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## Preliminary Environmental Information Report Volume III

Appendix 6-1: LVIA methodology

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## Table of Contents

<b>1</b>	<b>Glossary .....</b>	<b>iv</b>
<b>2</b>	<b>Introduction.....</b>	<b>6</b>
<b>3</b>	<b>Baseline.....</b>	<b>7</b>
<b>4</b>	<b>Design.....</b>	<b>9</b>
<b>5</b>	<b>Assessment.....</b>	<b>10</b>



## Glossary

Cumulative effects	The additional changes caused by the Project in conjunction with other similar developments or as the combined effect of a set of developments, taken together.
Illustrative Viewpoint.	A viewpoint chosen specifically to demonstrate a particular effect or specific issues, which might, for example, be the restricted visibility at certain locations.
Landscape Character Areas	These are single unique areas which are the discrete geographical areas of a particular landscape type.
Landscape Character Type	These are distinct types of landscape that are relatively homogeneous in character. They are generic in nature in that they may occur in different areas in different parts of the country, but wherever they occur they share broadly similar combinations of geology, topography, drainage patterns, vegetation, and historical land use, and settlement pattern, and perceptual and aesthetic attributes.
Landscape effects	Effects on the landscape as a resource in its own right.
Landscape character	A distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse.
Landscape quality (or condition)	A measure of the physical state of the landscape. It may include the extent to which typical character is represented in individual areas, the intactness of the landscape and the condition of individual elements.
Landscape receptors	Defined aspects of the landscape resource that have the potential to be affected by a proposal.
Landscape value	The relative value that is attached to different landscapes by society. A landscape may be valued by different stakeholders for a whole variety of reasons.
Magnitude (of effect)	A term that combines judgements about the size and scale of the effect, the extent of the area over which it occurs, whether it is reversible or irreversible and whether it is short or long term, in duration.
Mitigation	Measures which are proposed to prevent, reduce and where possible offset any significant adverse effects (or to avoid, reduce and if possible remedy identified effects).

Representative Viewpoint	A viewpoint selected to represent the experience of different types of visual receptor, where larger numbers of viewpoints cannot all be included individually and where the significant effects are unlikely to differ.
Sensitivity	A term applied to specific receptors, combining judgements of the susceptibility of the receptor to the specific type of change or development proposed and the value related to that receptor.
Specific Viewpoint	A viewpoint because it is key and sometimes a promoted viewpoint within the landscape, including for example specific local visitor attractions, viewpoints in areas of particularly noteworthy visual and/or recreational amenity such as landscapes with statutory landscape designations, or viewpoints with particular cultural landscape associations.
Susceptibility	The ability of a defined landscape or visual receptor to accommodate the specific Project without undue negative consequences.
Visual amenity	The overall pleasantness of the views people enjoy of their surroundings, which provides an attractive visual setting or backdrop for the enjoyment of activities of people living, working, recreating, visiting or travelling through an area.
Visual effect	Effects on specific views and on the general visual amenity experienced by people.
Visual receptor	Individuals and/or defined groups of people who have the potential to be affected by a proposal.
Zone of Theoretical Visibility (ZTV)	A map, usually digitally produced, showing areas of land within which a development is theoretically visible.

Definitions from *Guidelines for Landscape and Visual Impact Assessment*, 3rd Edition, Landscape Institute with the Institute of Environmental Management and Assessment, 2013

## 1 Introduction

- 1.1.1 This appendix contains additional detail regarding the assessment methodology, supplementing the information provided within the LVIA technical chapter. This appendix sets out a standard approach – specific matters in terms of the scope of assessment, Study Area and modifications to the standard approach for this assessment are set out within the LVIA.
- 1.1.2 The methodology has the following key stages, which are described in more detail in subsequent sections, as follows:
- **Baseline** – includes the gathering of documented information; agreement of the scope of the assessment with the EIA co-ordinator and local planning authority; site visits and initial reports to the EIA co-ordinator of issues that may need to be addressed within the design.
  - **Design** – input into the design / review of initial design / layout / options and mitigation options.
  - **Assessment** – includes an assessment of the landscape and visual effects of the scheme, requiring site based work and the completion of a full report and supporting graphics.
  - **Cumulative Assessment** – assesses the effects of the Project in combination with other developments, where required.



## 2 Baseline

2.1.1 The baseline study establishes the planning policy context, the scope of the assessment and the key receptors. It typically includes the following key activities:

- A desk study of relevant current national and local planning policy, in respect of landscape and visual matters, for the site and surrounding areas.
- Agreement of the main Study Area radius with the Local Planning Authority (LPA).
- A desk study of nationally and locally designated landscapes for the site and surrounding areas.
- A desk study of existing landscape character assessments and capacity and sensitivity studies for the site and surrounding areas.
- A desk study of historic landscape character assessments (where available) and other information sources required to gain an understanding of the contribution of heritage assets to the present day landscape.
- Collation and evaluation of other indicators of local landscape value such as references in landscape character studies or parish plans, tourist information, local walking & cycling guides, references in art and literature.
- The identification of valued character types, landscape elements and features which may be affected by the proposal, including rare landscape types.
- Exchanging information with other consultants working on other assessment topics for the development as required to inform the assessment.
- Draft Zone of Theoretical Visibility (ZTV) studies to assist in identifying potential viewpoints and indicate the potential visibility of the Project, and therefore scope of receptors likely to be affected. The methodology used in the preparation of ZTV studies is described below.
- The identification of candidate sites and development through consultation of the scope of assessment for cumulative effects.
- The identification of, and agreement through consultation, the number and location of representative and specific viewpoints within the Study Area.



- The identification of the range of other visual receptors (e.g. people travelling along routes, or within open access land, settlements and residential properties) within the Study Area.
- Site visits to become familiar with the site and surrounding landscape; verify documented baseline; and to identify viewpoints and receptors.
- Input to the design process.

2.1.2 The information gathered during the baseline assessment is drawn together and summarised in the baseline section of the report and reasoned judgements are made as to which receptors are likely to be significantly affected. Only these receptors are then taken forward for the detailed assessment of effects (GLVIA3, para 3.19).

### 3 Design

- 3.1.1 The design and assessment stages are necessarily iterative, with stages overlapping in parts. Details of any mitigation measures incorporated within the Project to help reduce identified potential landscape and visual effects are set out within the LVIA.

## 4 Assessment

4.1.1 The assessment of effects includes further desk and site based work, covering the following key activities:

- The preparation of a ZTV based on the finalised design for the development.
- An assessment, based on both desk study and site visits, of the sensitivity of receptors to the Project.
- An assessment, based on both desk study and site visits, of the magnitude and significance of effects upon the landscape character, designated and recreational landscape and the existing visual environment arising from the Project.
- Informed professional judgements as to whether each identified effect is positive, neutral or adverse.
- A clear description of the effects identified, with supporting information setting out the rationale for judgements.
- Identification of which effects are judged to be significant based on the significance thresholds set out within the LVIA.
- The production of photomontages from a selection of the agreed viewpoints showing the anticipated view following construction of the Project.

## 4.2 Site

4.2.1 The effect of physical changes to the site are assessed in terms of the effects on the landscape fabric.

## 4.3 Landscape and Townscape Character Considerations

4.3.1 The European Landscape Convention (2000) provides the following definition: *“Landscape means an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors.”*

4.3.2 The susceptibility of landscape character areas is judged based on both the attributes of the receiving environment and the characteristics of the Project as discussed under ‘susceptibility’ within the methodology section of the LVIA. Thus, the key characteristics of the landscape character types/areas are considered, along with scale, openness, topography; the absence of, or presence, nature and

patterns of development, settlement, landcover, the contribution of heritage assets and historic landscape elements and patterns, and land uses in forming the character. The condition of the receiving landscape, i.e. the intactness of the existing character will also be relevant in determining susceptibility. The likelihood of material effects on the landscape character areas can be judged based on the scale and layout of the proposal and how this relates to the characteristics of the receiving landscape.

4.3.3 The introduction of any development into a landscape adds a new feature which can affect the 'sense of place' in its near vicinity, but with distance, the existing characteristics reassert themselves. The baseline is informed by desk study of published Landscape Character Assessments (LCA's) and field investigations. In order to assess whether landscape character is significantly affected by a Project, it should be determined how the key characteristics would be affected. The judgement of magnitude therefore reflects the degree to which the key characteristics and elements which form those characteristics will be altered by the Project.

#### 4.4 Landscape value - considerations

4.4.1 Para 5.19 of GLVIA3 states that *"a review of existing landscape designations is usually the starting point in understanding landscape value, but the value attached to undesignated landscapes also needs to be carefully considered and individual elements of the landscape- such as trees, buildings or hedgerows -may also have value. All need to be considered where relevant."*

4.4.2 Para 5.20 of GLVIA3 indicates information which might indicate landscape value, including:

- Information about areas recognised by statute such as National Parks and National Landscapes (Areas of Outstanding Natural Beauty);
- Information about Heritage Coasts, where relevant;
- Local planning documents for local landscape designations;
- Information on features such as Conservation Areas, listed buildings, historic or cultural sites;

- Art and literature, identifying value attached to particular areas or views; and
- Material on landscapes of local or community interest, such as local green spaces, village greens or allotments.

4.4.3 An assessment of landscape value is made based on the following factors outlined in Table 1 of the Landscape Institute's Technical Guidance Notes 02-21: *Assessing landscape value outside national designations* criteria including: natural heritage; cultural heritage; landscape condition; associations; distinctiveness; recreational; perceptual (scenic); perceptual (wildness and tranquillity); and functional.

## 4.5 Viewpoints and Visual Receptors – considerations

4.5.1 A wide variety of visual receptors can reasonably be anticipated to be affected by the Project. Within the baseline assessment, the ZTV study and site visits are used to determine which visual receptors are likely to be significantly affected by the Project and therefore merit detailed assessment. In line with GLVIA3 both representative and specific viewpoints may be identified to inform the assessment. In general, the majority of viewpoints will be representative – representing the visual receptors at the distance and direction in which they are located and of the type(s) that would be present at that location. The representative viewpoints have generally been selected at locations where significant effects would be anticipated; though some may be selected outside of that zone – either to demonstrate the reduction of effects with distance; or to specifically ensure the representation of a particularly sensitive receptor.

4.5.2 The types of visual receptors likely to be included with the assessment are:

- Users of walking routes or accessible landscapes including Public Rights of Way, National and Regional Trails and other long distance routes, Common Land, Open Access Land, permissive paths, land held in trust (e.g. Woodland Trust, National Trust) offering free public access, and other regularly used, permitted walking routes;
- Visitors to and residents of settlements;
- Visitors to specific valued viewpoints;

- Visitors to attractions or heritage assets for which landscape and views contribute to the experience; and
- Users of roads or identified scenic routes.

4.5.3 Visual receptors are grouped for assessment into areas which include all of the routes, public spaces and properties within that area. Groups are selected as follows:

- Based around settlements in order to describe effects on that that community – e.g. a settlement and routes radiating from that settlement; or
- An area of open countryside encompassing a number of routes, accessible spaces and individual dwellings; or
- An area of accessible landscape and the routes within and around it e.g. a country park; and
- such that effects within a single visual receptor group are similar enough to be readily described and assessed.

4.5.4 With the exception of specific viewpoints, each route, settlement or location will encompass a range of possible views, which might vary from no view of the development to very clear, close views. Therefore, effects are described in such a way as to identify where views towards the Project are likely to arise and what the scale, duration and extent of those views are likely to be. In some cases, this will be further informed by a nearby viewpoint and in others it will be informed with reference to the ZTV, aerial photography and site visits. Each of these individual effects are then considered together in order to reach a judgement of the effects on the visual receptors along that route, or in that place.

4.5.5 The representative viewpoints are used as ‘samples’ on which to base judgements of the scale of effects on visual receptors. The viewpoints represent multiple visual receptors, and duration and extent are judged when assessing impacts on the visual receptors.

4.5.6 For specific viewpoints (key and sometimes promoted viewpoints within the landscape), duration and extent are assessed, with extent reflecting the extent to which the Project affects the valued qualities of the view from the specific viewpoint.

**Visual Receptor Sensitivity – Typical Examples**

	High	Medium	Low
<b>National/International</b>	1	4	8
<b>Local/District</b>	2	5	8
<b>Community</b>	3	6	9
<b>Limited</b>		7	10

1. Visitors to valued viewpoints or routes which people might visit purely to experience the view, e.g. promoted or well-known viewpoints, routes from which views that form part of the special qualities of a designated landscape can be well appreciated; key designed views; panoramic viewpoints marked on maps.
2. People in locations where they are likely to pause to appreciate the view, such as from local waypoints such as benches; or at key views to/from local landmarks. Visitors to local attractions, heritage assets or public parks where views are an important contributor to the experience, or key views into/out of Conservation Areas.
3. People in the streets around their home, or using public rights of way, navigable waterways or accessible open space (public parks, open access land).
4. Users of promoted scenic rail routes.
5. Users of promoted scenic local road routes.
6. Users of cycle routes, local roads and railways.
7. Outdoor workers.
8. Users of A-roads which are nationally or locally promoted scenic routes.
9. Users of sports facilities such as cricket grounds and golf courses.
10. Users of Motorways and A-roads; shoppers at retail parks, people at their (indoor) places of work.

**4.6 Cumulative Assessment**

4.6.1 Cumulative effects arise where the visibility of other developments overlaps or combines with that of the Project to incur an incremental effect. GLVIA3 para 7.5 advises that:



*“The challenge is to keep the task reasonable and in proportion to the nature of the project under consideration. Common sense has an important part to play in reaching agreement about the scope of the assessment [and that] it is always important to remember that the emphasis in EIA is on the likely significant effects rather than comprehensive cataloguing of every conceivable effect that might occur.”*

- 4.6.2 The scope of the cumulative assessment is therefore focussed on those other developments which are likely to influence the decision-making process. A long list of cumulative schemes was prepared by the Applicant as part of the statutory consultations with PINS and IoACC. The long list of cumulative schemes was refined following consultations with PINS and IoACC in July 2024.
- 4.6.3 Developments that are subject to a valid planning application are included where specific circumstances indicate there is potential for cumulative effects to occur, with progressively decreasing emphasis placed on those which are less certain to proceed. Typically, operational and consented developments are treated as being part of the landscape and visual baseline. i.e. it is assumed that consented schemes will be built except for in occasional circumstances where there is good reason to suggest that they will not be constructed.
- 4.6.4 The cumulative assessment examines the same groups of landscape and visual receptors as for the assessment of the Project, though different viewpoints may be used in order to better represent the likely range of effects arising from the schemes in-combination with one another. In addition, the effects on users of routes through the area, from which developments may be visible sequentially as a person travels through the landscape are also considered, if appropriate. The cumulative assessments are based upon desk study, ZTVs, aerial photography and fieldwork.
- 4.6.5 In relation to the cumulative landscape and visual assessment, it is important to note:
- For each receptor, cumulative or in-combination effects may be the same as for the application scheme, or greater (where the influence of multiple schemes would increase effects, or where schemes in planning other than the application scheme would have the predominant effects);

- For each receptor, incremental cumulative effects may be the same as for the Project, or reduced (where the influence of other schemes in planning would be such that were they consented and considered to be part of the baseline, the incremental change arising from the addition of the Project would be less).
- Subject to the distance and degree of intervening landform, vegetation and structures there may be no cumulative effects.

4.6.6 The way in which the assessment is described and presented is varied depending on the number and nature of scenarios which may arise.

## 4.7 Visualisations and ZTV Studies

### ZTV Studies

4.7.1 ZTV studies are prepared using the ESRI ArcGIS Viewshed routine. This creates a raster image that indicates the visibility (or not) of the points modelled. LDA Design undertakes ZTV studies that include visual barriers from built form or vegetation (with heights derived from LiDAR 2m<sup>2</sup> resolution surface mapping data). If significant deviations from these assumed heights are noted during site visits, for example young or felled areas of woodland, or recent changes to built form, the features concerned will be adjusted within the digital surface model data to obtain actual heights for these visual barriers.

4.7.2 The model is also designed to take into account both the curvature of the earth and light refraction. LDA Design undertake all ZTV studies with observer heights of 2 metres above ground level (agl). The ZTV analysis begins at 1m from the observation feature and will work outwards in a grid of the set resolution until it reaches the end of the terrain map for the Project. For all plan production LDA Design will produce a ZTV that has a base and overlay of the 1:50,000 Ordnance Survey Raster mapping or greater. The ZTV will be reproduced at a suitable scale on an A3 template to encompass the Study Area.

### Ground Model Accuracy

4.7.3 Depending on the level of detail required, different height datasets may be applied as summarised below:

Product	Distance Between Point Data	Vertical RMSE Error
LiDAR	50cm – 2m	up to +/- 5cm
Photogrammetrically Derived Heights	2m – 5m	up to +/- 1.5m
Ordnance Survey OS Terrain 5	5 m	up to +/- 2.5m
NextMap25 DTM	25 m	+/- 2.06m
Ordnance Survey OS Terrain 50	50 m	+/- 4m

4.7.4 Site-specific topographical survey data may also be used where available.

#### **Photomontages and Photowires**

4.7.5 In accordance with the Landscape Institute’s Technical Guidance Note 06/19 *Visual representation of development proposals*, photomontages will be prepared to the technical methodology set out in below. The photowires for this LVIA will adhere to the Type 2 wireline specification. The Type 2 wireline visualisations do not account any embedded mitigation or visual screening that may be provided by proposed vegetation between year 1 and 15 of operation.

4.7.6 Verified or verifiable photomontages are produced in seven stages. Photowires are produced using the same overall approach, but only requires some of the steps outlined below:

- 1) Photography is undertaken using a full frame digital SLR camera and 50mm lens. A tripod is used to take overlapping photographs which are joined together using an industry standard application to create a single panoramic image for each viewpoint. These are then saved at a fixed height and resolution to enable correct sizing when reproduced in the final images. The photographer also notes the GPS location of the viewpoint and takes bearings to visible landmarks whilst at the viewpoint.
- 2) Creation of a ground model and 3D mesh to illustrate that model. This is created using NextMap25 DTM point data (or occasionally other terrain

datasets where required, such as site-specific topographical data or Photogrammetrically Derived Heights) and ground modelling software.

- 3) The addition of the Project to the 3D model. The main components of the Project are accurately modelled in CAD and are then inserted into the 3D model at the proposed locations and elevations.
- 4) Wireline generation – The viewpoints are added within the 3D CAD model with each observer point being inserted at 1.5m above the modelled ground plane. The location of the landmarks identified by the photographer may also be included in the model. The view from the viewpoint is then replicated using virtual cameras to create a series of single frame images, which also include bearing markers. As with the photographs, these single frame images are joined together using an industry standard application to create a single panoramic image for each viewpoint. These are then saved at a fixed height and resolution to ensure that they are the same size as the photographs.
- 5) Wireline matching – The photographs are matched to the wirelines using a combination of the visible topography, bearing markers and the landmarks that have been included in the 3D model.
- 6) For the photomontage, an industry standard 3D rendering application is used to produce a rendered 3D view of the Project from the viewpoint. The rendering uses materials to match the intended surface finishes of the development and lighting conditions according to the date and time of the viewpoint photograph.
- 7) The rendered Project is then added to the photograph in the position identified by the wireline (using an image processing application) to ensure accuracy. The images are then layered to ensure that the development appears in front of and behind the correct elements visible within the photograph.

**Technical Methodology**

Information	Technical Response
<b>Photography</b>	
Method used to establish the camera location	Aerial photography in ESRI ArcGIS along with GPS reading taken on site
Likely level of accuracy of location	Better than 1m
If lenses other than 50mm have been used, explain why a different lens is appropriate	N/A
Written description of procedures for image capture and processing	See para above
Make and type of Panoramic head and equipment used to level head	Manfrotto Levelling Head 338 and Manfrotto Panoramic Head MH057A5
If working outside the UK, geographic co-ordinate system (GCS) used	N/A
<b>3D Model/Visualisation</b>	
Source of topographic height data and its resolution	LiDAR 2m resolution
How have the model and the camera locations been placed in the software?	Georeferenced model supplied by engineers/architects Camera locations taken from photography viewpoint locations
Elements in the view used as target points to check the horizontal alignment	Existing buildings, infrastructure/road alignments, telegraph poles/street lighting/signage, field boundaries, DSM
Elements in the view used as target points to check the vertical alignment	Topography, existing buildings
3D Modelling / Rendering Software	Civil 3D / AutoCAD / 3DS Max / Rhino / V-Ray

