinct from photographically-based photomontages.

4.3.2 The main examples are computer-generated 3D wirelines (also described as 'wireframes') and 'massing' models, potentially with computer-generated context, such as buildings, terrain or other surrounding features.

4.3.3 'Dynamic' visual representations, such as 'augmented reality' or 'virtual reality' (AR or VR), are dealt with separately in Section 4.6 below.

4.3.4 Images to be included in reports should be of sufficient size to communicate a sense of the scale of the development. An A3 Sheet, as with Types 1 and 3, would generally be appropriate. An image based on a 3D model to show proposed development layout (for example, an aerial view) need have no specific FoV or location reference, but should have a realistic sense of perspective.

4.3.5 Computer models generally do not convey landscape context unless they are extremely sophisticated. Most planning applications should be accompanied by photographs or photomontages, rather than solely relying on Type 2 visualisations to convey an impression of a development proposal.

4.4 Type 3: Photomontage / Photowire

4.4.1 Type 3 visualisations are photomontages or photowires (photographs with wireline overlays) where site photography forms the basis of the imagery, which is then overlaid by a 3D wireframe, massing or rendered model. Type 3 are suitable for representing proposals where precise perception of scale of the printed image, and the highest levels of locational accuracy, are not necessary. If the key criteria for Type 4 cannot be guaranteed, then the visualisation will be classified as a Type 3. 'Type 3' should be clearly stated on all visualisations.

Table 4: Suitable photographic / print formats (Type 3):

Camera / lens	FFS + 50mm lens	Cropped frame + 28 or 35mm lens
Presented Field of View (H x V)	39.6° x 27°	Either 35mm = slightly narrower than FFS+50mm, or crop 28mm image to match FFS+50mm
Sheet size	A3	
Image size (mm)	390 x 260	
Enlargement relative to FFS / 50mm	100%	100 - 120%
Sheet size	Cylindrical Panoramic image @ A1 width	
	90° x 27° (VFoV as appropriate)	
Enlargement relative to FFS / 50mm	96%	
Image size (mm)	820 x 250 minimum (height as appropriate)	

Lens and Camera

4.4.2 Full-Frame Sensor cameras (FFS) are appropriate. Cropped-frame cameras (e.g. Canon APS-C / Nikon DX) are acceptable when a fixed lens of 35mm FL is used. Alternatively a 28mm lens could be used and the resulting photographs cropped to achieve the same FoV as a 50mm FL lens with an FFS. See Appendix 1.2. Note that different cropped-frame lens / camera combinations will result in slightly different FoV and enlargement factors.

Purpose

4.4.3 Type 3 visualisations are intended to represent design, form and context to a reasonable degree of objectivity and accuracy, one which can be understood and relied on by competent authorities and others. This category covers a wide range of applications including non-verifiable viewpoint locations, such as those from moving vehicles / drones and other such situations where the viewpoint coordinates cannot be replicated with the same degree of accuracy / precision as Type 4 visualisations. It would also be appropriate where photographs have been taken by a 3rd party, provided these are prepared in accordance with the principles set out in this guidance and supported by a clear methodology.

4.4.4 Type 3 visualisations should not be selected when printed scale representation is required.

4.4.5 Single images are planar (i.e., as captured by the camera). Alternative lens types may be considered - see Appendix 1.

4.4.6 Where single images can capture the site (e.g. 39.6° x 27°) and be presented at A3, they may be supported by two baseline panoramic images (maximum 60° HFoV) presented on an A3 sheet. This is purely to show the location of the full-size single image frame in its context and, as such, should be noted as being 'for context only'. Wide panoramas on an A3 sheet are too small to provide a

representation of the proposed development. They do not replace baseline photographs, which should be presented at the same size and scale as their corresponding visualisations.

Presentation

4.4.7 Imagery will typically be presented as two related sheets: Baseline photograph and photomontage. These should be presented at the same size to allow direct comparison. A wireframe may be included to explain alignment between the 3D model and site features.

4.4.8 Visualisations should be accompanied by a Technical Methodology, setting out the criteria listed in Appendix 10.

Panoramas

4.4.9 Where panoramic images are required to capture the site for visualisation, they may be presented as cylindrical panoramas of up to 90° HFoV at A1 width with an image size of 820mm x 250mm (see Appendix 8). This sizing equates to around 96% image 'enlargement' (i.e. a slight reduction from the 100% reference). When a wider FoV than 90 degrees needs to be captured, this should be done by using adjoining A1 sheets.

Locational Accuracy

4.4.10 It is important to disclose the level of locational accuracy of Type 3 visualisations, which should be determined on the basis of proximity of viewpoint to the site and on Sensitivity of receptors / importance of the view. The level achieved should be clarified in the methodology and the same approach should be taken for all visualisations presented. Typically, horizontal accuracy of 1-2 metres can be obtained from aerial photography. However, this may vary according to the aerial photography source and location (see Appendix 14) and this should be considered when reporting on locational accuracy in the methodology.

Type 3 Summary

Type 3 visualisations will be appropriate for many planning applications, LVAs and LVIAs, where photomontage is required but a verifiable process and printed scale representation are not needed.

- Use a Full Frame Sensor camera with 50mm lens or cropped-frame sensor camera with 35mm or 28mm fixed lens.
- Images will typically be presented with a single frame on an A3 sheet, providing an enlargement in the range 100-120% subject to camera / lens combination.
- The enlargement factor should be stated on each page, together with the label 'Visualisation Type: 3'.
- For very wide linear infrastructure, consider presenting cylindrical panoramas up to 90° at A1 width, with multiple sheets for very wide panoramas.
- Accompany visualisations with a Technical Methodology (see Appendix 10).

4.5 Type 4: Photomontage / Photowire (survey / scale verifiable)

4.5.1 Type 4 visualisations are photomontages or photowires, produced using quantifiable data, with procedural transparency and appropriate levels of accuracy. This involves using a defined camera / lens combination and establishing the camera location with sufficient locational accuracy to enable accurate scaling and location of the 3D model within the view. In addition, the print presentation size can be determined to provide binocular image scaling when appropriate (see Section 3.8). Note that, due to the variable nature of digital viewing devices, images cannot be assumed to provide a perception of scale unless printed at the specified size. See Appendix 7 for more details. 'Type 4' should be clearly stated on all visualisations.

4.5.2 See Appendix 6 'Preparing Photomontages' and Appendix 8 'Panoramas'.

Lens and Camera

4.5.3 Base photography should be carried out with a Full Frame Sensor (FFS) camera and 50mm Focal Length prime lens, unless there are exceptional conditions where wider-angle lenses are required to fully capture the scene (e.g. tall tower blocks - see below). In such cases, any departures from FFS + 50mm FL should be explained and agreed with the competent authority.

4.5.4 Table 5 represents the range of approaches suitable for Type 4 visualisations. Note that the stated percentage enlargement figures are relative to a 50mm FL image printed on an A3 sheet at 390mm x 260mm image size (para 3.8.4, 100% Reference Image).

Table 5: Suitable photographic / print formats (Type 4)

Camera / lens	FFS + 50mm lens	
Option	1	2
Captured Field of View (HFoV x VFoV)	39.6° x 27°	
Image scaling (see 3.8)	'Monocular'	'Binocular'
Sheet size	Single image @ A3	
Projection (see App 8)	Planar	
Image size (mm)	390 x 260	
Presented Field of View (H x V)	39.6° x 27°	27° x 18.2°
Enlargement relative to FFS / 50mm	100%	150%
Sheet size	Panoramic image @ A1 width	
Projection (see App 8)	Cylindrical (for baseline and very wide linear infrastructure)	Planar
Presented Field of View (H x V)	90° x 27°	53.5° x 18.2°
Enlargement relative to FFS / 50mm	96%	150%
Image size (mm)	820 x 250 minimum (height as appropriate)	

Note that exceptions to lens and image sizes are acceptable if explained and agreed with the competent authority

Presentation

4.5.5 Imagery will typically be presented as three related sheets: Baseline photograph; wireline / wireframe or photowire composite; and photomontage. These should be presented at the same size to allow direct comparison.

4.5.6 Visualisations should be accompanied by a Technical Methodology, setting out the criteria listed in Appendix 10. In addition, a clear written description should be provided to explain the procedures involved in image capture and processing.

Locational Accuracy

4.5.7 For Type 4, the minimum level of locational accuracy is similar to the upper end of the Type 3 range.

4.5.8 The degree of accuracy should be determined on the basis of proximity of viewpoint location to the site and on Sensitivity of receptors / importance of the view. Typically, horizontal accuracy within 1-2 metres can be obtained from aerial photography. See Appendix 14.

4.5.9 In situations where the subject of the photomontage is close and the Sensitivity is high (typically in important urban and heritage contexts) high levels of locational accuracy may be required to establish intervisibility between the viewpoint, the subject of the photomontage and other elements in the scene, e.g. when assessing if a development interrupts a sensitive skyline or not. Such accuracy may be obtained from survey techniques providing sub-metre accuracy (see Appendix 11.4, survey-verified photography).

Image Scaling

4.5.10 The objective of Type 4 visualisation is to present a printed image which gives a realistic impression of scale and detail. Where scale-verifiable output is not possible (Appendix 1.1.7), verified photomontages can still be regarded as Type 4, provided they are supported by quantifiable data and a technical methodology, and agreed by the competent authority.

Table 5, Option 1: 100% enlargement

4.5.11 This is a 39.6° HFoV photograph presented within a 390 x 260mm frame. This option does not provide for binocular image scaling when printed. Nonetheless, it is included within Type 4 for the following reasons:

- where 150% enlargements would be problematic for large / close sites (due to impractical paper sizes), an option is still required for use in the planning process which maintains high levels of accuracy (e.g. levels 'A' or 'B' in Table 1);
- even though a 100% enlargement image will not provide 'binocular' perception scaling, it may still be useful and practical in its own right.
- once the 50mm / FFS combination is engaged, the EXIF metadata of the source RAW / JPG photographs can be interrogated and verified (as per SNH 2017), irrespective of how they are presented - see Appendix 11.2; and
- appropriately captured source photographs are capable of meaningful survey and verification when required - see Appendix 11.4.

4.5.12 In the majority of situations, and wherever context is important to understanding of the proposal, an A1 width 90° cylindrical baseline photograph will provide a 100% enlargement contextual reference.

Table 5, Option 2: 150% enlargement

4.5.13 SNH 2017 effectively requires an image enlargement of 150%, in other words 50% over that which is 'mathematically correct for monocular vision' (see Section 3.8). Option 2 of Table 5 corresponds with this approach. This is regarded as the default enlargement factor for Type 4 visualisations.

4.5.14 The SNH 2017 guidance is endorsed by the LI for windfarms and similar projects which are viewed in expansive landscapes over medium to far distances. Refer directly to the SNH 2017 guidance for full details and requirements.

4.5.15 The image capture and presentation process should be capable of being verified, in accordance with SNH 2017 guidance. See Appendix 11, Verified Photomontages.

4.5.16 As noted at 3.8.10, in mid- to smaller-scale landscapes or townscapes, enlargement factors around halfway between 100% and 150% may be a more appropriate. This guidance does not propose any definitive rule, but considers that this reduced level of enlargement may provide an option for consideration by practitioners and the competent authority.

4.5.17 In either case, the principle, of producing an image which represents the scale of the proposal, is maintained. The proposition, that different approaches may be applied to image scaling, recognises that this depends on context and distance. However, a consistent approach to image scaling should be applied within any project.

Other Approaches

4.5.18 There are circumstances where it may be appropriate to depart from using a 50mm lens on site and from setting up pages with a 150% enlargement. These are described below.

Wider Vertical Field of View (VFoV)

4.5.19 The proposed development, viewed at close quarters, may not be captured by a 50mm lens with FFS camera, or fit within the A3 or A1 width x A4 height page sizes - for example, a tall building or high-voltage overhead lines. Alternative lenses may be required in exceptional circumstances - see Appendix 1.

4.5.20 In such instances, alternatives such as increasing the vertical height of the page (to A2 landscape, A1 landscape width with A3 landscape or even A1 landscape width and height) may be appropriate. Reasons for adopting such dimensions should be set out in the Technical Methodology. Wherever practical, 150% enlargement should be maintained.

Wider Horizontal Field of View (HFoV)

4.5.21 The edge distortion of planar panoramas results in them being unsuitable for images with a wide HFoV. Where the required HFoV exceeds 53.5°, multiple planar panoramas of 53.5° may be butted, or overlapped by 25-50% to provide a wider total HFoV. The extent of overlap may be determined by the total HFoV to be shown. In either case (butting / overlapping) the approach should be clearly explained.

4.5.22 If there is a particular reason to show very wide panoramas, (for example, for linear infrastructure occupying a wide FoV) the use of cylindrical projection (Table 5, Option 1, A1 width) may be considered and, if justified, the reasons explained in the Technical Methodology and the projection set out clearly on the presentation page.

Type 4 Summary

Type 4 visualisations enable the highest level of locational accuracy and image scaling where required:

- For sites / settings which can be captured either as single images or panoramically, use a 50mm lens with Full Frame Sensor camera.
- If the site / setting cannot be captured with the 50mm lens (e.g. close, tall buildings), consider alternative lenses - see Appendix 1.
- Images will typically be presented with a 150% enlargement (27°@ A3, or 53.5° @ A1)
- The enlargement factor should be stated on each presentation page, together with the label 'Visualisation Type: 4'.
- Present Planar projection panoramas for views up to 60° HFoV.
- 100% size (39.6° HFoV @ A3) may be considered and agreed with the competent authority where higher levels of enlargement are not practical.
- For wider view angles, use overlapping or butted planar panoramas.
- For very wide linear infrastructure, consider presenting cylindrical panoramas up to 90° at A1 width, with multiple sheets for very wide panoramas.
- Wherever wider context is important to understanding of the proposal, include an A1 width 90° cylindrical baseline photograph.
- Accompany visualisations with a Technical Methodology (see Appendix 10) including a clear written description of procedures involved in image capture and processing.

4.6 Dynamic Visualisations

4.6.1 Emerging visualisation technologies such as Augmented Reality (AR) and Virtual Reality (VR) currently require specialist skills and technology / software and may have significant cost implications and may, therefore, be beyond the scope of many landscape professionals, their clients and competent authorities. However, as these technologies develop, they are likely to become more widely available and used.

Augmented Reality

4.6.2 Augmented Reality (AR) visuals typically use phones, tablets or headsets. AR visuals have the advantage of being able to present moving elements (such as vehicles or turbines) within the view, and, if used on site, of moving the viewpoint. Images can be captured on site and subsequently used off site. Depending on the viewing screen size, visuals will be presented at a range of scales, so care is needed when interpreting their outputs. Similarly, the cameras of such devices are likely to be wide-angle (in the region of 30-35° HFoV). Note that levels of locational accuracy can be improved with surveying techniques, and that specialist devices with precision lenses, or connected to digital cameras, may come into use. It is likely that, under such circumstances, AR could in the future satisfy the requirement of Type 3 visualisations.

Virtual Reality

4.6.3 Virtual Reality (VR) headsets use computer-modelled backgrounds rather than photographic backgrounds, due to their ability to move location within the model. This is a disadvantage in terms of realism, but an advantage in terms of being able to study movement within or around a development. As such, they present an alternative approach to visualising development. Subject to the quality of the hardware used, image resolution may be relatively poor, compared to print outputs.

Summary

4.6.4 AR and VR visuals are under constant development. Although their preparation and use is beyond the scope of this guidance, they are expected to become increasingly important and common in visualisation, as the technologies mature and improve. For more information on Augmented and Virtual Reality, refer to the LI Digital Realities Technical Information Note.