M60/M62/M66 Simister Island Interchange

TR010064

ENVIRONMENTAL STATEMENT APPENDICES

APPENDIX 7.1 LANDSCAPE AND VISUAL IMPACT ASSESSMENT METHODOLOGY

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ENVIRONMENTAL STATEMENT APPENDICES

APPENDIX 7.1 LANDSCAPE AND VISUAL IMPACT ASSESSMENT METHODOLOGY

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Appendix 7.1 Landscape and visual impact assessment methodology

1.1 Introduction

1.1.1 This appendix provides an outline of the methodology used to assess the landscape and visual effects of the Scheme. The methodology has been prepared in accordance with the following documents:

- Design Manual for Roads and Bridges (DMRB) LA 104 Environmental Assessment and Monitoring (Highways England, 2020a)
- DMRB LA 107 Landscape and Visual Effects (Highways England, 2020b)
- Guidelines for Landscape and Visual Impact Assessment, Third Edition (GLVIA3) (Landscape Institute and Institute of Environmental Management and Assessment, 2013).
- An Approach to Landscape Character Assessment (Natural England, October 2014)
- Technical Information Note 05/2017 on Townscape Character Assessment (Landscape Institute, April 2018)
- Landscape Institute Technical Guidance Note 06-19 Visual Representation of Development Proposals (LI TGN 06/19) (Landscape Institute, 2019).

Landscape and visual impact assessment process

1.1.2 The following steps have been undertaken for the production of the landscape and visual impact assessment (LVIA):

- A review to take account of relevant standards, guidance and planning policy
- Definition of the study area
- Establishing the environmental baseline conditions and identify viewpoint locations and receptors
- Determining susceptibility, value and sensitivity of landscape and visual receptors, with reference to public perception of the landscape where public consultation allows
- Determining the magnitude of effect arising from the Scheme on its own and in combination with other landscape elements
- Identifying embedded and essential mitigation measures in order to reduce potential effects on landscape and visual receptors

- Producing a landscape design with appropriate landscape mitigation measures illustrated on the Environmental Masterplan (Figure 2.3 of the Environmental Statement Figures (TR010064/APP/6.2))
- Undertaking an assessment of the likely significance of residual effects on landscape and visual receptors
- Undertaking an assessment of the likely significance of cumulative landscape and visual effects which is contained within Chapter 15: Assessment of Cumulative Effects of the Environmental Statement (TR010064/APP/6.1).

1.1.3 Whilst much of the LVIA process is subjective, professional judgement has been used to determine levels of sensitivity, magnitude of effect and significance of effect based on the criteria in DMRB LA 104 and DMRB LA 107 and with reference to GLVIA3. For example, where the significance matrix contains two levels for significance of effect, professional judgement has been used to determine which level is most appropriate.

1.1.4 The LVIA considers the effects at the following timeframes against the baseline conditions in accordance with DMRB LA 107 paragraph 2.6:

- **Construction phase, short term (temporary) effects:** Considers construction activities, temporary works (including compounds and haul roads) and construction traffic during the construction period. Assessments for each landscape and visual receptor has been considered for a worst-case scenario at a time of peak construction activity when there is likely to be the greatest change for an individual receptors. The seasonal differences in winter without foliage and summer with foliage has been described.
- **Operation year 1 (opening year), short term (temporary effects):** Considers impacts on a winter's day and a summer's day during year 1 following completion of all construction, but before mitigation planting would have sufficiently established to provide landscape integration or visual screening, or both. The completed Scheme and traffic using the Scheme has been considered. The judgement with regards the level and significance of effect on each visual receptor refers to winter. Visual effects experienced during winter months are considered to show the worst case in assessment terms. A judgement has been made for a summer's day in year 1 when vegetation is in leaf and views tend to be more enclosed.
- **Operation year 15 (design year) long term (residual) effects:** Considers the impacts on a summer's day and a winter's day in the 15th year after opening, when mitigation planting becomes sufficiently established to provide beneficial integration and screening. Both the completed Scheme and the traffic using it has been considered. The judgement with regards the level and significance of effect on each visual receptor refers to summer. Visual effects experienced during summer months are considered to show the effectiveness of mitigation planting in

assessment terms. A judgement has been made for a winter's day in year 15 when vegetation is without leaf and views tend to be more open.

1.1.5 The assessment and design are guided by relevant sections of the National Policy Statement for National Networks (Department for Transport, 2014) and, where appropriate, includes policies contained within the National Planning Policy Framework (Department for Levelling Up, Housing and Local Communities, 2023). Planning policies and designations of relevance to the Scheme set out in the Bury Unitary Development Plan (1997) has been taken into consideration, for example in terms of assessing the value of receptors and identifying mitigation measures.

Study areas

1.1.6 DMRB LA 104, paragraph 3.13.1, states that, *'the study area for an assessment should reflect the project and the surrounding environment over which effects are reasonably be thought to occur, taking into account cumulative effects'*.

1.1.7 DMRB LA 107, paragraph 3.11 (abbreviated here) states that the study area for the assessment of landscape effects should be *'proportionate'* to the '*project boundary'*, '*wider landscape setting'*, '*extent of the area visible'* and '*the full extent of adjacent or affected landscape receptors of special value'*.

1.1.8 DMRB LA 107, paragraph 3.31 (abbreviated here) states that the study area for assessment of visual effects should be '*proportionate*' to the '*project/construction visual footprint'*, '*the wider visual envelope'*, '*the extent of representative viewpoints visible'*, and '*the extent of adjacent or affected visual receptors and the visual amenity of the area'*.

1.1.9 The study area for definition of the baseline landscape and visual conditions is informed by a consideration of the nature of the development and the extent to which the Scheme is likely to be visible from the surrounding landscape. In the first instance, a digital Zone of Theoretical Visibility (ZTV) (Figure 7.1: Zone of Theoretical Visibility of the Environmental Statement Figures (TR010064/APP/6.2)) has been produced based on a 'bare earth' scenario to illustrate the theoretical extent of visibility extending to 5km from the Scheme boundary to initially identify the extent of views and potential visual receptors.

1.1.10 To help confirm the extent of visibility, a ZTV has then been produced that takes into account screening features such as buildings and large woodland blocks (Figure 7.2: ZTV with Screening Features of the Environmental Statement Figures (TR010064/APP/6.2)) following guidance in DMRB LA 107 paragraph 3.35.1.

1.1.11 The ZTV incorporating screening features is based on buildings from Ordnance Survey (OS) MasterMap and woodland blocks from the National Forest Inventory (NFI) Woodland Map (see ZTV methodology in section 1.2). However, in reality there are additional screening features present in the landscape such as hedgerows and individual trees that are not modelled. The ZTVs, therefore, are not precise and are an indication only of the area within which visual effects may be expected.

1.1.12 Both DMRB LA 107 and GLVIA3 advocate a proportionate approach to the LVIA process, with emphasis placed on the potential for significant effects. The likelihood of significant landscape and visual effects diminishes with increasing distance from a development. This has been taken into consideration when determining the study area boundary.

Baseline conditions

1.1.13 The landscape and visual baseline has been described for the existing year (2021 and 2022) following a desk-study of published sources of information and subsequent site surveys. Baseline conditions has been informed by site survey work, aerial photographs and OS data, collating information on topography, surface water features, landcover, land use, landscape pattern and the locations of potential visual receptors.

Landscape

1.1.14 Landscape Character Areas (LCAs) are areas with distinguishing characteristics formed by combinations of landscape elements, such as topography, vegetation and landscape pattern. Published landscape character assessments are available at a national level, published by Natural England, and regional or local level, usually published by the local planning authority. Due to their broad geographical coverage the effects on character of National Character Areas are not considered for assessment within the LVIA.

1.1.15 The regional-level Greater Manchester Landscape Character and Sensitivity Assessment (Greater Manchester Combined Authority (GMCA), 2018) is more related to the scale and extent of the landscape character in the assessment area. Natural England (in Appendix 2 of the Scoping Opinion (TR010064/APP/6.7)) has noted that, *'[they] would wish to see details of local landscape character areas mapped at a scale appropriate to the development site, any relevant management plans or strategies pertaining to the area'.* Natural England also state that, *''The EIA should include a full assessment of the potential impacts of the development on local landscape character.*

1.1.16 Therefore, LCAs from the Greater Manchester assessment has been described and assessed in the LVIA, including information relating to the quality and condition of the landscape. The LCAs have been reviewed during site survey work to ensure they are representative of the study area and, if required, supplementary description provided and/or additional LCAs identified. Any landscape character assessment required has been informed by GLVIA3 and Natural England's An Approach to Landscape Character Assessment (2014).

1.1.17 Townscape Character Areas (TCAs) are areas where the built environment is dominant. There are no published townscape character assessments for the study area and therefore a desk-based townscape character assessment has been undertaken for the parts of the study area not covered by the published landscape character assessments. The townscape character assessment has been informed by GLVIA3, An Approach to Landscape Character Assessment (Natural England, 2014) and Townscape Character Assessment Technical Information Note 05/2017 (Landscape Institute, 2017).

1.1.18 In line with paragraph 3.17 of DMRB LA 107, the effect on the constituent landscape/townscape features and elements/components of the LCAs and TCAs, such as trees, woods, hedgerows, hedgerow trees, landform and landscape/townscape pattern, has been considered in combination as part of the effects on landscape/townscape character and not as individual receptors.

Visual

1.1.19 The visual assessment considers physical changes in views from receptors (individuals or a range of people) including residential properties, public rights of way, open spaces, sports facilities and the local and main road network due to the Scheme. Viewpoints have been identified within the ZTV to represent views towards the Scheme from potential visual receptors. The visual impact assessment does not therefore identify effects on every individual receptor. However, the viewpoint selection process has ensured that the number and locations of representative viewpoints are proportionate to the development.

1.1.20 Photomontages have been produced to illustrate the Scheme for four viewpoint locations. Photography and visualisations have been prepared in accordance with the requirements of the Visual Representation of Development Proposals Technical Guidance Note 06/19 (Landscape Institute, 2019). The methodology for the production of the photomontages is provided at the end of this document.

1.1.21 The following broad distance categories have been used to describe baseline views and in the subsequent assessment of effects:

- Short distance: Up to 150m
- Medium distance: 150m to 1km
- Long distance: Over 1km.

Sensitivity

Landscape

1.1.22 The sensitivity of a landscape reflects its susceptibility to change and its ability to accommodate the Scheme without undue, adverse consequences. It also reflects the importance of the landscape in relation to national and local designations, its perceived value to users and any intrinsic aesthetic characteristics such as its contribution to local landscape quality or sense of place.

1.1.23 DMRB LA 107 paragraph 3.18 states that the assessment of landscape sensitivity should take into account, '*the susceptibility of the receptor to the proposed change from the baseline situation'*, and '*the value attached to that receptor*'.

1.1.24 The determination of the sensitivity of landscape receptors have been based on the criteria set out within DMRB LA 107, Table 3.22 Landscape sensitivity (susceptibility and value) and typical descriptions, and as presented in Table 1.1 below. The descriptions in the table take into account the value and susceptibility of the landscape. Professional judgement has been used where a landscape receptor does not wholly accord with the typical description, for example an undesignated landscape of low value that has limited ability to accommodate change and is therefore of high susceptibility. Reasoning behind judgements has been presented in the LVIA text.

Table 1.1 Landscape sensitivity (susceptibility and value) and typical descriptions

Landscape sensitivity (susceptibility and value) of receptor/resource	Typical description
Very High	Landscapes of very high international/national importance and rarity or value with no or very limited ability to accommodate change without substantial loss/gain (i.e. national parks, internationally acclaimed landscapes - UNESCO World Heritage Sites).
High	Landscapes of high national importance containing distinctive features/elements with limited ability to accommodate change without incurring substantial loss/gain (i.e. designated areas, areas of strong sense of place - registered parks and gardens, country parks).
Medium	Landscapes of local or regional recognition of importance able to accommodate some change (i.e. features worthy of conservation, some sense of place or value through use/perception).
Low	Local landscape areas or receptors of low to medium importance with ability to accommodate change (i.e. non-designated or designated areas of local recognition or areas of little sense of place).
Negligible	Landscapes of very low importance and rarity able to accommodate change (i.e. areas unlikely to be designated, with very little sense of place).

Visual

1.1.25 The sensitivity of a visual receptor depends on the viewer's familiarity with the scene, the activity or occupation that brings them into contact with the view and the nature of the view, whether full or glimpsed, near or distant. It is also determined by the importance of the receptor, the importance of the view, the perceived quality of the view and its ability to accommodate change.

1.1.26 DMRB LA 107 paragraph 3.39 states that, '*determining the susceptibility of different visual receptors to change and the value attached to particular views identified within the ZTV, is of particular importance to the assessment process*'.

1.1.27 The determination of the sensitivity of visual receptors has been based on the criteria set out within DMRB LA 107 Table 3.41 Visual sensitivity (susceptibility and value) and typical descriptions, as presented in Table 1.2 below. The descriptions in the table take into account the value and susceptibility of visual receptors. Professional judgement has been used where a visual receptor does not wholly accord with the typical description, for example where a receptor of low susceptibility has a view across a rare, designated landscape. Reasoning behind judgements has been presented in the LVIA text.

Table 1.2 Visual sensitivity (susceptibility and value) and typical descriptions

Visual sensitivity (susceptibility and value) of receptor/resource	Typical description
Very High	Static views from and of major tourist attractions Views from and of very important national/international landscapes, cultural/historical sites (e.g. National Parks, UNESCO World Heritage sites) Receptors engaged in specific activities for enjoyment of dark skies
High	Views by users of nationally important PRoW / recreational trails (e.g. national trails, long distance footpaths) Views by users of public open spaces for enjoyment of the countryside (e.g. country parks) Static views from dense residential areas, longer transient views from designated public open space, recreational areas Views from, and of, rare designated landscapes of national importance
Moderate	Static views from less populated residential areas, schools and other institutional buildings and their outdoor areas Views by outdoor workers Transient views from local/regional areas such as public open space, scenic roads, railways or waterways, users of local/regional designated tourist routes of moderate importance Views from, and of, landscapes of regional importance
Low	Views by users of main roads or passengers on public transport on main arterial routes Views by indoor workers Views by users of recreational/formal sports facilities where the landscape is secondary to enjoyment of the sport Views by users of local public open spaces of limited importance with limited variety or distinctiveness

Visual sensitivity (susceptibility and value) of receptor/resource	Typical description
Negligible	Quick transient views such as from fast moving vehicles Views from industrial area, land awaiting re-development Views from landscapes of no importance with no variety or distinctiveness

Magnitude of effect (change)

1.1.28 The magnitude of effect is the degree of change that would arise due to the development. As defined in DMRB LA 107 and in accordance with GLVIA3, the magnitude of effect '*combines judgements about size and scale of effect, extent of area it occurs over, whether reversible or irreversible and whether short or long term in duration'*.

Landscape

1.1.29 The judgement on the magnitude of landscape effect have taken into consideration the following factors:

- The extent/proportion of landscape elements lost or added
- The contribution of elements to landscape character and the degree to which aesthetic/perceptual aspects are altered
- Whether the change is likely to alter the key characteristics of the landscape, which are critical to its distinctive character.

1.1.30 The criteria set out in DMRB LA 107 Table 3.24 Magnitude and nature of effect on the landscape and typical descriptions, have been used for determining the magnitude of landscape effects, as presented in Table 1.3 below (refer also to duration of change criteria at the end of this section).

Table 1.3 Magnitude and nature of effect on the landscape and typical descriptions

Magnitude of effect (change)		Typical descriptions
Major	Adverse	Total loss or large-scale damage to existing landscape character or distinctive features or elements; and/or addition of new uncharacteristic, conspicuous features or elements (e.g. road infrastructure).
	Beneficial	Large scale improvement of landscape character to features and elements; and/or addition of new distinctive features or elements, or removal of conspicuous road infrastructure elements.
Moderate	Adverse	Partial loss or noticeable damage to existing landscape character or distinctive features or elements; and/or addition of new uncharacteristic, noticeable features or elements (e.g. road infrastructure).

Magnitude of effect (change)		Typical descriptions
	Beneficial	Partial or noticeable improvement of landscape character by restoration of existing features or elements; or addition of new characteristic features or elements or removal of noticeable features or elements.
Minor	Adverse	Slight loss or damage to existing landscape character of one (maybe more) key features and elements; and/or addition of new uncharacteristic features and elements.
	Beneficial	Slight improvement of landscape character by the restoration of one (maybe more) key existing features and elements; and/or the addition of new characteristic features.
Negligible	Adverse	Very minor loss, damage or alteration to existing landscape character of one or more features and elements.
	Beneficial	Very minor noticeable improvement of character by the restoration of one or more existing features and elements.
No change		No noticeable alteration or improvement, temporary or permanent, of landscape character of existing features and elements.

Visual

1.1.31 The judgement on the magnitude of visual effect have taken into consideration the following:

- The scale of the change in the view with respect to the loss or addition of features and changes in its composition, including the proportion of the receptor's available view affected by the development
- The degree of contrast or integration of any new features or changes in the landscape with the existing landscape elements and characteristics
- The nature of the view of the development, in terms of the relative amount of time over which it has been experienced and whether views are full, partial or glimpsed
- The angle of view relative to the main activity of the receptor
- The distance of the viewpoint from the Scheme
- The extent of the area over which changes would be visible.

1.1.32 The criteria set out in DMRB LA 107 Table 3.41 Visual sensitivity (susceptibility and value) and typical descriptions, have been used for determining the magnitude of landscape effects, as presented in Table 1.4 below (refer also to duration of change criteria at the end of this section).

Table 1.4 Magnitude (change) of visual effect and typical descriptions

Magnitude of effect (change)	Typical descriptions
Major	The project, or a part of it, would become the dominant feature or focal point of the view.
Moderate	The project, or a part of it, would form a noticeable feature or element of the view which is readily apparent to the receptor.
Minor	The project, or a part of it, would be perceptible but not alter the overall balance of features and elements that comprise the existing view.
Negligible	Only a very small part of the project work or activity would be discernible or, being at such a distance, it would form a barely noticeable feature or element of the view.
No change	No part of the project work or activity would be discernible.

1.1.33 Unlike for magnitude of landscape effects, DMRB LA 107 does not include criteria for adverse or beneficial magnitude of visual effects. GLVIA3 paragraph 3.22 notes that, '*The Regulations specify that an EIA must consider the positive and negative effects of the development*'. '*This means that in LVIA thought must be given to whether the likely significant landscape and visual effects*,' (inter alia) *'are judged to be positive (beneficial) or negative (adverse) in their consequences for landscape or for views and visual amenity'*.

1.1.34 Therefore, the assessment of visual effects has considered whether the magnitude of effect is adverse or beneficial and a justification for the findings provided.

1.1.35 The duration of the change has been based on guidance in GLVIA3, and has been categorised as:

- Short term – up to 5 years or during the period of construction
- Medium term – 5 to 20 years (between year 1 and year 15 of operation) when mitigation planting will not be fully effective
- Long term – over 20 years (beyond year 15 of operation) when mitigation planting will be sufficiently effective.

1.1.36 In terms of reversibility, the Scheme would form a permanent feature in the landscape and views. Only short-term changes during construction would be considered as reversible.

Mitigation

1.1.37 Mitigation measures have been developed following a hierarchical approach to environmental assessment and design as described in DMRB LA 104, paragraph 3.23. Firstly, through avoidance and prevention then reduction (and mitigation) where avoidance is not possible. Where it is not possible to avoid or reduce a significant adverse effect from the Scheme on LCAs and visual receptors, remediation measures are used to offset the effect.

1.1.38 The aim of the mitigation measures has been to reduce, where possible, the magnitude of effect and therefore the significance of effect to below moderate adverse levels, as a result of the Scheme. The LVIA identifies embedded mitigation measures (good design) and essential mitigation measures (measures identified through the assessment process).

1.1.39 Mitigation has also been identified by individual specialists, as is the case for this topic, and fed into the Environmental Masterplan (Figure 2.3: Environmental Masterplan of the Environmental Statement Figures (TR010064/APP/6.2)). A description of landscape and visual embedded and essential mitigation measures has been provided in the Chapter 7: Landscape and Visual of the Environmental Statement (TR010064/APP/6.1). The beneficial effect of these measures has been considered in the assessment of significance of effect.

Significance of effect

1.1.40 The significance of a potential effect on landscape and visual receptors has been determined by combining the sensitivity of a receptor and the magnitude of an effect. Table 1.5 provides a matrix showing this combination, based on Table 3.8.1 of DMRB LA 104, but including the minor amendments required in DMRB LA 107. Professional judgement has been used to ascertain the significance of effect using the criteria in Table 1.5, in accordance with Table 3.7 of DMRB LA 104. In general, more significance is likely to be placed on large, long-term or permanent changes than small short-term temporary ones.

Table 1.5 Significance matrix (based on Table 3.8.1 of DMRB LA 104 with minor amendments required in DMRB LA 107)

		Magnitude of impact (Magnitude of effect DMRB LA 107) (degree of change)				
		No change	**Negligible**	**Minor**	**Moderate**	**Major**
Landscape / Townscape and Visual sensitivity (suscept-ibility and value)	**Very high**	Neutral	Slight	Moderate or large	Large or very large	Very large
	High	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
	Medium (Landscape/ Townscape) Moderate (Visual)	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
	Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
	Negligible	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

Table 1.6 Significance categories for landscape/townscape and visual effects and typical descriptions

Significance category	Typical description
Very large	Effects at this level are material in the decision-making process.
Large	Effects at this level are likely to be material in the decision-making process.
Moderate	Effects at this level can be considered to be material decision-making factors.
Slight	Effects at this level are not material in the decision-making process.
Neutral	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

1.2 ZTV methodology

Introduction

1.2.1 ZTV mapping has been generated in ArcGIS software Pro 2.9.6 using the 'Viewshed' tool under the 'Surface' section of the Spatial Analyst software extension. Viewsheds are used to display where there is theoretical intervisibility between a designated target point, to reflect the location and height of part of the Scheme and the surrounding topography. The ZTV has been modelled assuming a person's viewing height of 1.7m above the surrounding topography.

1.2.2 The ZTV illustrates the theoretical maximum extents to which the development may be visible from within 5km of the Order Limits. It is just the starting point for defining the area from which the Scheme could be seen. The actual extent of visibility is likely to be less due to intervening features that are not incorporated into the ZTV modelling.

Topography layer

1.2.3 The ZTV mapping has been generated based on a digital terrain model (DTM).

1.2.4 Two datasets have been used to generate viewsheds:

- A topography layer in raster format
- A point dataset of target points representing points along the Scheme.

1.2.5 For the initial ZTV, the DTM model has been used without any modifications, representing 'bare earth'.

1.2.6 For the ZTV with screening features, the DTM model has been modified to include the screening effects of buildings and trees, based upon the following assumptions:

- Buildings within the figure extent have been incorporated, based upon data obtained from OS MasterMap and the assumption that all buildings are 10m height

- Blocks of trees and woodlands identified in the NFI Woodland Map have been incorporated, based upon the assumption that all trees are 10m tall, with the following exception; trees within the extent of the Order Limits have been omitted in order to represent a worst-case scenario where all existing vegetation within the Order Limits would be removed. The NFI data does not include all trees but is focused on woodland of at least 0.5ha and minimum 20m width. While the NFI data includes blocks of deciduous woodland, the blocks are considered to generally provide an effective screen even during winter, due to the width of the blocks.

Point database/target points

1.2.7 The ZTVs have been generated using target points to represent high-sided vehicle traffic. The target points have been aligned to the design centreline, using the Scheme chainage data to identify target points at 50m intervals and that there are points at the start and end of the centreline.

1.2.8 Target points 4.5m above the level of the carriageway have been used to represent the height of high-sided vehicle traffic using the motorway.

Theoretical range of visibility

1.2.9 The final output of the ZTV mapping is a raster image. The resulting raster image generated contains value columns, where 0 is not visible and numbers 1 and above are visible. A symbology has been automatically applied to the raster dataset as it is loaded into ArcGIS. The ZTVs shows multiple point analysis approach to identify how much of the Scheme would be theoretically visible from a point in the study area.

1.3 Type 3 visualisations technical methodology

1.3.1 This section explains the visualisation production process undertaken in accordance with the following core guidance documents:

- Landscape Institute Technical Guidance Note 06-19 Visual Representation of Development Proposals (TGN 06/19) (Landscape Institute, 2019)
- GLVIA3 (Landscape Institute and Institute of Environmental Management and Assessment, 2013).

Viewpoint selection

1.3.2 A mix of representative viewpoints have been chosen to illustrate likely significant effects from a range of different types of visual receptors.

Visualisation type determination

1.3.3 LI TGN 06/19 identities a process of determining the Visualisation Type by way of a proportionate appraisal of project type/scale, likely audience, visualisation purpose and anticipated level of visual effect. This has been undertaken by a suitably qualified Landscape Architect based on the available site and design data and in accordance with GLVIA3 and DMRB LA 107.

1.3.4 The Scheme comprises a highway junction improvement scheme. The purpose of the visualisations is to illustrate the likely change in view from a proportionate selection of representative viewpoints that may occur as a result of the Scheme being introduced into that view.

1.3.5 The visualisations are provided to inform Chapter 7: Landscape and Visual of the Environmental Statement (TR010064/APP/6.1) with a likely audience including people affected by the development, statutory consultees, participants at examination hearings, the client and decision-makers.

1.3.6 Therefore Type 3 Visualisations - Photomontages / Photowires as defined within TGN 06/19 are considered appropriate for this Scheme.

1.3.7 The objective of Type 3 visualisation is to present a printed image which gives a realistic impression of appearance, context, form and extent of the development.

1.3.8 Type 3 is summarised in TGN06/19 Section 4 – Type 3 Summary as '… *appropriate for many planning applications, LVAs and LVIAs, where photomontage is required but a verifiable process and printed scale representation are not needed*.'

1.3.9 The recommendations from this summary that are adhered to are as follows:

- *'Use a Full Frame Sensor camera with 50mm lens or cropped frame sensor camera with 35mm or 28mm fixed lens….*
- *…The enlargement factor should be stated on each page, together with the label 'Visualisation Type: 3'….*
- *…For very wide linear infrastructure, cylindrical panoramas up to 90° at A1 width, with multiple sheets for very wide panoramas will be produced.*
- *Accompany visualisations with a Technical Methodology (see Appendix 10). Images will typically be presented with a 100% enlargement (27°@ A3, or 90° @ A1)'*

Assumptions and limitations

1.3.10 Every effort has been made to ensure a high level of accuracy is maintained throughout the production of the visualisations and as such that the Scheme is represented accurately. The following assumptions and limitations have been identified to provide transparency to the process of developing and representing the final visualisations.

Existing vegetation

1.3.11 The growth of retained existing vegetation between year 1 and year 15 of operation has not been represented due to uncertainty of age, growth rates and future maintenance regimes and liabilities, as in most cases it would be assumed outside the control of National Highways.

Planting mitigation details

1.3.12 To reflect a worst-case scenario for the year 1 (winter) scenario, it is assumed that the smallest plants within the typical range of planting heights (300mm or 600-800mm) would not be visible above typical tree and shrub shelters (600mm or 1.2m). Therefore, with the exception of occasional feathered and standard trees, trees and shrub three-dimensional (3D) models have not been included the year 1 scenario, only the suitable tree and shrub shelter models.

1.3.13 All mitigation planting is modelled in accordance with Figure 2.3: Environmental Masterplan of the Environmental Statement Figures (TR010064/APP/6.2). The planting stock height, growth rates and plant protection assumed for modelling purposes are described in more detail in paragraph 1.3.33 below.

Type 3 visualisation production process

1.3.14 The Type 3 visualisations are shown on Figure 7.7: Photomontages of the Environmental Statement Figures (TR010064/APP/6.2) beneath the existing 'baseline' views and illustrate the following scenarios:

- Year 1 (first year of operation in winter): reflecting the completed scheme with traffic, as well as landscape mitigation at the beginning of the operational stage, when planting mitigation would not yet be fully effective; and
- Year 15 (operational and established scheme in summer): reflecting the completed Scheme with traffic, as well as the landscape mitigation following 15 years of establishment of the planting mitigation.

1.3.15 The viewpoint locations are shown on the inset plans on each sheet of Figure 7.7 : Photomontages of the Environmental Statement Figures (TR010064/APP/6.2), as well as on Figure 7.5: Representative Viewpoints and Photomontage Locations of the Environmental Statement Figures (TR010064/APP/6.2).

Photography and survey

1.3.16 Winter baseline photography was undertaken in March 2021, February 2022 and December 2022 before trees were in leaf. These baseline photographs were taken in winter to reflect "worst case" views towards the completion (year 1) of the development.

1.3.17 Summer baseline photography was undertaken when trees were in leaf during September 2021 and October 2022. These were undertaken to illustrate the maximum extent of existing screening as well as the likely effectiveness of mitigation measures in the summer year 15 scenario.

1.3.18 At each viewpoint location, the following survey data has been collected:

- OS Grid coordinates of the camera location
- Date and time of photograph
- The height of the camera above ground level (comfortable height for photographer – preferably between 1.5m and 1.65m)

- Weather conditions at the time of photography.

1.3.19 Camera locations were recorded using a hand-held SatMap Active 20 Global Positioning System (GPS) unit.

1.3.20 The baseline photographs were taken using either a Canon EOS 5D or EOS 6D Mark II Digital Single Lens Reflex (DSLR) camera dependant on the time of visits. Both cameras used the same fixed 50mm Focal Length lens. All photographs were taken on a tripod levelled to the vertical and horizontal axis.

1.3.21 Camera settings were standardised for correct exposure, shutter speed and resolution to enable clean production of high-resolution output and balanced panoramic images (see paragraph 1.3.23 below).

1.3.22 All survey and settings information as well as other relevant information have been provided on the sheets on Figure7.7: Photomontages of the Environmental Statement Figures (TR010064/APP/6.2).

Panoramic images

1.3.23 The panoramic photography has been undertaken using a series of photographs taken with a panoramic tripod head set to provide a 50% overlap (20° increments) between frames to reduce barrel distortion. The photographs have been taken in a landscape orientation in line with TGN 06/19.

1.3.24 Photographs have been stitched together within PTGui software using cylindrical projection to produce a single panoramic image. During this process, only minor improvements, for example, to balance brightness and contrast, are made by the software to blend the images together.

1.3.25 Images have been fixed to a maximum field of view of 90° horizontal and 27° vertical (as determined by the 50mm focal lens used for the photography). Images have then been resized to fit to the final A1 page plates (820 x 250mm) to reflect 96% image enlargement in accordance with TGN 06/19.

Camera matching process

1.3.26 To assist the process of matching the baseline photograph with the 3D digital model of the Scheme, reference points have been identified at each viewpoint location. Reference points are features that could be identified from a topographical survey or OS data. Examples include telegraph poles, field boundaries and pylons.

1.3.27 The baseline panoramic images have been imported into the 3D modelling software (Autodesk 3DS Max) and used in the camera matching process as backdrops when rendering, using the VRay Next render engine within the software. As part of this process the ‘warped old-style camera’ settings have been used to match the cylindrical projection of the image and allow accurate matching of reference points.

1.3.28 A baseline 3D model (existing environment and site context) has been produced using information from 3D topographical surveys and two-dimensional (2D) and 3D OS contour information to vertically place reference objects. A local grid with a common global shift from OS National Grid has been identified to enable the 3D modelling software to operate efficiently and all data has been moved using this information.

1.3.29 In the 3D modelling software, the locations of the viewpoints were added to the model using the survey data and then fine-tuned to match terrain, reference points and other information in the model to the corresponding features in the background image (the 3D camera backdrop).

3D design modelling

1.3.30 All relevant 3D models of the Scheme have been imported into Autodesk 3DS Max base model using core design information provided by the design team (see Table 1.7).

1.3.31 Environmental lighting settings within the combined model has been configured to match the lighting conditions as surveyed on site at the time of the photography.

Table 1.7 Core design information

Design / data element	3D models / Autodesk Civil 3D Export files	2D CAD models / drawings and pdf reference documents
OS mapping		HE548642-JAC-HGN-SII_MLT-M2-C-0003.dwg
Topographical Survey	HE548642-JAC-VTO-SII_MLT-M3-C-0001.dwg HE548642-JAC-VTO-SII_MLT-M3-C-0002.dwg HE548642-JAC-VTO-SII_MLT-M3-C-0003.dwg	
Highways design	HE548642-JAC-HML-SII_MLT-M3-C-0002.dwg	
Bridge design	HE548642-JAC-SBR-SII_41792-MR-S-0001.nwc HE548642-JAC-SBR-SII_41793-MR-S-0001.nwc	
Drainage / pond design	HE548642-JAC-HDG-SII_N02-M3-D-0104.dwg HE548642-JAC-HDG-SII_N04-M3-D-0102.dwg	
Highway boundary Fencing	HE548642-JAC-HFE-SII_MLT-MR-C-0001.dwg	

Design / data element	3D models / Autodesk Civil 3D Export files	2D CAD models / drawings and pdf reference documents
	HE548642-JAC-HFE-SII_MLT-MR-C-0201.dwg	
Road markings	HE548642-JAC-HMK-SII_MLT-M3-C-0001.dwg	
Highways gantries and signage	HE548642-JAC-SGY-M60_CG41958-MR-S-0001.nwc HE548642-JAC-SGY-M60_EG14634-MR-S-0001.nwc HE548642-JAC-SGY-M60_EG14637-MR-S-0001.nwc HE548642-JAC-SGY-M60_EG25865-MR-S-0001.nwc HE548642-JAC-SGY-M60_EG25933-MR-S-0001.nwc HE548642-JAC-SGY-M60_EG43272-MR-S-0001.nwc HE548642-JAC-SGY-M60_EG43273-MR-S-0001.nwc HE548642-JAC-SGY-M60_NG11640-MR-S-0001.nwc HE548642-JAC-SGY-M60_NG11641-MR-S-0001.nwc HE548642-JAC-SGY-M60_WG14633-MR-S-0001.nwc HE548642-JAC-SGY-M60_WG14635-MR-S-0001.nwc HE548642-JAC-SGY-M60_WG14638-MR-S-0001.nwc HE548642-JAC-SGY-M60_WG41959-MR-S-0001.nwc HE548642-JAC-SGY-M62_EG14639-MR-S-0001.nwc HE548642-JAC-SGY-M62_WG32028-MR-S-0001.nwc HE548642-JAC-SGY-M66_SG4694-MR-S-0001.nwc HE548642-JAC-SGY-M66_SG4697-MR-S-0001.nwc HE548642-JAC-SGY-M66_SG4698-MR-S-0001.nwc	

Design / data element	3D models / Autodesk Civil 3D Export files	2D CAD models / drawings and pdf reference documents
	HE548642-JAC-SGY-M66_SG21785-MR-S-0001.nwc HE548642-JAC-SGY-M66_SG21786-MR-S-0001.nwc HE548642-JAC-SGY-M66_SG41953-MR-S-0001.nwc HE548642-JAC-SGY-M66_SG41954-MR-S-0001.nwc HE548642-JAC-SGY-M66_SG41955-MR-S-0001.nwc HE548642-JAC-SGY-M66_SG41956-MR-S-0001.nwc HE548642-JAC-SGY-SII_NG11638-MR-S-0001.nwc HE548642-JAC-HSN-SII_MLT-MR-C-0001.nwf HE548642-JAC-HSN-SII_MLT-MR-C-0002.nwf	
Highway lighting	HE548642-JAC-HEL-SII_MLT-M3-EO-0001.dwg HE548642-JAC-HLG-SII_MLT-M3-EO-0002.dwg	
Environmental Masterplan / mitigation design information	HE548642-JAC-ELS-SII_MLT-M2-L-0101.dwg HE548642-JAC-ELS-SII_MLT-M2-L-0102.dwg	

1.3.32 The following additional modelling work has been undertaken to tie in imported design models within the visualisation 3D model.

Highways

- Combined surface model was split out into different designed elements such as earthworks, roads, kerbs, central reserve restraint barriers etc. This was undertaken to apply appropriate photorealistic materials
- Earthworks surfaces were adjusted to align correctly with bridge abutments and wingwalls as well as additional surfaces created to tie in between adjacent imported earthworks surfaces
- Retaining walls were modelled using existing and terrain surfaces.

Mitigation planting details

1.3.33 The following criteria have been applied to the 3D modelling of mitigation planting for the year 1 and year 15 scenarios:-

- Year 1:
  - Woodland: 1.2m tall tree shelters and 600mm tall shrub shelters (both 100 mm diameter) modelled along with occasional feathered trees at approximately 1.2m tall x 0.8m wide
  - Woodland edge: 1.2m tall tree shelters and 600mm tall shrub shelters (both 100mm diameter)
  - Shrubs with intermittent trees: 1.2m tall tree shelters and 600 mm tall shrub shelters (both 100mm diameter) modelled along with occasional feathered trees at approximately 1.2m tall x 0.8m wide
  - Shrub planting: 600mm tall shrub shelters (100mm and 160mm diameter)
  - Hedge planting: A double staggered row of 450mm tall x 40mm diameter shelters at 300mm centres
  - Hedge with trees planting: as above with 2m tall selected standard trees at each identified location
  - Individual tree planting: 2m tall selected standard trees at each identified location.
- Year 15:
  - Woodland and individual trees: 6-8m tall
  - Shrubs with intermittent trees: 4-8m tall
  - Shrubs and scrub: 4m tall
  - Managed hedgerows: 2m tall (including hedgerows with trees).

Compilation of Type 3 visualisations

1.3.34 The baseline panoramic images for each viewpoint were copied into a Photoshop template and layers created from the image to reflect any elements and/or vegetation lost to facilitate the Scheme (background modified) and any retained foreground elements. The rendered images generated in Autodesk 3DS Max Design software from the matched 3D cameras were then inserted into the Photoshop file and layered accordingly behind any foreground layers created.

1.3.35 Once all layering and final adjustments to brightness and contrast levels were complete; all visualisation images were resized to 820mm x 250mm to a reflect a 96% enlargement of 90° horizontal x 27° vertical field of view (in accordance with TGN 06/19). All images were then saved at 300 pixels per cm resolution.

1.3.36 All final images were then inserted to scale into A1 figures within AutoCAD with the accompanying information as detailed below added to the data and notes sections:

- Visualisation type
- Date and time of photograph
- Viewpoint ground elevation
- OS National Grid Reference and elevation
- Season within which the photography was taken
- Site lighting conditions when the photography was taken
- Camera height above ground
- Camera lens size
- Aperture, ISO and shutter speed details
- Bearing to centre of the panoramic
- Sheet size
- Enlargement factor
- Camera specification
- Field of view information
- Direction of view
- Key notes on use such as details on a comfortable viewing distance from the eye
- Inset plans showing the location and orientation of the viewpoints.

1.3.37 Once each viewpoint sheet set was complete, all were printed to a single pdf document set at high resolution and to 1:1 scale to ensure no loss of image size or quality.

Final output summary per location

- A1 Sheet 1: Existing winter view and winter year 1 photomontage.
- A1 Sheet 2: Existing summer view and summer year 15 photomontage.

Acronyms and initialisms

Acronym or initialism	Term
3D	Three-dimensional
2D	Two-dimensional
DMRB	Design Manual for Roads and Bridges
DSLR	Digital Single Lens Reflex (camera)
DTM	Digital terrain model
GLVIA3	Guidelines for Landscape and Visual Impact Assessment, 3rd Edition
GMCA	Greater Manchester Combined Authority
GPS	Global Positioning System
LCA	Landscape Character Area
LVIA	Landscape and Visual Impact Assessment
MCC	Manchester City Council
NCA	National Character Areas
NFI	National Forest Inventory
OS	Ordnance Survey
TCA	Townscape Character Area
TGN	Technical Guidance Note
UDP	Unitary Development Plan
ZTV	Zone of Theoretical Visibility

Glossary

Term	Definition
Characteristics	Elements or combination of elements, which make a particular contribution to distinctive character. DMRB LA 107
Effect (landscape and visual)	Term used to express the consequence of an impact (expressed as the 'significance of effect'). DMRB LA 107
Features	Particularly prominent, "eye-catching" elements or characteristic components (i.e. tree clumps, church towers, or wooded skylines). DMRB LA 107
GLVIA3	Guidelines for Landscape and Visual Assessment, 3rd Edition

Term	Definition
Impact	This distinguishes between the 'impact', defined as the action being taken, and the 'effect', defined as the change resulting from that action (GLVIA3). For consistency within LVIA "impact" cannot be used interchangeably with "effect" nor to mean a combination of several effects. DMRB LA 107
Landscape	An area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors. European Landscape Convention 2000
Landscape and visual impact assessment (LVIA)	A "... tool used to identify and assess the significance of and the effects of change resulting from..." a project on both the landscape as a resource and on people's views and visual amenity. GLVIA3
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. GLVIA3
Landscape character area	Single unique areas which are the discrete geographical areas of particular landscape type. GLVIA3
Landscape effects	The consequence of an impact (expressed as the 'significance of effect') on the landscape as a resource in its own right. GLVIA3
Landscape receptors	Defined aspect of the landscape resource that potentially could be affected by the project. GLVIA3
Landscape sensitivity	Applied to specific landscape receptors, combining judgements of the susceptibility of the receptor to specific type of change and the value related to the receptor LVIA: Landscape and Visual Assessment. GLVIA3
National Character Assessment	Natural England has divided England into 159 distinct natural areas which are called National Character Areas (NCA). Each is defined by a unique combination of landscape, biodiversity, geodiversity, history, and cultural and economic activity. Their boundaries follow natural lines in the landscape rather than administrative boundaries
Photomontage	Visualisation which superimposes an image of a development upon a photograph following Landscape Institute Guidelines or the Highland Council, July 2016 guidelines
Sensitivity (landscape and visual)	A term applied to specific receptors, combining judgements of the susceptibility of the receptor to the specific type of change or development, and the value related to the receptor. GLVIA3
Susceptibility	The ability of a defined landscape or visual receptor to accommodate the specified development without negative consequences. GLVIA3
Townscape	The landscape within the built-up area, including the buildings, urban open spaces, including green spaces and the relationship between buildings and between buildings and open spaces. GLVIA3

Term	Definition
Value	Relative value or importance of a landscape's quality, special qualities including perceptual aspects such as scenic beauty, tranquility, or wildness, cultural associations or other conservation issues. GLVIA3
Visual amenity	Overall enjoyment of a particular area, surroundings, or views in terms of people's activities - living, recreating, travelling through, visiting, or working. GLVIA3
Visual effects	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 project. GLVIA3
Visual sensitivity	Visual experience be it sensitivity to light or visual clutter. DMRB LA107
Zone of theoretical visibility (ZTV)	Map produced (usually digitally) to specific criteria to illustrate the area(s) from which a project can theoretically be visual. Note: For cumulative visual effects assessment it is the areas of overlap with the ZTV which can prove significant. DMRB LA107

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