Appendix 8.1: LVIA and Visualisation Methodology

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Muir Mhòr Offshore Wind Farm Limited

Muir Mhòr Onshore Environmental Impact Assessment Report

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Final report

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Appendix 8.1
LVIA and Visualisation Methodology

Introduction

A8.1.1 This appendix sets out the detailed methodology used for the Muir Mhòr Onshore Landscape and Visual Impact Assessment (LVIA), including cumulative Landscape and Visual Impact Assessment (CLVIA), which is contained in Chapter 8: Landscape and Visual Amenity, Volume 1 of the Environmental Impact Assessment Report (EIA).

A8.1.2 Landscape and visual assessments are separate, although linked, processes. LVIA therefore considers the potential effects of a proposed development on:

- Landscape as a resource in its own right (caused by changes to the constituent elements of the landscape, its specific aesthetic or perceptual qualities and the character of the landscape); and
- Views and visual amenity as experienced by people (caused by changes in the appearance of the landscape).

A8.1.3 Whilst landscape and visual effects are linked, this LVIA deals with landscape and visual effects separately, followed by an assessment of cumulative landscape and visual effects where relevant. Additionally, effects on residential visual amenity are also considered.

A8.1.4 This appendix also sets out the approach to viewpoint photography, visualisation production and zone of theoretical visibility (ZTV) mapping.

Guidance

A8.1.5 This methodology has been developed by Chartered Landscape Architects (Chartered Members of the Landscape Institute (CMLI)) at LUC, who have extensive experience in the assessment of landscape and visual effects arising from electricity transmission infrastructure (e.g. overhead transmission lines, substation infrastructure etc.) and a wide range of other types and scale of development.

A8.1.1 The methodology has been developed primarily in accordance with the principles contained within the Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3)[1]. NatureScot (formerly Scottish Natural Heritage (SNH)) cumulative guidance[2] also informs the approach to the assessment of cumulative landscape and visual effects. Whilst this NatureScot guidance has been prepared in relation to onshore wind energy development the overarching principles of cumulative assessment are of relevance to this methodology.

A8.1.2 The methodology for the production of accompanying visualisations used in the LVIA and CLVIA is based on current good practice guidance[3] as set out by the Landscape Institute[4,5].

A8.1.6 A full list of guidance that has been used to inform the LVIA is provided in section 8.6 of the Chapter 8: Landscape and Visual Amenity.

[1] The Landscape Institute and Institute of Environmental Management and Assessment (2013) Guidelines for Landscape and Visual Impact Assessment, 3rd Edition
[2] NatureScot (2021). Assessing the cumulative impact of onshore wind energy developments
[3] Current good practice guidance valid as of November 2024 was considered when undertaking the assessment
[4] The Landscape Institute (2019). Advice Note 01/11 Photography and photomontage in landscape and visual impact assessment
[5] The Landscape Institute (2017) Technical Guidance Note 02/17: Visual Representation of Development Proposals

Scope of Assessment

A8.1.7 An LVIA considers physical changes to the landscape as well as changes in landscape character. It also considers changes to areas designated for their scenic or landscape qualities, and the visual impacts of a proposed development on publicly available views as perceived by people.

A8.1.8 All potentially significant landscape and visual effects (including cumulative effects) are examined, including those relating to construction, operation and decommissioning of the proposed development.

A8.1.9 Where, based on professional judgement, it is established that significant effects are unlikely to occur, the assessment of potential effects on some receptors may be 'scoped out'. For an EIA development this is usually agreed at scoping stage, or through the iterative detailed design of the development through the EIA process. Effects assessed in full and effects scoped out of the LVIA are detailed in Chapter 8: Landscape and Visual Amenity.

LVIA Assessment Methodology

Study Area

A8.1.10 The study area is determined by the nature and scale of the development proposed and the nature of the surrounding area (e.g. complex topography or extensive tree cover leading to visually enclosed areas may limit the extent of likely significant effects). For the purposes of the LVIA a study area of 5 km radius from the Substation Zone was proposed and agreed with statutory consultees including Aberdeenshire Council as detailed in Chapter 8: Landscape and Visual Amenity, Table 8-1.

Methodological Overview

A8.1.11 The key steps in the methodology for assessing landscape and visual effects are as follows:

- the landscape of the study area is analysed and landscape receptors identified, informed by desk study and field survey;
- the area over which the development will potentially be visible is established through the creation of an initial ZTV plan[6];
- the visual baseline is recorded in terms of the different receptors (groups of people) who may experience views of the development (informed by the initial ZTV) and the nature of their existing views and visual amenity;
- potential assessment viewpoints are selected, as advocated by GLVIA3, to represent a range of different receptors and views, (in consultation with statutory consultees including Aberdeenshire Council), including:
  - *"**Representative viewpoints**, 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 – for example, certain points may be chosen to represent the views of users of particular public footpaths and bridleways;*
  - ***Specific viewpoints**, chosen because they are key and sometimes promoted viewpoints 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; and*
  - ***Illustrative viewpoints**, chosen specifically to demonstrate a particular effect or specific issues, which might, for example, be the restricted visibility at certain locations" (GLVIA3, Para 6.19, Page 109)*
- likely significant effects on both the landscape as a resource and visual receptors are identified; and
- the level (and significance) of landscape and visual effects are judged with reference to the nature of the receptor (commonly referred to as the sensitivity of the receptor), which considers both susceptibility and value, and the nature of

[6] A ZTV indicates areas from where a development is theoretically visible, but they cannot show what it would look like, nor indicate the nature or magnitude of landscape or visual impacts

the effect (commonly referred to as the magnitude of effect), which considers a combination of judgements including size/scale, geographical extent, duration and reversibility.

Description of Effects

A8.1.12 As required by the EIA Regulations, the assessment must also identify the effects as either being beneficial (or positive), adverse (or negative) or neutral.

A8.1.13 The landscape, visual and cumulative effects (**beneficial, adverse** or **neutral**) are determined in relation to the degree to which the proposal fits with the existing landscape character or views, and the contribution to the landscape or views that a proposed development makes, even if it is in contrast to the existing character of the landscape or views. With regard to electricity transmission infrastructure an assessment is required to take an objective approach. Therefore, to address the 'maximum case effect' situation, potential landscape and visual effects relating to the introduction of electricity transmission infrastructure are generally assumed to be adverse (negative).

Method for Assessing Landscape Effects

A8.1.14 As outlined in GLVIA3 '*An assessment of landscape effects deals with the effects of change and development on landscape as a resource*' (GLVIA3, Para 5.1, Page 70). Changes may affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character.

A8.1.15 An assessment of landscape effects requires consideration of the nature of landscape receptors (sensitivity of receptor) and the nature of the effect on those receptors (magnitude of effect). GLVIA3 states that the nature of landscape receptors, commonly referred to as their sensitivity, should be assessed in terms of the susceptibility of the receptor to the type of change proposed, and the value attached to the receptor. The nature of the effect on each landscape receptor, commonly referred to as its magnitude, should be assessed in terms of size and scale of effect, geographical extent, duration and reversibility.

A8.1.16 These aspects are considered together, to form a judgement regarding the overall significance of landscape effects (GLVIA3, Figure 5.1 Page 71). The following sections set out the methodology used to evaluate sensitivity and magnitude.

Sensitivity of Landscape Receptors

A8.1.17 The sensitivity of a landscape receptor to change is defined as **high**, **medium** or **low** and is based on weighing up professional judgements regarding susceptibility and value, as set out in Table A8.1.1 below. Intermediate levels (medium-high or medium-low) are used where it is considered appropriate based on professional judgement.

Table A8.1.1: Sensitivity of Landscape Receptors

	High	←→	Low
Susceptibility	Attributes that make up the character of the landscape offer very limited opportunities for the accommodation of change without key characteristics being fundamentally altered by electricity transmission infrastructure, leading to a different landscape character.	←→	Attributes that make up the character of the landscape are resilient to being changed by electricity transmission infrastructure.
Value	Landscapes with high scenic quality, high conservation interest, recreational value, important cultural associations or a high degree of rarity. Areas or features designated at a national level e.g. National Parks or National Scenic Areas or key features of these with national policy level protection.	←→	Landscapes of poor condition and intactness, limited aesthetic qualities, or of character that is widespread. Areas or features that are not formally designated.

Susceptibility of Landscape Receptors

A8.1.3 Susceptibility is defined by GLVIA3 as *"the ability of the landscape receptor (whether it be the overall character or quality/condition of a particular type or area, or an individual element and/or feature, or a particular aesthetic and perceptual aspect) to accommodate the proposed development without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies"* (GLVIA3 paragraph 5.40).

A8.1.18 A series of criteria are used to evaluate the susceptibility of Landscape Character Types (LCTs) to electricity transmission infrastructure as set out in Table A8.1.2 below. Aspects of these criteria are drawn from a range of published sources relating to electricity transmission infrastructure, including the Holford Rules[7], The Horlock Rules[8] and GLVIA3.

Table A8.1.2: Aspects Influencing Susceptibility of Landscape Receptors to Electricity Transmission Infrastructure

Criteria	Aspects indicating greater susceptibility to electricity transmission infrastructure	⟷	Aspects indicating reduced susceptibility to electricity transmission infrastructure
Scale	Smaller scale	⟷	Larger scale
Topography and landform	Presence of strong topographical variety or distinctive landform features Absence of strong topographical variety, featureless, convex or flat with little opportunity for screening and back clothing of electricity transmission infrastructure	⟷	Undulating and valley landscapes which offer opportunities for screening and back clothing of electricity transmission infrastructure
Landcover, pattern and complexity	Limited woodland/forestry cover to help reduce views of electricity transmission infrastructure (e.g. providing screening or back clothing of infrastructure) Complex Rugged and irregular	⟷	Extensive areas of woodland/forestry cover to reduce views of electricity transmission infrastructure (e.g. providing screening or back clothing of infrastructure) Simple Regular or uniform
Settlement and man-made influence	Absence of modern development Presence of small scale, historic or vernacular settlement	⟷	Presence of contemporary structures e.g. utility, infrastructure or industrial elements
Ridges and Skylines	Distinctive, undeveloped skylines Skylines that are highly visible over large areas or exert a large influence on landscape character Skylines with important historic landmarks	⟷	Non-prominent/screened skylines Presence of existing modern man-made features (e.g. other electricity transmission infrastructure, telecommunications masts or wind turbines)
Inter-visibility with adjacent landscapes	Strong inter-visibility with sensitive landscapes Forms an important part of a view from sensitive viewpoints Visually open	⟷	Little inter-visibility with adjacent sensitive landscapes or viewpoints Visually enclosed
Perceptual aspects	Remote from visible or audible signs of human activity and development	⟷	Close to visible or audible signs of human activity and development

[7] The Holford Rules: Guidelines for the Routeing of New High Voltage Overhead Transmission Lines (with NGC 1992 and SHETL 2003 Notes)
[8] The Horlock Rules: NGC Substations and the Environment: Guidelines on Siting and Design (2006)

A8.1.19 Landscape susceptibility is recorded as **high**, **medium** or **low**, as set out in Table A8.1.3 below. Intermediate levels (medium-high or medium-low) are used where it is considered appropriate based on professional judgement.

Table A8.1.3: Susceptibility of Landscape Receptors

Value	Indicative Criteria
High	Attributes that make up the character of the landscape offer very limited opportunities for the accommodation of change without key characteristics being fundamentally altered by electricity transmission infrastructure, leading to a different landscape character.
Medium	Attributes that make up the character of the landscape have some resilience to change or some opportunity for the accommodation of change without key characteristics being fundamentally altered by electricity transmission infrastructure.
Low	Attributes that make up the character of the landscape are resilient to being changed by electricity transmission infrastructure.

Value of Landscape Receptors

A8.1.20 The European Landscape Convention advocates that all landscape is of value, whether it is the subject of defined landscape designation or not: "*The landscape is important as a component of the environment and of people's surroundings in both town and country and whether it is ordinary landscape or outstanding landscape."*[9] The Landscape Institute also provides guidance on assessing landscape value outside of national landscape designations[10] which has been used to inform the LVIA. The value of a landscape receptor is recognised as being a key contributing factor to the sensitivity of landscape receptors.

A8.1.21 The value of landscape receptors is determined with reference to:

- Review of relevant designations and the level of policy importance that they signify (such as landscapes designated at international, national or local level); and/or
- Application of criteria that indicate value (such as scenic quality, rarity, recreational value, representativeness, conservation interests, perceptual aspects and artistic associations) as described in GLVIA3, paragraphs 5.44 - 5.47.

A8.1.22 Internationally and nationally designated landscapes would generally indicate landscape of higher value whereas those without formal designation (such as a widespread or common landscape type without high scenic quality) are likely to be of lower value, bearing in mind that all landscapes are valued at some level. There is however variation across both designated and undesignated areas, and so judgements regarding value are also informed by fieldwork.

A8.1.23 Landscape value is described as being **high**, **medium** or **low**, as set out in Table A8.1.4 below. Intermediate levels (medium-high or medium-low) are used where it is considered appropriate based on professional judgement.

Table A8.1.4: Value of Landscape Receptors

Value	Indicative Criteria
High	Landscapes with high scenic quality, high conservation interest, recreational value, important cultural associations or a high degree of rarity. Areas or features designated at a national level e.g. National Parks or National Scenic Areas or key features of these with national policy level protection.
Medium	Landscapes potentially designated at a regional or local level e.g. Special Landscape Areas (SLAs) or similar, or areas which in part may be designated in relation to their scenic quality or distinctiveness e.g. Forest Parks or Conservation Areas.

[9] Council of Europe, (2000). The European Landscape Convention – Council of Europe Treaty Series No. 176.
[10] Landscape Institute (2021) Technical Guidance Note 02/21 Assessing landscape value outside national designations

Value	Indicative Criteria
Low	Landscape of poor condition and intactness with limited aesthetic qualities, or of character that is widespread. Areas or features that are not formally designated.

Magnitude of Landscape Change

A8.1.24 The overall judgement of magnitude of a landscape change is based on combining professional judgements on size and scale, geographical extent, duration and reversibility. Further information on the criteria is provided below.

Size and Scale of Effect

A8.1.25 For landscape elements/features this depends on the extent of existing landscape elements that would be lost or changed, the proportion of the total extent that this represents, and the contribution of that element to the character of the landscape.

A8.1.26 In terms of landscape character, this reflects the degree to which the character of the landscape would change as a result of removal or addition of landscape components, and how the changes would affect key characteristics.

A8.1.27 The size and scale of the effect is described as being **large**, **medium**, **small**, or **barely perceptible**.

Geographical Extent of Effect

A8.1.28 The geographical extent over which the landscape effect would arise is described as being **large** (widespread or scale of the landscape character type, affecting several landscape types or character areas), **medium** (more immediate surroundings) or **small** (localised, for example at a site level).

Duration of Effect

A8.1.29 GLVIA3 states at paragraph 5.51 on page 91 that *'Duration can usually be simply judged on a scale such as short term, medium term or long term*.' For the purposes of the assessment, duration is often determined in relation to the phases of the substation, as follows:

- **Short-term** effects are those that occur during construction, and may extend into the early part of the operational phase, e.g. construction activities (generally lasting 0 - 5 years); and
- **Long-term** effects are those which occur throughout the operational phase, e.g. presence of electricity transmission infrastructure (generally lasting 5-80 years).

Reversibility of Effect

A8.1.30 In accordance with the principles contained within GLVIA3, reversibility is reported as **reversible, partially reversible** or **irreversible** (i.e. permanent), and is related to whether the change can be reversed at the end of the phase of development under consideration (i.e. at the end of construction or at the end of the operational lifespan of the development).

A8.1.31 Judgements on the magnitude of landscape effect (nature of landscape effect) are recorded as **high**, **medium**, **low** or **negligible** and are guided by Table A8.1.5 and Table A8.1.6 below, based on combining professional judgements on size and scale, geographical extent, duration and reversibility.

Table A8.1.5: Magnitude of Landscape Effect

Factor	High ⟷	Low
Size/Scale	Extensive loss of landscape features and/or elements, and/or change in, or loss of key landscape characteristics, and/or	Limited loss of landscape features and/or elements, and/or change in or loss of some secondary landscape characteristics

Factor	High	⟷	Low
	creation of new key landscape characteristics		
Geographical Extent	Change in landscape features and/or character extending considerably beyond the immediate site and potentially affecting multiple landscape character types/areas	⟷	Change in landscape features and/or character extending contained within or local to the immediate site and affecting only a small part of the landscape character type/area
Duration	Changes experienced for a period of around 5 years or more	⟷	Changes experienced for a shorter period of up to 5 years
Reversibility	Change to features, elements or character which cannot be undone or are only partly reversible after a long period	⟷	A temporary landscape change which is largely reversible following the completion of construction, or decommissioning of the development

Table A8.1.6: Definitions of magnitude of landscape effect

Magnitude of Landscape Effect	Definition
High	This may include: ■ An obvious (large scale) change in landscape features, characteristics and character potentially resulting in the creation of a new landscape character type; and ■ Likely to apply to obvious changes over the long or medium term, but could apply to very large changes over a short term.
Medium	This may include: ■ Discernible (medium scale) changes to landscape features, characteristics and character; and ■ Likely to apply to discernible changes over a long or medium term, but could include obvious changes for a short term.
Low	This may include: ■ A perceptible but small change to landscape features, characteristics and character; and ■ Likely to apply to small changes over the long or medium term, but could apply to discernible (medium scale) changes over a short term.
Negligible	This may include: ■ An imperceptible/barely perceptible change to landscape features, characteristics and character for any duration.

Judging Levels of Landscape Effect and Significance

A8.1.32 The final step in the assessment requires the judgements of sensitivity and magnitude of effect to be combined to make an informed professional assessment on the significance of each landscape effect (GLVIA3, Figure 5.1, Page 71).

A8.1.33 There may be a complex relationship between the value attached to a landscape and the susceptibility of the landscape to a specific change. Therefore, the rationale for judgements on the sensitivity of landscape receptors needs to be clearly set out for each receptor. It should be noted that whilst landscape designations at an international or national level are likely to be

accorded the highest value, it does not necessarily follow that such landscapes all have a high susceptibility to all types of change, and conversely, undesignated landscapes may also have high value and susceptibility to change (GLVIA3, Page 90).

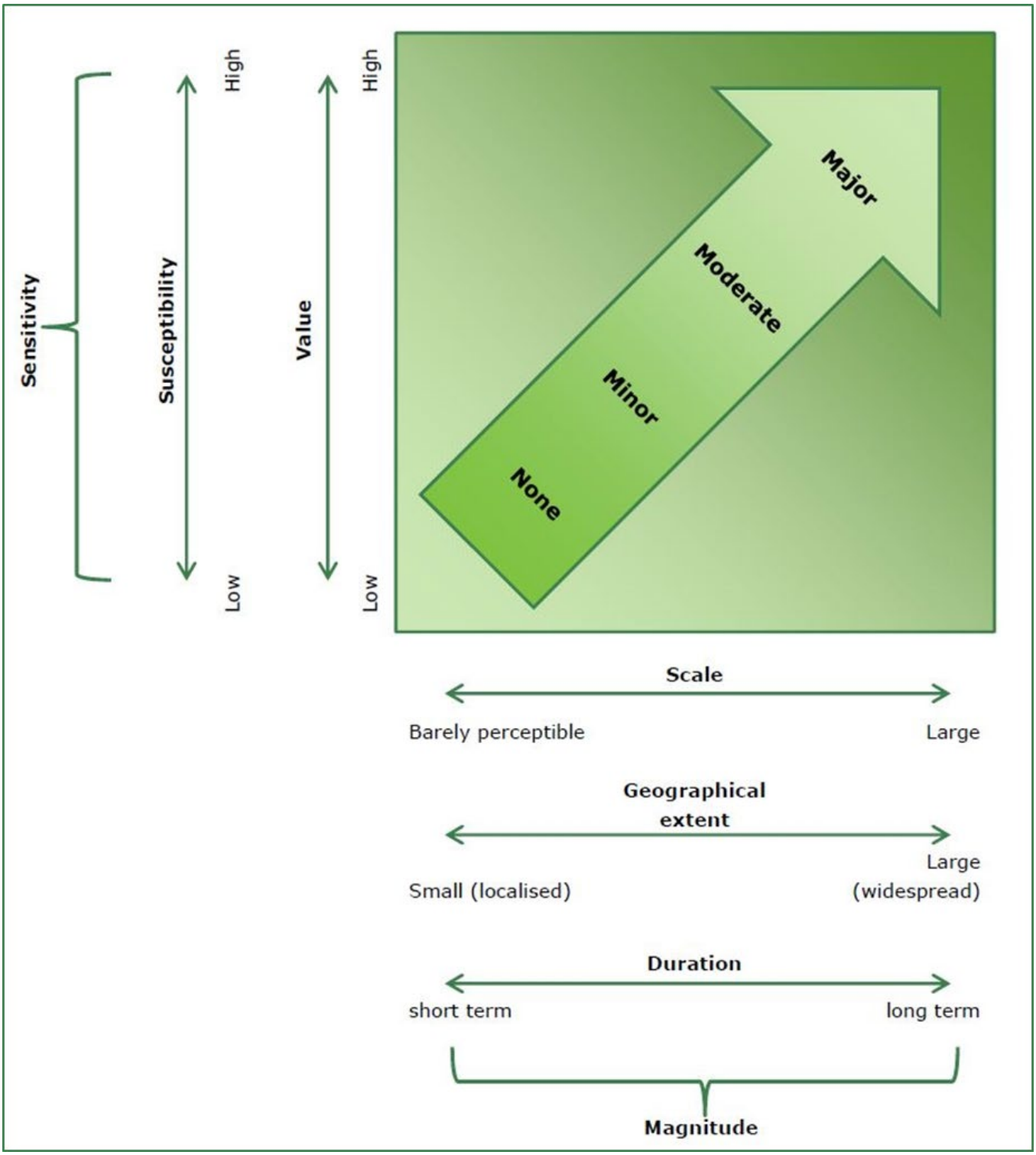
A8.1.34 This determination requires the application of professional judgement and experience to take on board the many different variables which need to be considered, and which are given different weight according to site-specific and location-specific considerations in every instance. Judgements are made on a case by case basis, guided by the principles set out in Diagram 1 below and the example descriptions/definitions detailed in the table below. A rigid matrix-type approach, which does not take on board professional judgement and experience, and where the level of effect is defined simply based on the level of sensitivity (nature of receptor) combined with the magnitude of effect (nature of effect), is not used. As such, the conclusion on the level of effect is not always the same for similar receptors, or determined through a formulaic process.

A8.1.35 Although a numerical or formal weighting system is not applied, consideration of the relative importance of each aspect is made to inform the overall decision as to the likely effect. Levels of effect are identified as **none/negligible**, **minor**, **moderate** or **major** as set out in Table A8.1.7 below, where moderate and major effects are considered **significant** in the context of the EIA Regulations.

Table A8.1.7: Level and Significance of Landscape Effects

Level and Significance of Landscape Effect	Indicative Description
Major (significant)	The proposed development will result in an obvious change in landscape characteristics and character, likely affecting a landscape with a moderate or high susceptibility to that type of change. This level of effect may also occur when a medium scale of effect acts on a nationally valued landscape. The effect is likely to be long-term and affect a relatively large area.
Moderate (significant)	The proposed development will result in a noticeable change in landscape characteristics and character, likely affecting a landscape with a moderate susceptibility to that type of change. This level of effect may also occur when a smaller scale of effect acts on a more widely valued landscape, or a larger scale of effect acting on a landscape valued at a more local level. This level of effect may also occur when a large scale of effect occurs over a relatively short period or over a small area.
Minor (not significant)	The development will result in a small change in landscape characteristics and character over a long-term duration. This level of effect may also occur when a larger scale of effect is of short-term duration or confined to the site.
None/ negligible (not significant)	The development will result in a barely perceptible change in landscape characteristics/character.

Diagram 1: Judging levels of effect – Landscape or Visual (including cumulative)



Method for Assessing Visual Effects

Significance of Visual Effects

A8.1.36 As outlined in GLVIA3 "*An assessment of visual effects deals with the effects of change and development on views available to people and their visual amenity*" (GLVIA3, Para 6.1, Page 98). Changes in views may be experienced by people at different locations within the study area including from static locations (normally assessed using representative viewpoints) and whilst moving through the landscape (normally referred to as sequential views, e.g. from roads and walking routes).

A8.1.37 Visual receptors are individuals or groups of people who may be affected by changes in views and visual amenity. They are usually grouped by their occupation or activity (e.g. residents, motorists, recreational users, tourists visiting a specific location or area) and the extent to which their attention is focused on the view (GLVIA3, Paras. 6.31 - 6.32, Page 113).

A8.1.38 GLVIA3 states that the sensitivity of visual receptors should be assessed in terms of the susceptibility of the receptor to change in views and/or visual amenity and the value attached to particular views. The magnitude of effect should be assessed in terms of the size and scale, geographical extent, duration and reversibility of the effect.

A8.1.39 These aspects are considered together, to form a judgement regarding the overall significance of visual effect (GLVIA3, Figure 6.1 Page 99). The following sections set out the methodology used to evaluate sensitivity and magnitude.

Sensitivity of Visual Receptors

Sensitivity of Visual Receptor

A8.1.40 The sensitivity of a visual receptor to change is defined as **high**, **medium** or **low** and is based on weighing up professional judgements regarding susceptibility and value, and each of their component considerations, as set out in Table A8.1.8 below. Intermediate levels (medium-high or medium-low) are used where it is considered appropriate based on professional judgement.

Table A8.1.8: Sensitivity of Visual Receptors

Factor	High	←→	Low
Susceptibility	Viewers whose attention or interest is focused on their surroundings, including communities / individual residential receptors / people engaged in outdoor recreation / visitors to heritage assets or other attractions where views of surrounding area are an important contributor.	←→	People whose attention is not on their surroundings (and where setting is not important to the quality of working life) such as commuters / people engaged in outdoor sports / people at their place of work.
Value	Views may be recorded in management plans, guide books, and/or which are likely to be experienced by large numbers of people. Views may be associated with nationally designated landscapes; local authority designated landscapes; designed views recorded in citations for historic parks, gardens, schedules monuments etc.	←→	Views which are not documented or protected. Views which are more incidental, and less likely to be associated with somewhere people travel to or stop, or which may be experienced by smaller numbers of people.

Susceptibility of Visual Receptors

A8.1.41 The susceptibility of visual receptors to changes in views/visual amenity is a function of the occupation or activity of people experiencing the view and the extent to which their attention is focused on views (GLVIA 3, para 6.32). This is recorded as **high**, **medium** or **low** informed by Table A.8.1.9 below.

Table A8.1.9: Susceptibility of Visual Receptors

High	Medium	Low
Viewers whose attention or interest is focused on their surroundings, including: ■ communities where views contribute to the landscape setting enjoyed by residents; ■ people engaged in outdoor recreation (including users of cycle routes, footpaths and public rights of way whose interest is likely to be focused on the landscape); ■ visitors to heritage assets or other attractions where views of surroundings are an important contributor to experience; ■ formal or promoted stopping places on scenic or tourist routes.	People travelling in vehicles on scenic routes and tourist routes, where attention is focused on the surrounding landscape, but is transitory; People at their place of work whose attention is focused on the surroundings and where setting is important to the quality of working life.	People travelling more rapidly on more major roads, rail or transport routes (not recognised as scenic routes); People engaged in outdoor sport or recreation which does not involve or depend upon appreciation of views of the landscape; People at their place of work whose attention is not on their surroundings (and where setting is not important to the quality of working life).

Value of View or Visual Amenity

A8.1.42 GLVIA3 also requires evaluation of the value attached to the view or visual amenity and relates this to planning designations and cultural associations (GLVIA3, Para. 6.37, Page 114).

A8.1.43 Recognition of the value of a view is determined with reference to:

- planning designations specific to views;
- whether it is recorded as important in relation to designated landscapes (such as views specifically mentioned in the special qualities of a National Scenic Area);
- whether it is recorded as important in relation to heritage assets (such as designed views recorded in citations of Gardens and Designed Landscapes (GDL) or views recorded as of importance in Conservation Area Appraisals); and
- the value attached to views by visitors, for example through appearances in guide books or on tourist maps, provision of facilities for their enjoyment and references to them in literature and art.

A8.1.44 A designated viewpoint or scenic route advertised on maps and in tourist information, or which is a significant destination in its own right, such as a Munro summit, is likely to indicate a view of higher value. High value views may also be recognised in relation to the special qualities of a designated landscape or heritage asset, or it may be a view familiar from photographs or paintings.

A8.1.45 Views experienced from viewpoints or routes not recognised formally or advertised in tourist information, or which are not provided with interpretation or, in some cases, formal access, are likely to be of lower value.

A8.1.46 Judgements on the value of views or visual amenity are described as being **high**, **medium** or **low**, as set out in Table A8.1.10 below. Intermediate levels (medium-high or medium-low) are used where it is considered appropriate based on professional judgement.

Table A8.1.10: Value of Views and Visual Amenity

Value	Indicative Criteria
High	Views may be recorded in management plans, guide books, and/or which are likely to be experienced by large numbers of people.

Value	Indicative Criteria
	Views may be associated with internationally or nationally designated landscapes; designed views recorded in citations for Gardens and Designed Landscapes (GDLs)/Scheduled Monuments etc.
Medium	Views may be associated with regionally or locally designated landscapes; designed views recorded in citations for historic parks, gardens designated at a regional or local level, or documented in local planning policy (e.g. landmark hills/views, promoted viewpoints).
Low	Views which are not documented or protected but may be valued at a local level. Views which are more incidental, and less likely to be associated with somewhere people travel to or stop, or which may be experienced by smaller numbers of people.

Magnitude of Visual Change

A8.1.47 The overall judgement of magnitude of visual change (nature of visual effect) is based on weighing up professional judgements on size and scale, geographical extent, duration and reversibility. Further information on the criteria is provided below.

Size and Scale

A8.1.48 The size and scale of a visual change depends on:

- the scale of the change in the view with respect to the loss or addition of features in the view and changes in its composition, including the proportion of the view occupied by the proposed development;
- the degree of contrast or integration of any new features or changes in the landscape with the existing or remaining landscape elements and characteristics in terms of form, scale and mass, line, height, colour and texture; and
- the nature of the view of the proposed development, in terms of the relative amount of time over which it will be experienced and whether views will be full, partial or glimpsed.

A8.1.49 All changes are assumed to be during winter, representing a 'maximum case effect' scenario with minimal screening by deciduous vegetation and trees. Wireframes and ZTVs prepared to illustrate potential visual effects are initially calculated on the basis of a 'Bare Earth' Digital Terrain Model (DTM) and therefore demonstrate the maximum extent of visibility possible, in the absence of buildings, woodland, vegetation or other surface features which may otherwise screen of filter views of the proposed development. Additional ‘screened’ ZTVs have been prepared to represent a more realistic ‘likely worse case’ scenario. Further information regarding the production of ZTVs is provided in the ‘Zone of Theoretical Visibility (ZTV) Production’ section of this methodology.

A8.1.50 Where known surface features such as deciduous woodland are present, either within the baseline or related to proposed landscape mitigation planting, the assessment provides commentary on the residual effect. The assessment considers the changes to views when deciduous vegetation is not in leaf (during winter) and fully in leaf (during summer).

A8.1.51 In this assessment size/scale of visual change is described as being **large**, **medium**, **small** or **barely perceptible**.

Geographical Extent

A8.1.52 The geographical extent of a visual change records the extent of the area over which the changes will be visible e.g. whether this is a unique viewpoint from where the proposed electricity transmission infrastructure can be glimpsed, or whether it represents a larger area from which similar views are gained. Geographical extent is described as being **large** (widespread), **medium** or **small** (localised).

Duration

A8.1.53 The duration of visual effects is reported as **short-term** or **long-term**, as defined for the duration of landscape effects (see above).

Reversibility

A8.1.54 Reversibility is reported as **irreversible** (i.e. permanent), **partially reversible** or **reversible**, and is related to whether the visual change can be reversed at the end of the phase of development under consideration (i.e. at the end of construction or at the end of the operational lifespan of the development). Operational visual effects associated with the proposed substation has been considered to be irreversible due to the operational lifetime of the infrastructure and long-term network requirements.

A8.1.55 Judgements on the magnitude of visual effect are recorded as **high**, **medium**, **low** or **negligible** guided by Table A.8.1.11 and Table A.8.1.12 below, based on combining professional judgements on size and scale, geographical extent, duration and reversibility.

Table A8.1.11: Magnitude of Visual Effects

	High	⟷	Low
Size/Scale	A large visual change resulting from the proposed development is the most notable aspect of the view, perhaps as a result of the development being in close proximity, or because a substantial part of the view is affected, or because the development introduces a new focal point and/or provides contrast with the existing view and/or changes the scenic qualities of the view.	⟷	A small or some visual change resulting from the proposed development as a minor or generally unnoticed aspect of the view, perhaps as a result of the development being in the distance, or because only a small part of the view is affected, and/or because the development does not introduces a new focal point or is in contrast with the existing view and/ does not change the scenic qualities of the view.
Geographical Extent	The assessment location is clearly representative of similar visual effects over an extensive geographic area.	⟷	The assessment location clearly represents a small geographic area.
Duration	Visual change experienced over around 5 years or more	⟷	Visual change experienced over a short period of up to 5 years.
Reversibility	A permanent visual change which is not reversible or only partially reversible following decommissioning of the proposed development.	⟷	A temporary visual change which is largely reversible following the completion of construction, or decommissioning of the proposed development.

Table A8.1.12: Definitions of magnitude of visual effect

Magnitude of Visual Effect	Definition
High	This may include: ■ A large change in available views, perhaps where the development is in close proximity in a direct line of vision, or affecting a substantial part of the view, or providing contrast with the existing view; and ■ Likely to apply to large changes over the long or medium term but could apply to very large changes over a short term.
Medium	This may include: ■ A clearly perceptible change in view, perhaps where the development is relatively close but at an oblique angle or further away in the direct line of vision, creating a distinct new element in the view; and

Magnitude of Visual Effect	Definition
	■ Likely to apply to clearly perceptible changes over a long or medium term but could include large changes for a short term.
Low	This may include: ■ A small change in view, perhaps where the development is at a distance or oblique angle, or where the scale of the landscape absorbs the development well; and ■ Likely to apply to small changes over the long or medium term but could apply to clearly perceptible changes over a short term.
Negligible	A change in view which is barely perceptible or may go unnoticed.

Judging the Level of Visual Effect and Significance

A8.1.56 As for landscape effects, the final step in the assessment requires the judgements on sensitivity of visual receptor and magnitude of visual effect to be combined to make an informed professional assessment on the significance of each visual effect.

A8.1.57 The sensitivity of visual receptors may involve a complex relationship between a visual receptors' (e.g., people's) susceptibility to change and the value attached to a view. Therefore, the rationale for judgements of sensitivity is clearly set out for each receptor in relation to both its susceptibility to the type of change proposed, and its value.

A8.1.58 A rigid matrix-type approach, where the level of visual effect is defined simply based on the level of sensitivity combined with the magnitude of effect is not used. As such, the conclusion on the level of effect is not always the same for similar receptors. Although a numerical or formal weighting system is not applied, consideration of the relative importance of each aspect is made to feed into the overall decision. Levels of visual effect are identified as **none/negligible**, **minor**, **moderate** or **major**, where moderate and major visual effects are considered **significant** in the context of the EIA Regulations.

A8.1.59 This determination requires the application of professional judgement and experience to take on board the many different variables which need to be considered, and which are given different weight according to site-specific and location-specific considerations in every instance. As such, the conclusion on the level of effect is not always the same for similar receptors. Judgements are made on a case-by-case basis, guided by the principles illustrated in Diagram 1 above, and the example descriptions/definitions detailed in Table A8.1.13 below.

Table A8.1.13: Level and Significance of Visual Effects

Level and Significance of Visual Effects	Indicative Description
Major (significant)	The proposed development will result in an obvious change in view, likely affecting a visual receptor with a moderate or high susceptibility to that type of change. This level of effect may also occur when a medium scale of effect acts on a nationally valued view and/ or a high susceptibility receptor. The effect is likely to be long-term and affect a relatively large area or relatively large number of people.
Moderate (significant)	The proposed development will result in a noticeable change in a view, likely affecting a viewer with a moderate susceptibility to that type of change and/ or locally valued view. This level of effect may also occur when a smaller scale of change acts on a higher susceptibility receptor or affects a large number of people, or a larger scale of effect acting on a lower susceptibility receptor or affecting fewer people.

Level and Significance of Visual Effects	Indicative Description
	This level of effect may also occur when a large scale of effect occurs over a relatively short period or over a small area/ affects few people.
Minor (not significant)	The development will result in a small change in view over a long-term duration, likely affecting a smaller geographic extent and/ or fewer people. This level of effect may also occur when a larger scale of effect is of short-term duration or is confined in its geographical extent.
None/ negligible (not significant)	The development will result in a barely perceptible change in views.

Cumulative Landscape and Visual Impact Assessment

A8.1.60 The aim of the cumulative assessment is to identify any interactions with other developments (including transmission infrastructure, wind farms or other large scale development) which could result in further significant landscape and visual effects not identified within the LVIA.

A8.1.61 NatureScot has prepared guidance relating to the cumulative assessment of wind energy developments: *Assessing the Cumulative Impact of Onshore Wind Energy Developments*. Whilst this guidance specifically relates to wind farms, many of the overarching principles are of relevance to the cumulative assessment of other types of development. This guidance states that the aim of cumulative assessment is to: "*describe, visually represent and assess the ways in which a proposed windfarm would have additional impacts when considered together with other existing, consented or proposed windfarms*" (NatureScot, 2021).

A8.1.62 The cumulative assessment therefore focuses on the additional cumulative change which may result from the introduction of a proposed development. A cumulative assessment considers the potential interactions between different developments of the same or different types (including wind farms, other energy generation stations or other large scale development) if these are likely to result in similar landscape and visual impacts.

A8.1.63 As with LVIA, cumulative assessment deals with cumulative landscape and visual effects separately.

Differences between LVIA and CLVIA

A8.1.64 Although both LVIA and CLVIA look at the effects of a proposed development on the landscape and on views, there are differences in the baseline against which the assessments are carried out.

A8.1.65 For the LVIA, the baseline includes existing developments (including transmission infrastructure, wind farms and other large-scale development) which are present in the landscape at the time of undertaking the assessment, which may be either operational or under construction, and as such they are assumed to form a part of the baseline situation. Their presence has the potential to influence the assessment of effects on landscape (including its character) and the assessment of effects on views.

A8.1.66 For the CLVIA the baseline is partially speculative and in addition to the Proposed Development, considers transmission infrastructure, wind farms or other large scale development which have been granted planning consent but are not yet constructed (consented); and developments which are the subject of a submitted valid application which are currently awaiting determination by the relevant consenting authority, including those at appeal. Other developments within 5 km of the Proposed Development are shown on Figure 2.1 with further commentary provided in section 8.9 of Chapter 8: Landscape and Visual Amenity as to which developments were considered within the cumulative landscape and visual impact assessment.

A8.1.67 The cumulative assessment considers the operational and under construction sites, as well as consented and proposed sites, and differs from that contained in the LVIA in that it focuses specifically on the cumulative effects of the Proposed Development arising in association with all other transmission infrastructure, wind farms or other large scale developments, and assesses the relationship between them.

Types of Cumulative Effects

A8.1.68 Assessing the Cumulative Impact of Onshore Wind Energy Developments states that *"cumulative landscape effects can change either the physical fabric or character of the landscape, or any special values attached to it"* (NatureScot, 2021).

A8.1.69 Three types of cumulative effects on visual amenity are considered in the assessment: combined, successive and sequential:

- Combined effects occur where a static viewer is able to view two or more developments from a viewpoint within the viewers' same arc of vision (assumed to be about 90 degrees for the purpose of the assessment);
- Successive effects occur where a static viewer is able to view two or more developments from a viewpoint, but needs to turn to see them; and
- Sequential effects occur when a viewer is moving through the landscape from one area to another, for instance when a person is travelling along a road or footpath, and is able to see two or more developments at the same, or at different times as they pass along the route. Frequently sequential effects occur where developments appear regularly, with short time lapses between points of visibility. Occasionally sequential effects occur where long periods of time lapse between views of developments, depending on speed of travel and distance between viewpoints.

Assessing Cumulative Effects

Assessment Methodology for CLVIA

A8.1.70 The CLVIA considers the potential effects of the addition of a proposed development, against a baseline landscape that includes transmission infrastructure, wind farms/ other energy generation infrastructure or other larger scale development that may or may not be present in the landscape in the future, i.e. developments that are consented but not yet built, and/or undetermined planning applications. The developments included in each stage of the cumulative assessment are assumed to be present in the landscape for the purposes of the CLVIA.

A8.1.71 The methodology for the CLVIA follows that of the primary LVIA, which considers the introduction of a proposed development to a baseline which includes existing (operational and under construction) developments. The size and scale of cumulative change focuses on:

- the number of existing, consented and/or proposed developments visible;
- the pattern and arrangement of developments in the landscape or view, e.g. developments seen in one direction or part of the view (combined views), or seen in different directions (successive views in which the viewer must turn) or developments seen sequentially along a route;
- the relationship between the scale of the developments (similar scale developments or scales of development which are clearly at odds with each other);
- the position of the developments in the landscape, e.g. in similar landscape or topographical context;
- the position of the developments in the view, e.g. on the skyline or against the backdrop of land; or how the proposed development will be seen in association with another development (separate, together, behind etc.); and
- the distances between developments, and their distances from the viewer.

Study Area

A8.1.72 The study area for a CLVIA is determined by the nature and scale of the development proposed, the nature of the surrounding area (e.g. complex topography or extensive tree cover leading to visually enclosed areas may limit the extent of likely significant effects), and informed by the location, pattern and distribution of existing, consented and proposed developments which may give rise to similar landscape and visual effects as the substation. For the purposes of the CLVIA assessment, other developments within a study area of 5 km radius from the Substation Zone were considered.

Significance of Cumulative Effects

A8.1.73 As for the LVIA, judging the significance of cumulative landscape and visual effects requires consideration of the sensitivity and the magnitude of effect on those receptors.

A8.1.74 GLVIA 3 states *'The most significant cumulative landscape effects are likely to be those that would give rise to changes in the landscape character of the study area of such an extent as to have major effects on its key characteristics and even, in some cases, to transform it into a different landscape type. This may be the case where the project being considered itself tips the balance through its additional effects. The emphasis must always remain on the main project being assessed and how or whether it adds to or combines with the others being considered to create a significant cumulative effect*' (paragraph 7.28, page 129).

A8.1.75 Significant landscape effects are likely where:

- a proposed development extends or intensifies a landscape effect;
- a proposed development 'fills' an area such that it alters the landscape resource; and / or
- the interaction between a proposed development and other developments means that the total effect on the landscape is greater than the sum of its parts.

A8.1.76 Significant visual effects are likely where:

- a proposed development extends or intensifies a visual effect;
- a proposed development 'fills' an area such that it alters the view/visual amenity;
- the interaction between a proposed development and other developments means that the total visual effect is greater than the sum of its parts; and/or
- a proposed development will lengthen the time over which effects are experienced (sequential effects).

A8.1.77 This determination of cumulative landscape and visual effects requires the application of professional judgement and experience to take on board the many different variables which need to be considered, and which are given different weight according to site-specific and location-specific considerations in every instance. Judgements are made on a case-by-case basis, guided by the same principles as set out in Diagram 1, and the typical descriptions/definitions of potential landscape effects set out above.

Residential Visual Amenity

Background

A8.1.78 The Landscape Institute (LI) published Residential Visual Amenity Assessment (RVAA) guidance[11] in early 2019, setting out the background and approach to the assessment of potential effects on residential visual amenity. The guidance states that "*Residential Visual Amenity Assessment (RVAA) is a stage beyond LVIA and focuses exclusively on private views and private visual amenity*." (Foreword, Page 2).

A8.1.79 This is reinforced by the guidance provided in GLVIA3, which states; *"Effects of development on private property are frequently dealt with mainly through 'residential amenity assessments'. These are separate from LVIA although visual effects assessment may sometimes be carried out as part of a residential amenity assessment, in which case this will supplement and form part of the normal LVIA for a project. Some of the principles set out here for dealing with visual effects may help in such assessments but there are specific requirements in residential amenity assessment."* (Para. 6.17, Page 107 and 109).

A8.1.80 It is also important to note that residential visual amenity is only one component of residential amenity and should be considered in conjunction with assessments of potential effects on the other components of residential amenity including noise, dust, access to daylight, vibration and electromagnetic field etc. and which may otherwise be referred to collectively as 'living conditions'.

[11] The Landscape Institute (February 2019) Technical Guidance Note 2/19: Residential Visual Amenity Assessment (RVAA)

A8.1.81 With respect to visual effects, the focus of LVIA is on public views and public visual amenity which are given due consideration in the planning process. In respect of private views and visual amenity, it is widely accepted that no one has 'a right to a view', including situations where the visual amenity of a property is judged to be significantly affected by a proposed development. As a consequence, views from private residences are not a 'material consideration' in the determination of an application for planning or associated consents. However, in instances where the views of development from a property or its curtilage are judged to be so overbearing or unavoidable in key/principal views that they become a material planning consideration which is of greater public interest they may be considered in the planning balance by a determining authority or decision maker.

A8.1.82 GLVIA3 provides further clarification of the differences between LVIA and RVAA: *"The issue of whether residents should be included as visual receptors and residential properties as private viewpoints has been discussed in Paragraph 6.17. If discussion with the competent authority suggests that they should be covered in the assessment of visual effects it will be important to recognise that residents may be particularly susceptible to changes in their visual amenity - residents at home, especially using rooms normally occupied in waking or daylight hours, are likely to experience views for longer than those briefly passing through an area. The combined effects on a number of residents in an area may also be considered, by aggregating properties within a settlement, as a way of assessing the effect on the community as a whole. Care must, however, be taken first to ensure that this really does represent the whole community and second to avoid double counting of the effects".* (Para. 6.36, Page 114).

A8.1.83 The RVAA guidance introduces an approach to considering a potential 'Residential Visual Amenity Threshold', beyond which effects may be of "*such nature and/or magnitude that it potentially affects 'Living Conditions' or residential Amenity*" (Para. 2.1, Page 5).

A8.1.84 The guidance highlights that "*LVIA prepared in accordance with GLVIA3 provides an appropriate starting point for a RVAA*." (Para. 2.4, Page 5), and recommends four step approach (Figure 1 RVAA Process, page 7) and which draws heavily on the GLVIA3 principles and process. The first three steps of the approach "*fall broadly within the normal scope of LVIA consisting of an assessment of the magnitude and significance of visual effect (in the EIA context) and change to visual amenity likely to be experienced by occupants at those individual residential properties which were identified*" (Para. 3.2, Page 6). The fourth step "*requires a further assessment of change to visual amenity examining whether the Residential Visual Amenity Threshold is likely to be, or has been, reached. Whether or not this final step is engaged depends on the circumstances specific to the case*." (Para. 3.3, Page 6).

Identification of Residential Properties to be Assessed

A8.1.85 Avoiding settlements and residential properties was a key consideration of the siting process for the Proposed Development in order to avoid or minimise the potential for significant effects on the views and visual amenity of residential receptors.

A8.1.86 The guidance recommends that the study area for RVAA "*should be determined on a case-by-case basis taking both the type and scale of proposed development, as well as the landscape and visual context, into account*". As such, properties for inclusion in the RVAA will be considered on a case-by-case basis, with a 500 m radius study area, as measured from the outer boundary of the Substation Zone, applied as a guide. As the substation (and associated infrastructure within the Substation Zone) will form the only permanent, above-ground components of the Proposed Development, the RVAA focuses on likely effects resulting from the introduction of the proposed substation into views from residential properties.

A8.1.87 The 500 m study area for the RVAA was informed by the scale and nature of the Proposed Development, ZTV analysis, and fieldwork undertaken in the area, and considers settlement pattern around the Proposed Development. In addition to ZTV analysis and fieldwork, each property and group of properties included in the RVAA was informed by aerial photography and wireframes to determine the scale of visual effects. Aspects such as combined and successive views, and encirclement are considered.

Approach to Consideration of Visual Effects from Residential Properties

A8.1.88 As set out above it is important to note that the assessment of effects on residential visual amenity is often distinctly separate from the assessment of visual effects as covered in a standard LVIA. Nevertheless, in order to determine whether more detailed consideration of effects on views and visual amenity from residential properties is required, in the form of an

RVAA, the potential effects on views and visual amenity from residential properties in closest proximity to the proposed Development, experienced during construction and operation, have been considered in the form of an assessment of effects on views and visual amenity experienced by visual receptors at publicly accessible locations in the vicinity of residential properties located within approximately 500 m of the Substation Zone.

A8.1.89 It is this distinction between LVIA and RVAA which has informed the approach to considering potential effects on views and visual amenity in relation to the introduction of the proposed Development, and "*In any event RVAA should be considered supplementary to LVIA following on from, and informed by, the latter's findings and conclusions*." (Para. 3.3, Page 6).

Sensitivity of Residential Receptors

A8.1.90 As advocated in Landscape Institute Guidance receptors at their homes are often judged to be most susceptible to changes in views and visual amenity. GLVIA3 states at paragraph 6.36: "*in the assessment of visual effects it will be important to recognise that residents may be particularly susceptible to changes in their visual amenity - residents at home, especially using rooms normally occupied in waking or daylight hours, are likely to experience views for longer than those briefly passing through an area*."

A8.1.91 As outlined in Landscape Institute Guidance (para 4.23) residential receptors (people) are considered to be of high susceptibility to changes in views from their places of residence (property, curtilage, and access). An appreciation of the surrounding views is often material to the quality of life from residential properties, therefore the value of these views is typically considered to be high. However, this may vary and is determined in relation to the availability and nature of existing views, including the presence of other existing transmission infrastructure, or other infrastructure in views.

A8.1.92 The nature of the existing view, including the direction of the view, the orientation of buildings, location of garden or curtilage areas access and the presence of intervening features such as vegetation are considered, whilst the seasonality of vegetation screening and potential changes to forestry are referred to where applicable.

A8.1.93 Taking account of the susceptibility of receptors and the value of views from residential properties, the overall sensitivity of residential receptors is typically judged to be **high** and is referred to as such throughout the assessment.

Magnitude of Visual Change

A8.1.94 In order to establish whether visual effects are of such magnitude that they require further consideration as part of a more detailed RVAA (final fourth step) and thus warrant material consideration within the planning balance, it is important to determine whether these effects make the property 'an unattractive place to live'. Potential significant adverse effects on views and visual amenity, in the context of the Environmental Impact Assessment (EIA) Regulations, experienced by people at their place of residence as a result of introducing a new development are not uncommon, but in themselves may not trigger further consideration in the planning balance as a 'material consideration'.

A8.1.95 As outlined in the RVAA guidance, *"Determining whether the threshold has been reached requires informed professional judgement. It is the process by which informed professional judgement is engaged to reach a conclusion regarding the Residential Visual Amenity Threshold that is the subject of this Technical Guidance Note."* (Para. 2.2, Page 5), informed by the *"LVIA findings of significant (adverse) effects on outlook and /or on visual amenity at a residential property do not automatically imply the need for a RVAA. However, for properties in (relatively) close proximity to a development proposal, and which experience a high magnitude of visual change, a RVAA may be appropriate, and may be required by the determining / competent authority." (Para. 2.5, Page 5).*

A8.1.96 In line with Step 3 of the RVAA guidance, the consideration of visual effects from residential properties in the LVIA therefore concludes "*by identifying which properties should be assessed further in the final step in order to reach a judgement regarding the Residential Visual Amenity Threshold*." (Para. 4.16, Page 12).

Further Residential Visual Amenity Assessment (RVAA)

A8.1.97 In the event that more detailed examination of effects on residential visual amenity is required, as identified during Step 3 of the process advocated within the RVAA Guidance, properties which are predicted to experience the largest magnitude of visual effect will be subject to a further judgement regarding the Residential Visual Amenity Threshold.

A8.1.98 As detailed in the RVAA Guidance, *"This concluding judgement should advise the decision maker whether the predicted effects on visual amenity and views at the property are such that it has reached the Residential Visual Amenity Threshold, therefore potentially becoming a matter of Residential Amenity. This judgement should be explained in narrative setting out why the effects are considered to reach the Residential Visual Amenity Threshold. Equally, judgements should explain why the threshold has not been reached."* (Para. 4.18, Page 12).

A8.1.99 The Residential Visual Amenity Threshold is judged by considering whether the Proposed Development, for example:

- Blocks the only available view from a property; or
- Is overwhelming views in all directions; or
- Is unpleasantly encroaching; or
- Is inescapably dominant from the property.

A8.1.100 It is intended that this judgement may assist the decision maker in coming to a wider overall planning judgement on residential amenity, when considered within the context of its other component parts (e.g. noise, dust, vibration etc.).

Zone of Theoretical Visibility (ZTV) Production

A8.1.101 Evaluation of the theoretical extent to which the proposed substation is visible across the study area is undertaken by establishing a ZTV.

A8.1.102 Three ZTVs have been generated, representing the range of 'worst-case' visibility to a more realistic scenario for predicted visibility. The following ZTVs have been produced:

- The ZTV on Figure 8.4 indicates the theoretical visibility of points around the perimeter of the substation siting area at 100 m intervals with a height of 15 m from a viewing height of 2 m above ground level. The substation siting area represents an indicative area that is larger than the actual substation footprint. The ZTV shown on Figure 8.4 is based on bare earth OS Terrain 5 digital terrain model (DTM) data, and does not take into account screening by features such as woodland, forestry or buildings.
- As for Figure 8.4, the ZTV on Figure 8.5 indicates the theoretical visibility of points around the perimeter of the substation siting area at 100 m intervals with a height of 15 m from a viewing height of 2 m above ground level. The ZTV shown on Figure 8.5 incorporates indicative screening, based on existing buildings (using OSVML building data), existing woodland (using the woodland category of the Forestry Commission NFI 2022 dataset).
- The ZTV on Figure 8.6 is based on an indicative substation area footprint (at maximum measurements of 200 m x 250 m x 15 m height), which is subject to further refinement but will likely comprise a smaller area than the substation siting area. The ZTV on Figure 8.6 is based on this indicative substation footprint from a viewing height at 2 m above ground level. The ZTV shown on Figure 8.6 incorporates indicative screening, based on existing buildings (using OSVML building data), existing woodland (using the woodland category of the Forestry Commission NFI 2022 dataset).

A8.1.103 Further detail about how the ZTVs have been generated and the data used is provided below.

Bare Earth ZTVs

A8.1.104 The bare earth DTM is comprised of OS Terrain® 5 (5m resolution) data across the 5 km study area. It should be noted that the software uses raster height data, but while it is defined as continuous data (with each grid square referred to as a 'cell'), it assumes a single height value from the centre of that cell for the whole cell. Therefore, any height variations between centre points of cells will not be recognised.

A8.1.105 The DTM data has not been altered (i.e. by the addition of local surface screening features) for the production of the Bare Earth ZTV. No significant discrepancies have been identified between the DTM used and the actual topography around the study area. The effect of earth curvature and light refraction has been included in the Bare Earth ZTV analysis and a viewer height of 2 m above ground level has been used.

A8.1.106 There are limitations in the use and reliance on this theoretical visibility, and these should be considered in the interpretation and use of the ZTV:

- The ZTV uses a 'bare ground' DTM model, and does not consider the screening effects of vegetation, buildings, or other local features that may prevent or reduce visibility;
- The ZTV is considered to over emphasise the extent of visibility of the proposed overhead transmission infrastructure and therefore represents a 'maximum potential visibility' scenario; and
- There is often a wide range of variation within the visibility illustrated by a ZTV, for example, an area shown as having visibility of a larger number of proposed steel lattice towers or wood poles may in reality only be the result of only a small proportion of the structures, which can make a considerable difference in the potential effects of the proposed development on receptors within the area affected by visibility.

A8.1.107 In light of these limitations, whilst ZTVs are used as a starting point to inform the assessment, providing an indication of where the Proposed Development will theoretically be visible, the information drawn from the ZTV was verified with reference computer generated wireline images of the Proposed Development in the field, to ensure that the assessment conclusions represent the visibility of the Proposed Development reasonably accurately.

Visualisation Production

Verified View Visualisations

A8.1.108 LUC have produced Accurate Visual Representations (AVR) or verified views from six agreed viewpoint locations showing the proposed Muir Mhòr Onshore Substation and proposed mitigation planting at year 1 and year 15. The photomontages illustrate a fully enclosed substation at maximum measurements of 200 m x 250 m x 15 m height, consistent with the 'worst-case scenario' set out in Table 8-13 of Chapter 8: Landscape and Visual Amenity.

A8.1.109 Verified Views can be considered as technical visualisations, usually forming part of an LVIA or TVIA (Landscape or Townscape Visual Impact Assessment) and should allow understanding of the proposals within its context and its likely effects from specific viewpoints.

A8.1.110 The Landscape Institute Technical Guidance Note 06/19 - Visual Representation of Development Proposals (The Landscape Institute, 2019) sets out the types of visualisations which are appropriate to the circumstances in which they will be used. The visualisations showing the proposed Muir Mhòr Onshore Substation are of Landscape Institute Type 4: Photomontage (survey/scale verifiable) which will represent the scale, context, form and extent of development.

A8.1.111 The Landscape Institute guidance also refers to AVR 'Levels' as set out in the London View Management Framework (2012). This proposes four levels of AVRs from Level 0 to Level 3, with each providing an increased level of detail. The visualisations showing the proposed Muir Mhòr Onshore Substation are AVR1 (Photomontage indicating the location, size, degree of visibility.

A8.1.112 The methodology covering photography, locational accuracy, data sources and presentation format for the visualisations produced is set out below.

Technical Methodology

Viewpoint Photography

A8.1.113 Viewpoint photography was undertaken from six assessment viewpoint locations to capture the existing baseline view in compliance with Landscape Institute Technical Guidance Note 06/19 - Visual Representation of Development Proposals (The Landscape Institute, 2019). Photography was undertaken by LUC from 14th – 18th August 2024.

A8.1.114 A series of overlapping photographs to an extent of 360 degrees were taken with a Nikon D600 Full Frame digital SLR camera with a fixed 50 mm focal length lens using a fully levelled tripod with Manfrotto panoramic head. Photos were taken in landscape orientation.

A8.1.115 A tripod with vertical and horizontal spirit levels was used to provide stability and to ensure a level set of adjoining images. A panoramic head was used to ensure the camera rotated about the no-parallax point of the lens to eliminate parallax errors between the successive images and enable accurate stitching of the images. The camera was moved through increments of 24 degrees and rotated through a full 360 degrees at each viewpoint. 15 photographs were taken for each 360-degree view.

A8.1.116 The location of each viewpoint was recorded (GPS grid reference, location map and photograph of the tripod) in accordance with Landscape Institute guidance.

A8.1.117 Weather conditions and visibility were considered an important aspect of the field visits for the photography. Where possible, visits were planned around clear days with good visibility. Viewpoint locations were visited at times of day to ensure, as far as possible, that the sun lit the scene from behind, or to one side of the photographer. Photography opportunities facing into the sun were avoided where possible.

Photography stitching, alignment and montaging

A8.1.118 Photography stitching software (PTGui© version 12.24) was used to stitch together the adjoining images to form panoramic images in cylindrical projection. A selection of identical control points was created within each of the adjoining frames to increase the level of accuracy when stitching the 360° panoramic photography.

A8.1.119 The 3D development proposal model of the substation was provided as a shape file by Muir Mhòr Offshore Wind Farm Limited on 3/10/2024. The perimeter was extruded to a height of 12 m.

A8.1.120 Software packages Autodesk 3DS Max© 2024 and Blender were used to view the Proposed Development from the selected viewpoints. Blender was used to format the terrain data to allow use within 3dsMax. 3dsMax was used to set up the 3D model, cameras and lighting, and render outputs for photomontages.

A8.1.121 OST5 was used to obtain accurate z value heights for all viewpoint locations. This data has a vertical accuracy of 2.5m in rural areas. This data provided a detailed and reliable representation of the topography for the model views.

A8.1.122 Viewpoint locations were added to the 3DS Max environment model using the on-site photography GPS coordinate positions, cross-referenced and micro-sited with high-resolution aerial photography. The model views were created to replicate the camera lens parameters and perspective geometry of the baseline photography. Exposure settings (Aperture, ISO and Shutter speed) contained within the metadata of each photograph were also matched to the model cameras.

A8.1.123 Viewer height was set to 1.5 m above ground level. On limited occasions this viewer height was increased by a small increment to achieve a closer match between the terrain data and photographic landform content.

A8.1.124 Control points, including existing pylons, buildings and other notable landmarks, identified in high-resolution aerial photography were used to aid alignment of the model and photographic views.

A8.1.125 90° sections of the baseline photographs were linked as a background to each model view which allowed accurate horizontal and vertical alignment of the Proposed Development within the view.

A8.1.126 3DS Max software was used to render the proposed Muir Mhòr Onshore Substation with mitigation planting. A daylight system was created in the 3D model view with lighting strength and direction applied to closely represent the conditions present at the date and time when each photograph was taken.

A8.1.127 The mitigation planting shown in photomontages is in line with the Outline Landscape Mitigation Plan (Figure 8.8) prepared by LUC. The species are indicative at this point and will be formally specified within a detailed Landscape Mitigation and Management Plan, to be developed post-consent.

A8.1.128 The plugin IToo Forest Pack Pro was used within 3DS Max to replicate the mitigation planting specification, with 3D Assets obtained from Maxtree and Evermotion.

A8.1.129 The next stage required the rendered substation and mitigation planting to be blended into the baseline photographic view. This was carried out using Adobe Photoshop© software and allowed, where relevant, for infrastructure or parts of infrastructure to be masked (removed) where they were located behind foreground elements that appeared in the original photograph.

A8.1.130 The 3D model views were rendered and then composited and aligned with the baseline photography using Adobe Photoshop© software.

Presentation of Photomontages

A8.1.131 Adobe InDesign© software was used to present the figures. The dimensions for each image (printed height and field of view) are in accordance with Landscape Institute requirements. Photography information and viewing instructions are provided on each page.

A8.1.132 All viewpoints have been presented as separate images with a cylindrically projected 90° horizontal field of view (FOV).

A8.1.133 The elongated A1 width format pages presented for each viewpoint are set out as follows:

a. Viewpoint location plan – basemap with OS 25K basemapping showing viewpoint location and illustrating the 90˚ view directions shown in subsequent pages.

b. Baseline Photograph - 90˚ baseline photography to illustrate the wider landscape and visual context. These are shown in cylindrical projection and presented on an A1 width page.

c. Photomontage - 90˚ montage at Type 4/AVR1 level of detail. The photomontage matches the same formatting as the baseline photograph above, with fully rendered models representing the substation's extent and height with proposed mitigation planting at year 1.

d. Photomontage - 90˚ montage at Type 4/AVR1 level of detail. The photomontage matches the same formatting as the baseline photograph above, with fully rendered models representing the substation's extent and height with proposed mitigation planting at year 15.

A8.1.134 Adobe InDesign© software was used to present each of the verified view visualisation figures. Each page of the visualisation figures contains technical information relating to viewpoint location, direction, field of view and photography details.