

## **Appendix 4.1**

### **Landscape and Visual Impact Assessment – Methodology and Criteria including Mapping Visibility and Photomontage Methodology**

#### **Introduction**

The methodology for the Landscape and Visual Impact Assessment undertaken for the proposed development is detailed in Chapter 4 of the Environmental Statement (ES). The following information is provided and should be read in conjunction with the overview methodology outlined in Chapter 4 of the ES:

As advised in the Guidelines for Landscape and Visual Impact Assessment (3rd Edition) (GLVIA3), the judgements made in respect of both landscape and visual effects are a combination of an assessment of the sensitivity of the receptor and the magnitude of the landscape or visual effect. The following details the definitions used in assessing sensitivity and magnitude for landscape and visual receptors.

Where it is determined that the assessment falls between or encompasses two of the defined criteria terms, then the judgement will be described as High/ Medium or Moderate/ Minor etc. This indicates that the assessment lies between the respective definitions or encompasses aspects of both.

#### **Landscape**

##### **Landscape Sensitivity**

Landscape receptors are assessed in terms of their 'Landscape Sensitivity'. This combines judgements on the value to be attached to the landscape and the susceptibility to change of the landscape from the type of change or development proposed. The definition and criteria adopted for these contributory factors is detailed below.

There can be complex relationships between the value attached to landscape receptors and their susceptibility to change which can be especially important when considering change within or close to designated landscapes. For example an internationally, nationally or locally valued landscape does not automatically or by definition have a high susceptibility to all types of change. The type of change or development proposed may not compromise the specific basis for the value attached to the landscape.

##### Landscape Value

Value can apply to a landscape area as a whole, or to the individual elements, features and aesthetic or perceptual dimensions which contribute to the character of the landscape. The following criteria have been used to categorise landscape value. Where there is no clear existing evidence on landscape value, an assessment is made based on the criteria/ factors identified below (based on the guidance in GLVIA3 Box 5.1 Page 84).

- Landscape quality (condition)
- Scenic quality
- Rarity
- Representativeness
- Conservation interest
- Recreation value
- Perceptual aspects
- Associations

<b>Landscape Value</b>	<b>Definition</b>
High	Landscape receptors of high importance based upon factors of quality, rarity, representativeness, conservation interest, recreational value, perceptual qualities and associations.
Medium	Landscape receptors of medium importance based upon factors of quality, rarity, representativeness, conservation interest, recreational value, perceptual qualities and associations.
Low	Landscape receptors of low importance based upon factors of quality, rarity, representativeness, conservation interest, recreational value, perceptual qualities and associations.

### Landscape Susceptibility to Change

This means the ability of the landscape receptor (overall character type/ area or individual element/ feature) to accommodate the proposed development without undue consequences for the maintenance of the baseline position and/ or the achievement of landscape planning policies and strategies. The definition and criteria for the assessment of Landscape Susceptibility to Change is as follows:

<b>Landscape Susceptibility to Change</b>	<b>Definition</b>
High	A highly distinctive and cohesive landscape receptor, with positive characteristics and features and no or very few detracting or intrusive elements. Landscape features intact and in very good condition and/ or rare. Limited capacity to accept the type of change/ development proposed.
Medium	Distinctive and more commonplace landscape receptor, with some positive characteristics/ features and some detracting or intrusive elements. Landscape features in moderate condition. Capacity to accept well planned and designed change/ development of the type proposed.
Low	Landscape receptor of mixed character with a lack of coherence and including detracting or intrusive elements. Landscape features that may be in poor or improving condition and few that could not be replaced.  Greater capacity to accept the type of change/ development proposed.

### **Magnitude of Landscape Effects**

The magnitude of landscape effects is the degree of change to the landscape receptor in terms of its size or scale of change, the geographical extent of the area influenced and its duration and reversibility. The table below sets out the categories and criteria adopted in respect of the separate considerations of Scale or Size of the Degree of Change and Reversibility. The geographical extent and duration of change are described where relevant in the assessment.

### Scale or Size of the Degree of Landscape Change

<b>Scale or Size of the Degree of Landscape Change</b>	<b>Definition</b>
High	Total loss of or major alteration to key characteristics / features and the introduction of new elements totally uncharacteristic to the receiving landscape. Overall landscape receptor will be fundamentally changed.
Medium	Partial loss of or alteration to one or more key characteristics / features and the introduction of new elements that would be evident but not necessarily uncharacteristic to the receiving landscape. Overall landscape receptor will be obviously changed.
Low	Limited loss of, or alteration to one or more key characteristics/ features and the introduction of new elements evident and/ or characteristic to the receiving landscape. Overall landscape receptor will be perceptibly changed.
Negligible	Very minor alteration to one or more key characteristics/ features and the introduction of new elements characteristic to the receiving landscape. Overall landscape receptor will be minimally changed.
None	No loss or alteration to the key characteristics/ features, representing 'no change'.

### Reversibility

<b>Reversibility</b>	<b>Definition</b>
Irreversible	The development would be permanent and the assessment site could not be returned to its current/ former use.
Reversible	The development could be deconstructed/ demolished and the assessment site could be returned to broadly its current/ historic use (although that may be subject to qualification depending on the nature of the development).

## **Visual**

### **Sensitivity of Visual Receptors**

Visual sensitivity assesses each visual receptor in terms of their susceptibility to change in views and visual amenity and also the value attached to particular views. The definition and criteria adopted for these contributory factors is detailed below.

### Visual Susceptibility to Change

The susceptibility of different visual receptors to changes in views and visual amenity is mainly a function of; firstly, the occupation or activity of people experiencing the view at particular locations; and secondly, the extent to which their attention or interest may therefore be focussed on the views and visual amenity they experience.

<b>Visual Susceptibility to Change</b>	<b>Definition</b>
High	<p>Residents at home with primary views from ground floor/garden and upper floors.</p> <p>Public rights of way/ footways where attention is primarily focussed on the landscape and on particular views.</p> <p>Visitors to heritage assets or other attractions whose attention or interest is likely to be focussed on the landscape and/ or on particular views.</p> <p>Communities where views make an important contribution to the landscape setting enjoyed by residents.</p> <p>Travellers on recognised scenic routes.</p>
Medium	<p>Residents at home with secondary views (primarily from first floor level).</p> <p>Public rights of way/ footways where attention is not primarily focussed on the landscape and/ or particular views.</p> <p>Travellers on road, rail or other transport routes.</p>
Low	<p>Users of outdoor recreational facilities where the view is less important to the activities (e.g. sports pitches).</p> <p>Travellers on road, rail or other transport where views are primarily focussed on the transport route.</p> <p>People at their place of work where views of the landscape are not important to the quality of the working life.</p>

### Value of Views

The value attached to a view takes account of any recognition attached to a particular view and/ or any indicators of the value attached to views, for example through guidebooks or defined viewpoints or references in literature or art.

<b>Value of Views</b>	<b>Definition</b>
High	A unique or identified view (eg. shown as such on Ordnance Survey map, guidebook or tourist map) or one noted in literature or art. A view where a heritage asset makes an important contribution to the view.
Medium	A typical and/ or representative view from a particular receptor.
Low	An undistinguished or unremarkable view from a particular receptor.

### **Magnitude of Visual Effects**

Magnitude of Visual Effects evaluates each of the visual effects in terms of its size or scale, the geographical extent of the area influenced and its duration and reversibility. The table below sets out the categories and criteria adopted in respect of the Scale or Size (including the degree of contrast) of Visual Change. The distance and nature of the view and whether the view will be permanent or transient are also detailed in the Visual Effects Table.

Scale or Size of the Degree of Visual Change	Definition
High	The proposal will result in a large and immediately apparent change in the view, being a dominant and new and/ or incongruous feature in the landscape.
Medium	The proposal will result in an obvious and recognisable change in the view and will be readily noticed by the viewer.
Low	The proposal will constitute a minor component of the wider view or a more recognisable component that reflects those apparent in the existing view. Awareness of the proposals will not have a marked effect on the overall nature of the view.
Negligible/ None	Only a very small part of the proposal will be discernible and it will have very little or no effect on the nature of the view.

### Level of Effect

The final conclusions on effects, whether adverse or beneficial, are drawn from the separate judgements on the sensitivity of the receptors and the magnitude of the effects. This overall judgement is formed from a reasoned professional overview of the individual judgements against the assessment criteria.

GLVIA3 notes, at paragraphs 5.56 and 6.44, that there are no hard and fast rules with regard to the level of effects, therefore the following descriptive thresholds have been used for this appraisal:

- **Major:** A Major landscape or visual effect based on an evaluation of the susceptibility and value of the receptor, combined with the magnitude of change;
- **Moderate:** A Moderate landscape or visual effect based on an evaluation of the susceptibility and value of the receptor, combined with the magnitude of change;
- **Minor:** A Minor landscape or visual effect based on an evaluation of the susceptibility and value of the receptor, combined with the magnitude of change;
- **Negligible:** A Negligible landscape or visual effect based on an evaluation of the susceptibility and value of the receptor, combined with the magnitude of change.

### Judging Overall Significance

A judgement is reached, based on the assessment, as to whether an effect is significant or not. Those degrees of effects that are considered to be *significant* by the assessor for *this* LVIA are judged to be effects that are either Major or Major/ Moderate.

GLVIA3 Statement of Clarification 1/13 (2013)<sup>1</sup> notes that:

*"Concerning 'significance', it is for the assessor to define what the assessor considers significant... Depending on the means of judgment and terminology (which should be explicitly set out), effects of varying degrees of change (or levels of change), may be derived. The assessor*

<sup>1</sup> Landscape Institute and the Institute of Environmental Management (10th June 2013) **GLVIA3 Statement of Clarification 1/13**

should then establish (and it is for the assessor to decide and explain) the degree or level of change that is considered to be significant.” (GLVIA3 Statement of Clarification, § 3.)

### **Significance of Landscape Effects**

GLVIA3 states, at paragraph 5.56, that:

*“There are no hard and fast rules about what makes a significant effect, and there cannot be a standard approach since circumstances vary with the location and context and with the type of proposal. At opposite ends of the spectrum it is reasonable to say that:*

- *Major loss or irreversible negative effects, over an extensive area, on elements and/ or aesthetic and perceptual aspects that are key to the character of nationally valued landscapes are likely to be of the greatest significance;*
- *Reversible negative effects of short duration, over a restricted area, on elements and/ or aesthetic and perceptual aspects that contribute to but are not key characteristics of the character of landscapes of community value are likely to be of the least significance and may, depending on the circumstances, be judged as not significant;*
- *Where assessments of significance place landscape effects between these extremes, judgements must be made about whether or not they are significant, with full explanations of why these conclusions have been reached.”* (GLVIA3 paragraph 5.56.)

### **Significance of Visual Effects**

GLVIA3 states, at paragraph 6.44, that:

*“There are no hard and fast rules about what makes a significant effect, and there cannot be a standard approach since circumstances vary with the location and context and with the type of proposal. In making a judgement about the significance of visual effects the following points should be noted:*

- *Effects on people who are particularly sensitive to changes in views and visual amenity are more likely to be significant;*
- *Effects on people at recognised and important viewpoints or from recognised scenic routes are more likely to be significant;*
- *Large-scale changes which introduce new, non-characteristic or discordant or intrusive elements into the view are more likely to be significant than small changes or changes involving features already present within the view.”* (GLVIA3 paragraph 6.44.)

## **Mapping Visibility and Photomontage Methodology**

### **Mapping Visibility**

GLVIA3 advises that land that may potentially be visually connected with a proposed development should (subject to the scale and nature of the proposed development) be identified and mapped. It identifies two main approaches to mapping visibility - by a manual method and by a digital (or computer modelled) method. A combination of both approaches usually provides the best results.

In this instance, the approach has adopted both methods to map the potential visible extent of the proposed development. Firstly, a digital modelled Zone of Theoretical Visibility (ZTV) has been defined as a desk based study. This ZTV has then been 'tested' and reviewed in the field and through cross sectional analysis to produce a more representative and refined ZTV indicating the main visible extents of the proposed development.

### **Zone of Theoretical Visibility (ZTV)**

The Zone of Theoretical Visibility (ZTV), is a computer-generated tool used to identify the 'theoretical' extent of visibility of a development. It is a desk study component of the visibility analysis.

The digital terrain model of the Site and the surrounding area is sourced from Ordnance Survey. This computer model is a 'Bare Earth' terrain model and therefore does not feature any areas of settlement, buildings, woodland, vegetation or other features or boundaries. These elements can have a substantive visual screening effect, especially in combination. As a result, the computer modelled 'Bare Earth' ZTV presents an extreme view of the possible 'worst case' visibility of the proposed development, without taking into account of those features in the surrounding landscape that may contribute towards visually screening the proposed development from certain directions and positions.

This type of ZTV is frequently used as a starting point. GLVIA3 recognises the importance of surrounding landscape components in influencing actual visibility and in relation to these components it states; '*Their effects are best judged by field surveys that can examine and record their location, size and extent, and their effect in screening visibility at key points...Site surveys are therefore essential to provide an accurate baseline assessment of visibility.*' (para 6.10)

It is important that the benefits and limitations of ZTV are fully understood - it is a useful tool, amongst others, particularly in the early stages of a project, to assist in gaining an appreciation of the potential and maximum visibility of a development. The 'Bare Earth' ZTV;

- provides a useful guide to field survey and analysis by showing areas from which visibility may potentially occur.
- focuses the visual assessment process on those areas which may be affected and avoids those which won't.
- supports more detailed field based evaluation and analysis, which can draw upon the 'Bare Earth' ZTV, to more accurately determine the potential visibility of the development.

It is also important to recognise that the significance of the visual effects arising from a development are dependent on many other factors as described elsewhere in the landscape and visual impact assessment methodology.

### **Project (Northampton Gateway) Specific Details:**

#### ZTV (Bare Earth Computer Model):

OS Terrain5 Digital Terrain Model (DTM) data on a 5 metre grid has been used to model the 'Bare Earth'. The data was thinned using a vertical thinning tolerance of 0.2m and horizontal spacing of 50m to reduce the number of points in the data set. OS Terrain 5 typically exceeds a root mean square error (RMSE) value of 2 metres, and in urban areas and major communication routes the data has a measured RMSE of 1.5 metres.

The ZTV has been modelled and is based upon the Illustrative Masterplan layout of buildings and infrastructure and using both the maximum building/ structures heights and maximum plot/ floor levels as detailed on the Proposed Development Parameters Plan. In this scenario, it presents the 'worst case' situation in terms of visible extents.

The ZTV was carried out using the 'line of sight to features' function in LSS. The analysis was carried out on a 50m grid at an eye level of 1.6m.

#### ZTV (Site Analysis):

The ZTV (Site Analysis) has been prepared (for both the Main Site Proposed Development and for the Bypass Proposed Development) following preparation of the 'Bare Earth' ZTV. The ZTV's (Site Analysis) for the Main Site Proposed Development and for the Bypass Proposed Development represent refined and more accurate representations of the potential visible extent of the Proposed Development. The ZTV's (Site Analysis) have been 'tested' and reviewed by both site based and further desk based analysis.

The resultant ZTV's (Site Analysis) are approximate, yet sufficiently well researched to be representative of the potential visible extent of the Proposed Development. As depicted, the ZTV (Site Analysis) illustrates the main area from within which views towards the Proposed Development will be potentially possible. There will be some locations beyond the ZTV (Site Analysis) that will also have a view(s) towards part of the Proposed Development, yet in these instances the views are most likely to be limited and/or distant and not likely to result in any significant visual effects.

It is also acknowledged that there will be some locations within the ZTV (Site Analysis) that will not have a view(s) towards part of the proposed development. Both of these scenarios are inevitable due to the presence of woodland, trees, hedgerows, settlement, buildings and other visual barriers throughout the surrounding landscape and the resultant complexities of determining the likely visibility of the Proposed Development.

The resultant ZTV (Site Analysis) is considered to be sufficiently refined and 'tested' to be an accurate representation of the main areas from within which the Proposed Development will be visible.

### **Photomontage Methodology**

Representative photomontages for the proposed development have been prepared based upon the agreed viewpoint locations. The methodology for the preparation of these photomontages is detailed below:

The photomontages were prepared in accordance with accepted guidance set out in The Landscape Institute and The Institute of Environmental Management & Assessment's – "*Guidelines for Landscape & Visual Impact Assessment – Third Edition*" and Landscape Institute Advice Note 01/11 – "*Photography and photomontage in landscape and visual impact assessment*".

A Canon 400D digital SLR, was used to take a series of adjoining photographs, with approximately 50% overlap, allowing the photos to be stitched using Canon Photostitch software, thus illustrating the full horizontal extents of each view. The horizontal field of view for each viewpoint montage varies, yet is based upon the landscape context for each respective view. This field of view is indicated on each Photomontage viewpoint.



A 3D model (created using LSS software) of the proposed development was created showing the proposed development. The proposed 3D LSS model was then accurately positioned in the photo viewpoints using reference markers. These markers are existing vertical features, such as buildings, pylons, and landform. Having set the 3D model accurately into the photo viewpoint, the model has then been rendered using Adobe Photoshop software. The textures used to create proposed workings were adjusted to suit the light conditions within the photograph.

#### Photomontage Project (Northampton Gateway SRFI) Specific Details:

The Proposed Development shown within the photomontages is illustrative only yet is based upon the maximum height for the development plot (and finished floor) levels and the maximum building heights (including the rail gantry cranes). The position and extent of the buildings and other elements of the Proposed Development reflect the Illustrative Masterplan, which is considered to be suitably representative of the potential layout, form, and extent of the proposals.

The use of the maximum height for the development plot (and finished floor) levels and the maximum building heights therefore represents the 'worst case' scenario in terms of the likely visible extent of the Proposed Development. 'Winter' views have also been adopted which also represent the 'worst case' scenario in terms of visual screening or filtering by woodland, trees and other planting.

The final design and detailing of the built development (elevational treatments, colours, rooflines etc) will be subject to subsequent detailed design work and agreement and therefore the final details of the buildings shown will differ. For further detail of the design approach to the scheme and proposed buildings, please refer to the accompanying Design and Access Statement.

The photomontages depict the scheme upon full completion (ie with all buildings, rail infrastructure, transport and other infrastructure and landscape and GI proposals included), detailed as Year 0, and after 15 years of planting growth.

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A Canon 400D digital SLR, was used to take a series of adjoining photographs, with approximately 50% overlap, allowing the photos to be stitched using Canon Photostitch software, thus illustrating the full horizontal extents of each view. The horizontal field of view for each viewpoint montage varies, yet is based upon the landscape context for each respective view. This field of view is indicated on each Photomontage viewpoint.

A 3D model (created using LSS software) of the proposed development was created showing the proposed development. The proposed 3D LSS model was then accurately positioned in the photo viewpoints using reference markers. These markers are existing vertical features, such as buildings, pylons, and landform. Having set the 3D model accurately into the photo viewpoint, the model has then been rendered using Adobe Photoshop software. The textures used to create proposed workings were adjusted to suit the light conditions within the photograph.

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