Appendix 6.1

LVIA Methodology

Scottish Power Energy Networks

Glenmuckloch to Glenglass Grid Reinforcement Project

LVIA Methodology

Final report
Prepared by LUC
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Appendix 6.1

LVIA Assessment Methodology (Appendix 6.1)

Introduction

6.1 This appendix sets out the detailed methodology used for the Glenmuckloch to Glenglass Reinforcement Project Landscape and Visual Impact Assessment (LVIA) and Cumulative Landscape and Visual Impact Assessment (CLVIA), which are contained in **Chapter 6: Landscape and Visual Amenity, Volume 1 of the Environmental Impact Assessment Report (EIA)**.

6.2 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.

6.3 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.

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

Guidance

6.5 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.

6.6 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.

6.7 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 NatureScot[4] and the Landscape Institute[5,6].

Scope of the Assessment

6.8 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.

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

6.10 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 6: Landscape and Visual Amenity**.

LVIA Assessment Methodology

Study Area

6.11 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 5km radius from the proposed GGRP was proposed and agreed with statutory consultees including the Scottish Government Energy Consents Unit (ECU), Dumfries and Galloway Council and NatureScot as detailed in **Chapter 6**, **Table 6.1.**

Methodological Overview

6.12 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[7];
- 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 the ECU, Dumfries and Galloway Council and NatureScot), 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 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

6.13 As required by the EIA Regulations[8], the assessment must also identify the effects as either being beneficial (or positive), adverse (or negative) or neutral.

[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 October 2022 was considered when undertaking the assessment
[4] Scottish Natural Heritage (2017) Visual Representation of Wind Farms Guidance, Version 2.2
[5] The Landscape Institute (2019). Advice Note 01/11 Photography and photomontage in landscape and visual impact assessment
[6] The Landscape Institute (2017) Technical Guidance Note 02/17: Visual Representation of Development Proposals
[7] 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
[8] The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017

6.14 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

6.15 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.

6.16 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.

6.17 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

6.18 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 below.

Sensitivity of Landscape Receptors

	Higher	←→	Lower
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

6.19 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).

6.20 A series of criteria are used to evaluate the susceptibility of Landscape Character Types (LCTs) to electricity transmission infrastructure as set out in **Table 6.1:** below. Aspects of these criteria are drawn from a range of published sources relating to electricity transmission infrastructure, including the Holford Rules[9], The Horlock Rules[10] and GLVIA3.

Table 6.1: 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

6.21 Published landscape capacity or sensitivity studies (where they exist) have been reviewed to inform the evaluation of susceptibility, in addition to fieldwork undertaken across the study area. This review includes an evaluation as to the relevance of the publication to the assessment being undertaken (e.g. consideration of the purpose and scope of the published studies and whether they are still deemed to be current/up to date). Landscape susceptibility is recorded as **high**, **medium** or **low**.

Value of Landscape Receptors

6.22 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."*[11] The value of a landscape receptor is recognised as being a key contributing factor to the sensitivity of landscape receptors.

6.23 The value of landscape receptors is determined with reference to:

[9] The Holford Rules: Guidelines for the Routeing of New High Voltage Overhead Transmission Lines (with NGC 1992 and SHETL 2003 Notes)
[10] The Horlock Rules: NGC Substations and the Environment: Guidelines on Siting and Design (2006)
[11] Council of Europe, (2000). The European Landscape Convention – Council of Europe Treaty Series No. 176.

- 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.

6.24 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.

6.25 Landscape value is described as being **high**, **medium** or **low**, as set out in **Table 6.2:** below.

Table 6.2: 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. Regional Scenic Areas (RSAs), 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.
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.

Sensitivity of Landscape Receptors

6.26 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 6.3:** below.

Table 6.3: Sensitivity of Landscape Receptors

	Higher ⟷ Lower
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. ⟷ 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 Effect

6.27 The overall judgement of magnitude of a landscape effect 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

6.28 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.

6.29 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.

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

Geographical Extent of Effect

6.31 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

6.32 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 GGRP, as follows:

6.33 **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

6.34 **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

6.35 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).

6.36 Judgements on the magnitude of landscape effect (nature of landscape effect) are recorded as **high**, **medium** or **low** and are guided by Table A.4 below, based on combining professional judgements on size and scale, geographical extent, duration and reversibility.

Table 6.4: Magnitude of Landscape Effect

	Higher ⟷ Lower
Size/Scale	Extensive loss of landscape features and/or elements, and/or change in, or loss of key landscape characteristics, and/or creation of new key landscape characteristics ⟷ Limited loss of landscape features and/or elements, and/or change in or loss of some secondary 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

Judging Levels of Landscape Effect and Significance

6.37 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).

6.38 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).

6.39 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 change (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.

6.40 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**, **minor**, **moderate** or **major** as set out in Table A7.1.5 below, where moderate and major effects are considered **significant** in the context of the EIA Regulations.

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

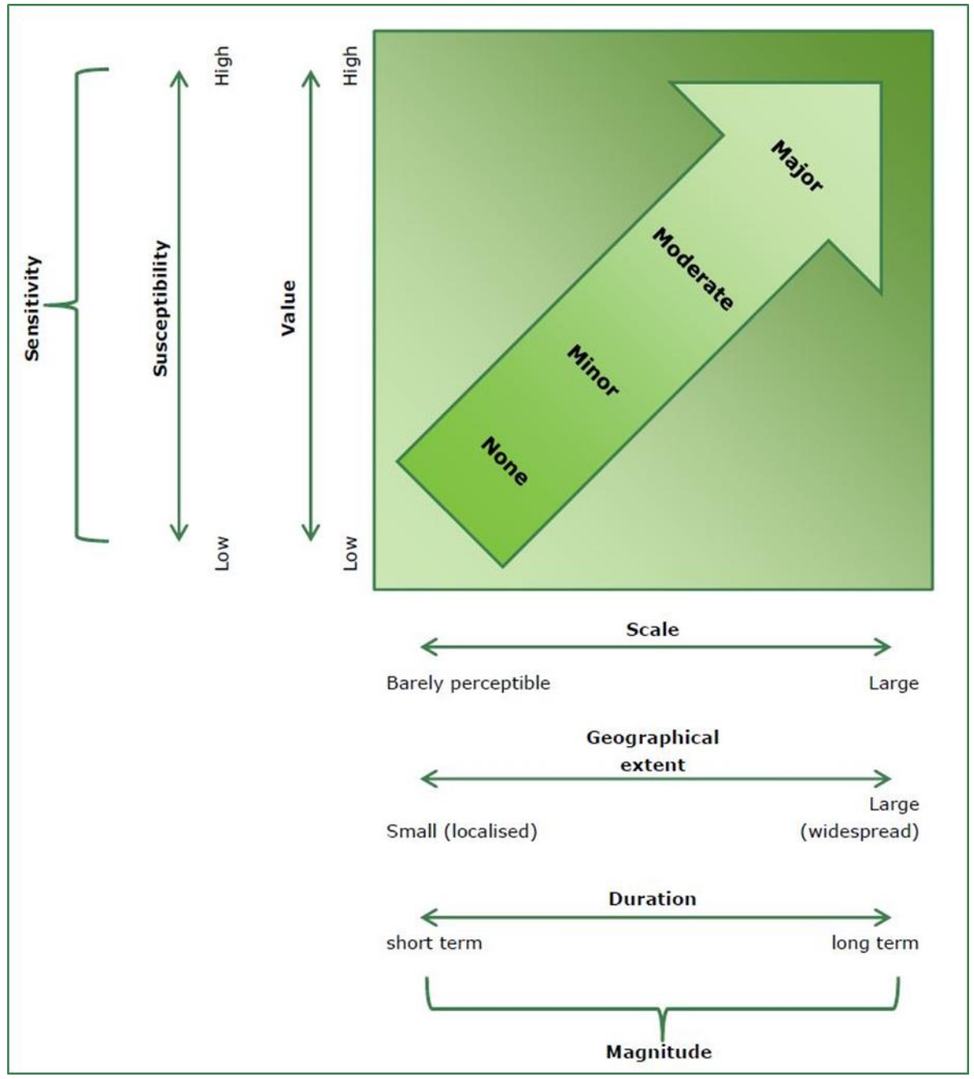

Table 6.5: Level and Significance of Landscape Effects

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 (not significant)	The development will not result in a noticeable (barely perceptible) change in landscape characteristics/character.

Method for Assessing Visual Effects

Significance of Visual Effects

6.41 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).

6.42 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).

6.43 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.

6.44 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

6.45 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 the below.

	Higher	←→	Lower
Susceptibility	Viewers whose attention or interest is focussed 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

6.46 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 6.6:** below.

Table 6.6: Susceptibility of Visual Receptors

High	Medium	Low
Viewers whose attention or interest is focussed on their surroundings, including: ■ communities where views contribute to the landscape setting enjoyed by residents;	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	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
■ 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.	and where setting is important to the quality of working life.	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

6.47 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).

6.48 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.

6.49 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.

6.50 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.

6.51 Judgements on the value of views or visual amenity are described as being **high**, **medium** or **low**, as set out in **Table A.7** below.

Table 6.7: 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. 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 Effect

6.52 The overall judgement of magnitude of visual effect (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

6.53 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.

6.54 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.

6.55 Where known surface features such as coniferous forestry are present, consideration is given to potential changes in the existing composition felling regimes where screening provided by existing forestry is likely to change notably during the lifetime of the GGRP.

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

Geographical Extent

6.57 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

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

Reversibility

6.59 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 overhead transmission lines have been considered to be reversible, as demonstrated by the decommissioning of the existing transmission infrastructure being replaced at the end of its operational life as part of the GGRP.

6.60 Although unlikely for practical system operational reasons, the decommissioning and reinstatement of infrastructure located within the pre-existing substation sites is possible. However, for the purposes of the assessment all visual effects associated with substation infrastructure (e.g. all infrastructure such as terminal towers, gantries and ancillary substation componentry contained within existing or extended substation compounds) are deemed to be irreversible due to the operational lifetime of the infrastructure and long-term network requirements.

6.61 Judgements on the magnitude of visual effect are recorded as **high**, **medium** or **low** guided by **Table 6.8:** below, based on combining professional judgements on size and scale, geographical extent, duration and reversibility.

Table 6.8: Magnitude of Visual Effects

	Higher	⟷	Lower
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		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
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.

Judging the Level of Visual Effect and Significance

6.62 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.

6.63 The evaluations of the individual aspects set out above (susceptibility, value, size and scale, geographical extent, duration and reversibility) are considered together to provide an overall profile of each identified visual effect. An overview is then taken of the distribution of judgements for each aspect to make an informed professional assessment of the overall level of effect, drawing on good practice guidance provided in GLVIA3.

6.64 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.

6.65 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**, **minor**, **moderate** or **major**, where moderate and major visual effects are considered **significant** in the context of the EIA Regulations.

6.66 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 6.9:** below.

Table 6.9: 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 (not significant)	The development will not result in a noticeable (barely perceptible) change in views.

Cumulative Landscape and Visual Impact Assessment (CLVIA)

6.67 The aim of a Cumulative Landscape and Visual Impact Assessment (CLVIA) is to identify any interactions with other types of development (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.

6.68 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 CLVIA 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).

6.69 The cumulative assessment therefore focuses on the additional cumulative change which may result from the introduction of a proposed development. The cumulative assessment may also make reference to *total* (also referred to as combined) cumulative effects, where these have the potential to be significant. A cumulative assessment considers the potential interactions between different types of development (including wind farms, other energy generation stations or other large scale development) if these are likely to result in similar landscape and visual impacts.

6.70 As with LVIA, CLVIA deals with cumulative landscape and visual effects separately.

Differences between LVIA and CLVIA

6.71 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.

6.72 For the LVIA, the baseline includes existing developments (including transmission infrastructure, wind farms 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.

6.73 For the CLVIA the baseline is partially speculative and in addition to the GGRP components, 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. A cut-off date of 2nd September 2022 was applied for the inclusion of other developments to be considered as part of the CLVIA. The developments considered within the CLVIA are shown on **Figure 6.7**.

6.74 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 GGRP 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

6.75 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).

6.76 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

6.77 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 scenario are assumed to be present in the landscape for the purposes of the CLVIA.

6.78 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 focusses 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

6.79 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 GGRP. For the purposes of the CLVIA assessment, other developments within a study area of 10km radius from the proposed GGRP were considered. The approach to the cumulative assessment was agreed with statutory consultees (e.g. Energy Consents Unit (ECU), Dumfries and Galloway Council and NatureScot) as detailed in **Chapter 6, Table 6.1**.

Significance of Cumulative Effects

6.80 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. The following sections set out the methodology applied for the assessment of cumulative effects for both landscape and visual receptors and explain the terms used.

Assessing Cumulative Landscape Effects

Sensitivity

6.81 An assessment of cumulative landscape effects requires consideration of the sensitivity of the landscape receptors. This requires consideration of susceptibility and value, and is as recorded in the LVIA.

Magnitude of Cumulative Landscape Effects

6.82 Similarly, to the methodology applied for the LVIA, the magnitude of cumulative landscape effect (nature of cumulative landscape effect) is based on combining professional judgements on size and scale, geographical extent, duration and reversibility. Judgements on the magnitude of cumulative landscape effect (nature of cumulative visual effect) are recorded as **high**, **medium** or **low**.

Size and Scale

6.83 The size/scale of cumulative landscape change is the additional influence a proposed development has on the characteristics and character of the area assuming the other transmission infrastructure/ developments considered in the CLVIA baseline scenarios are already present in the landscape. This is influenced by:

- how the proposal fits with existing pattern of cumulative developments, with specific emphasis on energy related developments, including the relationship to landscape character types and areas; and
- the siting and design of a proposed development in relation to other existing and proposed developments (including distance between developments, composition, size and scale).

Geographical Extent

6.84 As for the LVIA, the geographical extent over which the cumulative landscape change will be experienced is described as being **large** (scale of the landscape character type, or widespread, affecting several landscape types or character areas), **medium** (immediate surroundings) or **small** (site level).

Duration and Reversibility

6.85 For the purpose of the cumulative landscape assessment consideration of the judgements of the duration and reversibility of landscape effects are as recorded in the LVIA.

6.86 Judgements on the magnitude of cumulative landscape effect are recorded as **high, medium** or **low**.

Levels of Cumulative Landscape Effect and Significance

6.87 The final step in the assessment of cumulative landscape effects requires the judgements of sensitivity and magnitude of cumulative landscape effect to be combined to make an informed professional assessment on the significance of each cumulative landscape effect.

6.88 As for the LVIA the levels of cumulative landscape effect are described as **none, minor, moderate** or **major**, where moderate and major cumulative landscape effects are considered **significant** in the context of the EIA Regulations.

6.89 Significant 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.

6.90 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).

6.91 This determination of cumulative landscape 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.

Assessing Cumulative Visual Effects

Sensitivity

6.92 The assessment of the significance of cumulative visual effects requires consideration of the sensitivity of the visual receptors. This requires consideration of susceptibility and value, and is as recorded in the LVIA.

Magnitude of Cumulative Visual Effects

6.93 As for cumulative landscape effects and the methodology for the LVIA, the magnitude of cumulative visual effect (nature of cumulative visual effect) is based on combining professional judgements on size and scale; geographical extent; duration and reversibility. Judgements on the magnitude of cumulative visual effect (nature of cumulative visual effect) are recorded as **high, medium, low** or **barely perceptible**.

Size and Scale

6.94 The size/scale of cumulative change to views depends on the additional influence a proposed development has on views assuming the other developments considered in the cumulative assessment are already present in the landscape. This is influenced by:

- Whether a proposed development introduces development into a new part of the view so that the proportion of the developed part of the view increases;
- the relationship between a proposed development and other developments in terms of design, size and layout;
- the apparent visual relationship of cumulative developments to landscape character types and or landscape character areas; and/or
- in the case of magnitude of change to routes, the relative duration of views of developments from routes.

6.95 There has to be clear visibility of more than one cumulative development, of which one must be the proposed development, for there to be a cumulative effect (given this is an assessment of the effects of a proposed development and not a broader CLVIA of combined cumulative effects or capacity study). Where a proposed development is clearly visible and other developments are not, the effect is likely to be the same as recorded in the LVIA (i.e. the effect is not a cumulative effect).

Geographical Extent

6.96 As for the LVIA, the geographical extent of cumulative visual changes records the extent of the area over which the changes will be visible e.g. whether this is a unique viewpoint from where a proposed development and other cumulative developments can be glimpsed, or whether it represents a large area from which similar views are gained from large areas. Geographical extent is described as being **large**, **medium** or **small**.

Duration and Reversibility

6.97 For the purpose of the cumulative visual assessment consideration of the judgements of the duration and reversibility of visual effects are as recorded in the LVIA.

Levels of Cumulative Visual Effect and Significance

6.98 The final step in the assessment of cumulative visual effects requires the judgements of sensitivity and magnitude of cumulative visual effect to be combined to make an informed professional assessment on the significance of each cumulative visual effect.

6.99 As for the LVIA the levels of cumulative visual effect are described as **none, minor, moderate** or **major** where moderate and major cumulative visual effects are considered significant in the context of the EIA Regulations.

6.100 The evaluations of susceptibility, value, size and scale, geographical extent, duration and reversibility are considered together to provide an overall profile of each identified visual effect. An overview is taken of the distribution of judgements for each

aspect to make an informed professional assessment of the overall level of each visual effect, drawing on guidance provided in GLVIA3. Levels of effect are identified as **none, minor, moderate** or **major** where moderate and major visual effects are considered significant in the context of the EIA Regulations.

6.101 Most significant 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).

6.102 This determination of cumulative 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. Again, as for the assessment of landscape and visual effects, 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 visual effects set out above.

Residential Visual Amenity

Background

6.103 The Landscape Institute (LI) published Residential Visual Amenity Assessment (RVAA) guidance[12] 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 focusses exclusively on private views and private visual amenity*." (Foreword, Page 2).

6.104 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).

6.105 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'.

6.106 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.

6.107 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).

6.108 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).

6.109 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

6.110 In line with the key principles of the Holford Rules, avoiding settlements and residential properties was a key consideration of the routeing process for the GGRP in order to avoid or minimise the potential for significant effects on the views and visual amenity of residential receptors.

6.111 Wherever feasible, routeing of the GGRP sought to avoid encroaching on the 150m 'trigger for consideration zone' adopted at the routeing stages of the project to reflect the principles within the Further Notes on Clarification to the Holford Rules a)[13].

6.112 In addition, route options sought to avoid introducing visibility of infrastructure into principal views from residential properties, informed by observations made during fieldwork which considered the orientation of properties, the likely availability of views from the property and its curtilage and the presence of intervening screening (e.g. localised landform, woodland, forestry and vegetation, built form and other landscape features).

6.113 For overhead transmission lines, the RVAA guidance (para 4.7, page 10) recommends that all properties within 100-150m of the route are considered to determine whether any potential visual effects require further consideration through more detailed study as part of a RVAA. There are no residential properties within 150m of the GGRP[14]. Properties located beyond 150m distance (typically between 280-600m) were reviewed and a number of these properties which afford potential open views towards the existing and/or proposed connections are considered in the assessment.

Approach to Consideration of Visual Effects from Residential Properties

6.114 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 GGRP, 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 600m of the GGRP.

6.115 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 GGRP, 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

6.116 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*."

6.117 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

[12] The Landscape Institute (February 2019) Technical Guidance Note 2/19: Residential Visual Amenity Assessment (RVAA)
[13] The Holford Rules: Guidelines for the Routeing of New High Voltage Overhead Transmission Lines (with NGC 1992 and SHETL 2003 Notes)
[14] Distances calculated from the centre line of the GGRP and the proposed Glenmuckloch substation.

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.

6.118 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.

6.119 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

6.120 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'.

6.121 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).

6.122 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). Typically this will be limited to those properties judged to experience a high magnitude of visual change, resulting in major significant adverse effects, as a consequence of the introduction of a proposed development.

Further Residential Visual Amenity Assessment (RVAA)

6.123 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.

6.124 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).

6.125 It is important to note that any judgement in relation to the Residential Visual Amenity Threshold "*goes beyond the assessment undertaken in Step 3 which is restricted to judging the magnitude and significance of visual effect, typically as a supplement to the accompanying LVIA*." (Para. 4.20, Page 12), and as such, the detailed approach and methodology to inform this concluding step is not presented here. In the event that effects identified within the LVIA and/or CLVIA undertaken during Step 3, and in accordance with GLVIA3 principles and processes, require further consideration, the RVAA approach to Step 4 would be undertaken in accordance with the approach advocated within the LI RVAA Guidance.

Zone of Theoretical Visibility (ZTV) Production

6.126 Evaluation of the theoretical extent to which both the existing and proposed overhead transmission infrastructure is visible across the study area is undertaken by establishing a ZTV.

6.127 ESRI's ArcMap 10.8.1 software is used to generate the ZTVs. The Spatial Analyst/Viewshed tool does not use mathematically approximate methods, and the program calculates areas from which the wood pole structures are potentially visible.

6.128 This has been performed based on a 'Bare Earth' computer generated DTM which does not take account of potential screening by buildings, woodland, vegetation or other surface features. Further detail about how the ZTVs have been generated and the data used is provided below.

Bare Earth ZTVs

6.129 The bare earth DTM is comprised of OS Terrain® 5 (5m resolution) data across the 5km 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.

6.130 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 2m above ground level has been used.

- 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.

6.131 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.

Photography

Viewpoint Photography

6.132 The methodology for undertaking viewpoint photography is in accordance with guidance from NatureScot (SNH, 2017) and the Landscape Institute (Landscape Institute (LI), 2019). The focal lengths used are in accordance with recommendations contained in guidance and are stated on the figures. Photography was undertaken by LUC between Spring 2020 and Autumn 2022. A Nikon D750 full frame sensor digital single lens reflex (SLR) camera with a fixed 50mm focal length lens was used to undertake photography from all viewpoint locations.

6.133 A tripod with vertical and horizontal spirit levels was used to provide stability and to ensure a level set of adjoining images. The cameras were orientated to take photographs in landscape format. A panoramic head was used in each instance to ensure the camera rotated about the no-parallax point of the lens in order to eliminate parallax errors[15] 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˚ at each viewpoint. Fifteen photographs were taken for each 360˚ view.

6.134 The location of each viewpoint and information about the conditions at the time of the photographs being taken was recorded in the field in accordance with NatureScot (SNH, 2017) and LI guidance (LI, 2019).

6.135 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 appropriate times of day to ensure, as far as possible, that the sun lit the scene from behind, or to one side of the photographer. South facing viewpoints can present problems particularly in winter when the sun is low in the sky. Photography opportunities facing into the sun were avoided where possible to prevent the overhead transmission infrastructure appearing in silhouette. Adjustments to lighting of the overhead

[15] Parallax is the difference in the position of objects when viewed along two different lines of sight. In the case of a camera this would occur if the rotation point of the lens was not constant and would result in stitching errors in the panorama.

transmission infrastructure were made in the rendering software to make the infrastructure appear realistic in the view under the specific lighting and atmospheric conditions present at that time the photography was taken.

Photography Stitching

6.136 Photographic stitching software PTGui© was used to stitch together the adjoining frames to create panoramic baseline photography using cylindrical projection.

Visualisation Production

Wireline Visualisations

6.137 The software package 43D Topos was used to create a 3D Environment model. A digital terrain model (DTM) was created within the 3D model from OS Terrain® 5 and OS Terrain® 50 height data. The DTM includes the proposed development extents, viewpoint locations and all landform visible within the baseline photography. Overhead transmission line infrastructure, cumulative wind farm developments, Glenmuckloch Substation proposals and viewpoint location coordinates were added.

Photomontage Visualisations

6.138 Autodesk 3DSMax© software was used to create the transmission line infrastructure including the specified tower types and heights of the New 132kV OHL. The viewpoint locations were added to the 3DSMax Model using the on-site photography coordinate positions, cross-referenced and micro-sited with high-resolution aerial photography and model views created, which replicated the camera parameters and perspective geometry of the baseline photography. The 43D Topos Wireline exports overlaid and aligned with the photographs were linked as a background to each model view which allowed accurate horizontal and vertical alignment of the transmission line towers.

6.139 A daylight system was created in the 3D model view for each camera view directly informed by the f/stop, ISO and exposure settings within the EXIF photography data. The lighting strength and direction applied closely replicates the conditions present at the date and time when each range of viewpoint photography was taken.

6.140 The 3D model views were rendered and then composited and aligned with the baseline photography using Adobe Photoshop© software. Where the transmission line infrastructure proposals were located behind foreground elements in the photography, those parts of the render were ‘masked’ or removed.

6.141 A Shapefile containing areas of tree felling required as part of the transmission line proposals was imported into the 43D Topos environment model and exports for each view were imported to the Photoshop files to inform the removal of existing woodland where visible.

6.142 The render layer and baseline photograph (showing felling where visible) were then merged to form the photomontages.

6.143 Finally, where applicable the images were converted from Cylindrical Projection to Planar Projection using PTGui© software.

Figure Layout

6.144 Adobe InDesign© software was used to present the figures. The dimensions for each image (printed height and field of view) are detailed below and each viewpoint visualisation has been presented as follows:

- A3 Viewpoint location map;
- 90˚ Baseline photograph (cylindrical projection) and 90˚ Wireline image (cylindrical projection) below. Wireline image shows the New 132kV OHL and developments considered in cumulative assessment:
  - Page size: 841 x 297mm.
  - Up to four x 90˚ sections presented in this format.
- 53.5˚ Wireline image (planar projection);
  - Page size: 841 x 297mm.
- 53.5˚ Photomontage image (planar projection) showing forestry removal where applicable.
  - Page size: 841 x 297mm.
  - Up to four x 53.5˚ sections presented in this format