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# Appendix 5.1

## Landscape & Visual Methodology

### Contents

<b>A5.1</b>	<b>INTRODUCTION</b>	<b>3</b>
<b>A5.2</b>	<b>STATEMENT OF COMPETENCY</b>	<b>3</b>
<b>A5.3</b>	<b>ASSESSMENT GUIDANCE</b>	<b>3</b>
<b>A5.4</b>	<b>LANDSCAPE &amp; VISUAL BASELINE</b>	<b>4</b>
	<i>Landscape receptors</i>	4
	<i>Visual receptors</i>	4
<b>A5.5</b>	<b>LANDSCAPE AND VISUAL EFFECTS</b>	<b>4</b>
	<i>Design Criteria</i>	5
	<i>Landscape &amp; Visual Effects</i>	5
	<i>Significance of effects</i>	5
	<b>Assessing Landscape Effects</b>	<b>5</b>
	<i>Sensitivity of Landscape Receptors</i>	5
	<i>Magnitude of Change</i>	6
	<i>Overall Significance of Landscape Effects</i>	7
	<b>Assessing Visual Effects</b>	<b>7</b>
	<i>Sensitivity of Visual Receptors</i>	7
	<i>Susceptibility of visual receptors to change</i>	8
	<i>Overall significance of visual effects</i>	9
<b>A5.6</b>	<b>CUMULATIVE METHODOLOGY</b>	<b>9</b>
	<b>Introduction</b>	<b>9</b>
	<i>Differences between LVIA and CLVIA</i>	9
	<i>Cumulative approach</i>	9
	<b>Types of Cumulative Effect</b>	<b>9</b>
	<i>Cumulative landscape effects</i>	10
	<i>Cumulative visual effects</i>	10
	<i>Significance of cumulative effects</i>	10
	<i>Cumulative Sites</i>	10
	<i>Cumulative baseline</i>	10
	<b>Assessing Cumulative Effects</b>	<b>10</b>
	<i>Assessing cumulative landscape effects</i>	11
	<i>Assessing cumulative visual effects</i>	11
<b>A5.7</b>	<b>NIGHT-TIME ASSESSMENT</b>	<b>12</b>
<b>A5.8</b>	<b>ZTV AND VISUALISATION PRODUCTION</b>	<b>12</b>

## List of Abbreviations

Abbreviation	Description
CLVIA	Cumulative Landscape & Visual Impact Assessment
ECU	Energy Consents Unit
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
ELC	European Landscape Convention
GLVIA3	Guidelines for Landscape and Visual Impact Assessment, Third Edition
HES	Historic Environment Scotland
LCA	Landscape Character Area
LCT	Landscape Character Type
LVIA	Landscape & Visual Impact Assessment
PLI	Public Local Inquiry
SNH	Scottish Natural Heritage (now NatureScot)
ZTV	Zone of Theoretical Visibility

## A5.1 INTRODUCTION

A5.1.1 This Appendix sets out in detail the methodology that has been applied to undertake the Landscape and Visual Impact Assessment (LVIA). The aim of this LVIA is to identify, predict and evaluate potential key effects arising from the addition of Daer Wind Farm (the Proposed Development) within the landscape and visual resource. This landscape involves an existing baseline situation which includes operational wind farms and those under construction. The Cumulative Landscape and Visual Impact Assessment (CLVIA) also considers the potential key effects arising from the addition of the Proposed Development but presumes a baseline landscape situation which additionally includes wind farms that are consented or are currently being considered within the planning system, and that may or may not be present in the landscape in the future.

### Definition of Landscape & Visual Amenity

A5.1.2 Although closely related, landscape and visual amenity are considered separately in this LVIA according to best practice<sup>1</sup> and are distinguished as follows:

- **Landscape:** Is defined by the European Landscape Convention (ELC) as “*Landscape is an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors*”. Factors contributing to landscape character include the interaction of both natural (geology, soils, climate, flora and fauna) and cultural (historical and current impacts of land use, settlement, enclosure and other human interventions), which are perceived by people; and
- **Visual Amenity:** Relates to the way in which people visually experience the surrounding landscape.

### Key Stages of the LVIA

A5.1.3 The LVIA comprises six key stages as follows:

- Establishment of the landscape and visual baseline;
- Appreciation of the Proposed Development;
- Identification of the key landscape and visual receptors;
- Embedded Mitigation;
- Identification of Potential Effects; and
- Assessment of the Significance of Effect.

A5.1.4 Although set out above separately, each stage is interchangeable throughout the assessment process as the Proposed Development evolves and further information becomes available.

A5.1.5 This Appendix has been structured as follows:

- Statement of Competency;
- Assessment Guidance;
- Landscape & Visual Baseline;
- Landscape & Visual Effects (including Night-time effects);
- Cumulative Methodology;
- Residential Visual Amenity Assessment; and
- Zone of Theoretical Visibility & Visualisation Production.

## A5.2 STATEMENT OF COMPETENCY

A5.2.1 The LVIA has been prepared in accordance with the *Guidelines for Landscape and Visual Impact Assessment, Third Edition* (GLVIA3). The LVIA has been undertaken by Natural Power and led by Graeme Glencorse. Graeme is a Chartered Landscape Architect with over 15 years’ experience of undertaking LVIA’s of wind farms throughout the United Kingdom and Ireland. This has included siting, feasibility and capacity studies, wind farm layout design, assessment, and preparation of material for Public Local Inquiries (PLI). Graeme was assisted by Natural Power’s inhouse Planning and GIS teams.

A5.2.2 LVIA involves a combination of quantitative and subjective assessment and in accordance with GLVIA3, professional judgement is applied to the assessment of effects and a reasoned justification presented in respect of the findings. To provide a robust, consistent and balanced approach, this LVIA has been undertaken and verified by two experienced Chartered Landscape Architects.

A5.2.3 Photography was undertaken by Tom Finnie of Tom Finnie Photography. Tom has over 9 years’ experience in undertaking day and night-time photography to industry standards for LVIA’s and to support evidence at PLI.

## A5.3 ASSESSMENT GUIDANCE

A5.3.1 Legislation, policy and guidance are set out in Chapter 4: Climate Change, Legislative and Policy Context. In addition to the GLVIA3, the LVIA takes account of guidance documents published by the Landscape Institute and NatureScot<sup>2</sup> as follows:

- *GLVIA3 Statement of Clarification 1/13 10-06-13* (Landscape Institute, 2013);
- *Environmental Impact Assessment Handbook: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland*. (SNH, Historic Environment Scotland, April 2018);
- *General pre-application and scoping advice for onshore wind farms, Guidance* (NatureScot, September 2020);
- *Siting and Designing Wind Farms in the Landscape, Guidance, Version 3a* (SNH, August 2017);
- *Landscape Character Assessment, Guidance for England and Scotland*, (The Countryside Agency and Scottish Natural Heritage (SNH) 2002 Edition)<sup>3</sup>;
- *Topic Paper 6: Techniques and Criteria for Judging Capacity and Sensitivity* (The Countryside Agency and SNH, 2004);
- *Landscape Sensitivity Assessment – Guidance for Scotland, Consultation draft* (NatureScot, July 2020);
- *Assessing impacts on Wild Land Areas – Technical Guidance* (NatureScot, September 2020);
- *Visual Representation of Wind Farms, Version 2.2*, (SNH, February 2017);
- *Visual Representation of Development Proposals, Landscape Institute Technical Guidance Note 06/19* (Landscape Institute, 2019); and
- *Assessing the Cumulative Impact of Onshore Developments* (SNH, 2012).

<sup>1</sup> Guidelines for Landscape and Visual Impact Assessment, Third Edition, 2013.

<sup>2</sup> In August 2020, Scottish Natural Heritage (formerly SNH) were rebranded to NatureScot during the preparation of this LVIA. SNH and NatureScot are used interchangeably in this LVIA and where guidance was published prior to 2020, SNH have been referred to as the publisher.

<sup>3</sup> \*This document is superseded in England but still applies in Scotland, see <https://www.nature.scot/professional-advice/landscape/landscape-character-assessment/what-landscape-character-assessment>

## A5.4 LANDSCAPE & VISUAL BASELINE

A5.4.1 The first step of the LVIA is to establish the extent of study area. NatureScot guidance<sup>4</sup> indicates that for developments in excess of 150 m in tip height, a 45 km study area should be applied. This has been offset from the outermost turbines of the Proposed Development as these are the components with the most potential for landscape and visual effects.

A5.4.2 The second step of the LVIA is to identify the landscape and visual receptors that are likely to be affected by the introduction of the Proposed Development. These are identified through analysis of computer-generated Zone of Theoretical Visibility (ZTV) mapping to assist in determining the likely extent of theoretical visibility of the Proposed Development. The production of the ZTVs is described in Section A5.8 of this Appendix.

A5.4.3 Analysis of the ZTV identified areas where the proposed turbines would be theoretically visible within the 45 km study area. This process also identified those areas where there would be no visibility of the Proposed Development, which allowed some landscape and visual receptors to be scoped out of the assessment.

### Landscape receptors

A5.4.4 Landscape receptors may be whole areas defined as Landscape Character Types (LCT), Landscape Character Areas (LCA), protected and designated landscapes or individual elements, such as landscape features and aesthetic characteristics.

A5.4.5 At the broad scale, LCTs/LCAs are defined as a distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse. LCTs/LCAs refer to distinct types of landscape that are relatively homogenous in character. They are generic in nature and can occur more than once in different parts of the country, but wherever they occur they share broadly similar combinations of geology, topography, drainage patterns, vegetation, historic land use and settlement patterns. Designated landscapes at national and local level are also included as broad scale landscape receptors.

A5.4.6 At the detailed level, landscape receptors include the constituent elements of the landscape and its specific aesthetic or perceptual qualities. For designated landscapes these include the special qualities which contributed to the reasons for designation.

A5.4.7 The landscape receptors have been identified through review of the following information:

- Landscape Character Types and Map Descriptions (SNH, 2019);
- Glasgow and the Clyde Valley landscape assessment (SNH, 1999);
- Dumfries and Galloway landscape assessment (SNH, 1998);
- The Borders landscape assessment (SNH, 1998);
- The special qualities of the National Scenic Areas (SNH, 2010);
- Inventory of Gardens and Designed Landscapes (Historic Environment Scotland);
- Wild Land Area Descriptions and Maps (SNH, 2017);
- South Lanarkshire Landscape Character Assessment (South Lanarkshire, 2010);
- South Lanarkshire Validating Local Landscape Designations (South Lanarkshire Council, 2010);
- Dumfries and Galloway Council Local Development Plan 2, Part 1 Wind Energy Development: Development Management Considerations Appendix 'C' Dumfries & Galloway Wind Farm Landscape Capacity Study, Supplementary Guidance (Dumfries and Galloway Council, 2020);

- Regional Scenic Areas, Technical Paper (Dumfries & Galloway Council, 2018); and
- Local Landscape Designations, Supplementary Planning Guidance (Scottish Borders Council, 2012);

### Visual receptors

A5.4.8 Visual receptors are people who will be affected by changes in views or visual amenity at different places. They are usually grouped by what they are doing at these places, such as residents, walkers, and visitors etc. They include people living and working in the area, people travelling through the area on road, rail or other forms of transport, people visiting promoted tourist attractions and landscapes, and people pursuing other recreational activities.

A5.4.9 A selection of viewpoints have been chosen in consultation with Energy Consents Unit (ECU) and agreed with South Lanarkshire Council to represent the views experienced towards the Proposed Development throughout the study area by various groups of people.

A5.4.10 Selected viewpoints include representative, specific and illustrative views from publicly accessible locations, which are defined as:

- **Representative viewpoints:** selected to represent the experience of different types of visual receptors, where larger number 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 public footpaths and bridleways;
- **Specific viewpoints:** chosen because they are key views and sometimes promoted viewpoints within the landscape, including for example scenic viewpoints from roads, specific local visitor attractions, viewpoints in areas that are particular noteworthy for 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 issue, which might be the restricted visibility at certain locations.

A5.4.11 Viewpoints are selected to take account of the viewing experience (such as static views from settlements and sequential views from routes) cumulative views of other developments and as far as possible are representative of the range of key visual receptors and view types (including panoramas, vistas, glimpsed views), as well as being located at varying distances, elevations and orientations from the Proposed Development.

## A5.5 LANDSCAPE AND VISUAL EFFECTS

A5.5.1 In accordance with GLVIA3 the assessment of landscape and visual effects are considered separately.

A5.5.2 Landscape effects are defined in GLVIA3 as '**An assessment of landscape effects deals with the effects of change and development on landscape as a resource.** The concern here is with how the proposal will affect the elements that make up the landscape and its distinctiveness character (GLVIA3, Para 5.1).

A5.5.3 Visual effects are defined in GLVIA3 as '**An assessment of visual effects deals with the effects of change and development on the views available to people and their visual amenity.** The concern here is with assessing how the surroundings of individuals or groups of people may specifically be affected by the changes in the content and character of views as a result of the change or loss of existing elements of the landscape and/or introduction of new elements.' (GLVIA3, Para 6.1).

<sup>4</sup> Visual Representation of Wind Farms, Version 2.2, (SNH, February 2017)

## Design Criteria

- A5.5.4 This LVIA takes cognisance of the design criteria set out in *Siting and Designing Wind Farms in the Landscape, Guidance, Version 3a* (SNH, August 2017) and aims to demonstrate a development that is simple, cohesive, and visually balanced whilst meeting other environmental objectives.
- A5.5.5 The layout and design rationale for the Proposed Development is provided in Chapter 2: Site Selection and Design Evolution and Chapter 5: Landscape & Visual Impact Assessment which describes how the LVIA has had an iterative effect on the design and assessment process.

## Landscape & Visual Effects

- A5.5.6 For the purposes of the LVIA, the potential effects on the landscape and visual resource comprise the following:
- Physical effects on the landscape resource;
  - Indirect effects on the key characteristics of LCTs/LCAs and landscape designation;
  - Indirect effects on Wild Land;
  - Effects on views: and
  - Cumulative effects on landscape and visual amenity;
- A5.5.7 In accordance with the Environmental Impact Assessment (Scotland) Regulations 2017 Regulations, potential effects are stated as follows:
- Direct, Indirect or Secondary;
  - Cumulative;
  - Transboundary;
  - Short-term, Medium-term, or Long-term;
  - Permanent or Temporary; and
  - Positive or Negative.
- A5.5.8 Potential effects are classified into one or more of the following:
- **Direct effects** to the physical landscape and restricted within the Proposed Development site boundary that arise from activities that form an integral part of the project. For example, the effects upon landform and vegetation that may be physically altered by the Proposed Development;
  - **Indirect or Secondary effects** that arise from activities not explicitly forming part of the project or which arise subsequently as a result of an initial effect of the scheme. For example, effects on landscape character from the introduction of new elements that alter the recognisable pattern of elements that occurs consistently in a particular type of landscape;
  - **Temporary effects** that persist for a limited period only, due for example to particular construction activities;
  - **Medium to Long-term effects** which would persist for the foreseeable future or which would give rise to an irreversible change to the baseline environment;
  - **Residual effects** resulting from the scheme once the final design has been adopted and mitigation measures have been considered; and
  - **Cumulative effects** associated with consented and sites currently within the planning system.
- A5.5.9 As a precautionary approach, effects on landscape character and visual amenity are considered in this LVIA to be adverse but it should be noted that not all people would experience effects on landscape character, views and visual amenity as adverse, as people's perception of wind turbines varies between negative and positive attitudes.

An additional point is that simply because turbines are visible from a particular location or receptor, this does not mean that the effect is significant.

## Significance of effects

- A5.5.10 The two principal criteria for determining the significance of both Landscape and Visual effects are
- The nature of the location or receptor, (sensitivity); and
  - The nature of an effect (magnitude).
- A5.5.11 The criteria used for determining sensitivity and magnitude of effect for landscape character and protected and designated landscapes differ from those used for visual amenity.
- A5.5.12 Sometimes there may be likely significant effects on the landscape resource but the development may be in a location that does not affect visual amenity in a significant way. It is also possible that there may be likely significant effects on visual amenity without effects on the landscape resource.

## Assessing Landscape Effects

- A5.5.13 Assessing the significance of landscape effects on the landscape resource requires the identification of the landscape receptors, the consideration of the nature of the landscape receptors (sensitivity) and the nature of the effect (magnitude) on those receptors as a result of the Proposed Development.
- A5.5.14 GLVIA3 states that the nature of the landscape receptors (sensitivity) should be assessed in terms of the susceptibility of the receptor to the proposed change and the value of the receptor. The nature of the effect (magnitude) on each landscape receptor should be assessed in terms of the size and scale, geographical extent, duration and reversibility of that effect.
- A5.5.15 Combining these judgements together forms an overall evaluation of the significance of the effect.

## Sensitivity of Landscape Receptors

- A5.5.16 The sensitivity or nature of landscape receptors is defined by the professional judgement of the interaction between the value of the landscape and its' susceptibility to the particular form of change likely to result from the Proposed Development. Definitions of **Very High**, **High**, **Medium** and **Low** or **Very Low** are used in this LVIA to evaluate landscape value.

## Landscape Value

- A5.5.17 Landscape receptors may be valued at an international, national, local and community level. Evaluating landscape value can be very subjective but landscape designations including the designation of landscape elements such as Ancient Woodland for example provide a useful starting point to this process.
- A5.5.18 Other areas of landscape or landscape elements may not be formally recognised by designation but may still have value particularly in the local context by most sectors of the community. Landscape planning policy including landscape character assessments and landscape capacity studies can also give an indication of value.
- A5.5.19 GLVIA3 sets out in Box 5.1 a range of factors in the identification of valued landscapes as follows:
- **'Landscape quality (condition):** A measure of the physical state of the landscape. It may include the extent to which typical character is represented in individual areas, intactness of the landscape and the condition of individual elements;
  - **Scenic quality:** The term used to describe landscapes that appeal primarily to the senses (primarily but not wholly the visual senses);

- **Rarity:** The presence of rare elements or features in the landscape or the presence of a rare Landscape Character Type;
- **Representativeness:** Whether the landscape contains a particular character, and/or features or elements which are considered particularly important examples;
- **Conservation interests:** The presence of features of wildlife, earth science or archaeological or historical and cultural interest can add to the value of the landscape as well as having value in their own right;
- **Recreation value:** Evidence that the landscape is valued for recreational activity where experience of the landscape is important;
- **Perceptual aspects:** A landscape may be valued for its perceptual qualities, notably wildness and/or tranquillity; and
- **Associations:** Some landscapes are associated with particular people, such as artists or writers, or events in history that contribute to perceptions of the natural beauty of the area. (Based on Swanwick and Land Use Consultants (2002)'

#### Landscape Susceptibility to Change

- A5.5.20 Susceptibility is defined in paragraph 5.40 of GLVIA3 by the ability of a landscape receptor to accommodate the Proposed Development without undue consequences for the following:
- Overall character or quality/condition of a landscape type/area;
  - An individual element and/or feature; and
  - A particular aesthetic/perceptual aspect.
- A5.5.21 Criteria that influence the susceptibility of landscape receptors to different types of development being proposed are as follows and include examples that generally indicate a lower susceptibility to wind farm development:
- **Landscape scale and geographical extent:** Large scale landscapes generally indicate a lower susceptibility to wind farm development;
  - **Landform:** Flat plateau/gently undulating land without distinctive topographical features;
  - **Skylines:** Screened or less prominent skylines punctuated by modern man-made features;
  - **Landscape pattern and complexity:** Landscapes with a simple and regular pattern;
  - **Settlement and man-made influences:** Presence of modern, man-made structures such as infrastructural/ industrial features;
  - **Inter-visibility with adjacent landscapes and key vistas:** inward looking areas with no strong vistas or interconnectivity with adjacent landscapes; and
  - **Perceptual aspects:** Non remote areas, close to human activity or development.
- A5.5.22 The following examples generally indicate a higher susceptibility to wind farm development:
- **Landscape scale:** small scale landscapes generally indicate a higher susceptibility to wind farm development;
  - **Landform:** Variations in topography with distinctive or iconic topographical features;
  - **Skylines:** highly visible, generally undeveloped skylines often punctuated by important landmarks;
  - **Landscape pattern and complexity:** Landscapes with a complex, rugged and irregular pattern;
  - **Settlement and man-made influences:** Presence of small-scale features, historic/vernacular settlement and lack of modern development;

- **Inter-visibility with adjacent landscapes:** Landscapes which are integral to the character of adjacent landscapes and feature strongly in views from sensitive landscapes and/or have strong vistas and principal directions of view; and
- **Perceptual aspects:** Remote areas with no visual or audible signs of human activity and development.

A5.5.23 GLVIA3 (Para 5.41) advises that an individual assessment of the susceptibility of receptors to the specific development proposal is a key process and should not be replaced by existing landscape sensitivity and capacity studies. However, such studies have been reviewed to provide a useful guide to inform the evaluation of susceptibility of landscape receptors.

#### Determination of Landscape Sensitivity

A5.5.24 Professional judgement is used to evaluate the complex relationship between value and susceptibility to determine the overall sensitivity of the landscape receptor to the Proposed Development. Full justification for the assessment of the sensitivity of a particular receptor is included in the LVIA.

#### Magnitude of Change

A5.5.25 The nature or magnitude of the effect on landscape receptors considers the size and scale, geographical extent, duration and reversibility of the change likely to result from the Proposed Development.

#### Size & Scale

A5.5.26 The size and scale of the proposed change can refer to both whole Landscape Character Areas/Types and to individual elements and features. For Landscape Character Areas/Types, the size and scale of the change refers to the degree to which the key characteristics of the landscape are changed as a result of the addition of the Proposed Development. For landscape elements and features the size and scale of the change refers to the extent of existing landscape elements (including aesthetic and perceptual elements) that will be lost or changed and the proportion this represents of the total extent within the landscape. It also considers the contribution of the affected element to the overall character of the landscape.

A5.5.27 Existing wind farms also form part of the landscape baseline and the size and scale of change also considers the relationship between the Proposed Development and the other wind farms. This considers issues such as the arrangement of wind farms in the landscape (clustering or dispersal), the relationship between the scale and situation (different landscapes) of the different wind farms, distances between wind farms and ultimately whether the Proposed Development fits comfortably with the overall existing pattern of wind farm development or whether it intensifies the presence of wind farms creating a 'wind farm landscape'.

A5.5.28 The size and scale of change is determined as major, moderate, minor or negligible and could be either adverse or beneficial.

#### Geographical Extent

A5.5.29 This refers to the geographical extent over which the landscape change will occur. It is described as being limited at site level, to the immediate site setting (or local area) and to the wider area, across some or all of the Landscape Character Area/Type or designation affected.

#### Duration & Reversibility

A5.5.30 The duration of landscape changes are classified as permanent, temporary or reversible. This can be described as long term (generally lasting over 10 years, including effects that will persist for the 35 year operational lifespan of the wind farm), medium term (generally lasting 5-10 years) and short term (generally lasting 0-5 years).

A5.5.31 Reversibility is related to whether the change can be reversed at the end of the development's lifecycle (including the end of construction or decommissioning which would be short term reversible) For example, operational effects

related to the presence of turbines are considered to be reversible as they will be removed during decommissioning at the end of the operational lifespan.

**Determination of Magnitude of Landscape Change**

A5.5.32 The relationship between all three of the above factors is assessed to determine the overall nature of the change resulting from the introduction of the Proposed Development. This results in four levels of magnitude. **Substantial, Moderate, Slight** and **Negligible** which is outlined in Table A5.5.1 below. Each effect is judged on its own merit and the following table is used as a guide only.

Table A5.5.1: Levels of magnitude of potential effect defined by size and scale

Level of Magnitude	Definition of Magnitude
<b>Substantial</b>	Total loss or major alteration to key elements, features or perceptual characteristics of the baseline landscape over a large area including the possible introduction of major new and uncharacteristic elements. The post development character and composition of the baseline landscape resource will be fundamentally changed for some distance from the site.
<b>Moderate</b>	Partial loss or alteration to one or more key elements, features or perceptual characteristics of the baseline landscape over a moderate area, including the possible introduction of moderate new and uncharacteristic elements. The post development character and composition of the baseline landscape resource will be partially, but noticeably changed at a medium distance from the site, including the immediate setting and the landscape character area in which it lies.
<b>Slight</b>	Minor loss of or alteration to one or more key elements, features or perceptual characteristics of the baseline landscape over a small area, including the possible introduction of minor new and uncharacteristic elements. The post development character and composition of the baseline landscape resource will be noticeably changed but the underlying character of the baseline landscape will be similar to the pre-development character. The change would occur only within the site itself or within the immediate vicinity of the development proposal.
<b>Negligible</b>	Very limited or imperceptible loss or alteration to one or more key elements, features or perceptual characteristics of the baseline landscape over a negligible area, including negligible effects from the introduction of minor new and uncharacteristic elements. Change to the landscape character will be barely discernible with very limited influence on the landscape character within the site or immediate vicinity of the development proposal.

A5.5.33 The determination of the magnitude of effect on the designated landscape resource additionally considers the distance from the site at its closest point, potential changes to principal views from within and towards the designated landscape and potential effects on the integrity of the designated landscape, including the extent to which it could affect the for the special qualities of the designation.

**Overall Significance of Landscape Effects**

A5.5.34 An overall judgement is made on the nature of the receptor (sensitivity) and the likely change (magnitude) resulting from the Proposed Development. This judgement is based on evaluations of the individual aspects of value, susceptibility, size and scale, geographical extent, duration and reversibility. Table A5.1.4 illustrates the four main levels of landscape effect that are used in this LVIA; Major, Moderate, Minor and Negligible. Three intermediate combinations are also used for determining landscape effects: Major/moderate, Moderate/minor and

Minor/negligible. The table is not a prescriptive tool and the evaluation of potential effects makes allowance for the use of professional judgement and experience.

A5.5.35 Landscape Institute advice, contained in GLVIA3 statement of clarification 1/13 (June 2013), states that following the determination of magnitude and sensitivity, *‘the assessor should then establish (and it is for the assessor to decide and explain) the degree or level of change that is considered to be significant’*. In accordance with this advice, this LVIA establishes at what level in the assessor’s opinion, ‘significant’ effects arise, as referred to in the EIA (Scotland) Regulations 2017.

A5.5.36 Those effects considered to be **Major** and **Major/moderate** and **some Moderate** effects by virtue of the more sensitive receptors and the greater magnitude of change, are considered to be **Significant Landscape Effects. Some Moderate**, and all **Moderate/minor, Minor, Minor/negligible** and **Negligible** effects are considered to be **Not Significant Landscape Effects.**

A5.3.37 A significant landscape effect could arise as follows:

- Where a new landscape type or sub-type and therefore character area (at various scales) could occur. This is consistent with the definition of landscape character: *‘A distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse...’*. Clearly, those parts of the landscape in which a significant character effect of this kind would arise would be ‘sensitive’ to the Proposed Development given the host landscape would be subject to a stimulus i.e. the Proposed Development, leading to a change in state, i.e. a new or modified landscape character; and
- Where changes occur to what are considered to be important key elements or attributes of the landscape without necessarily giving rise to a change in character. For example, the removal of important key elements or features as a result of the Proposed Development might be deemed significant in its own right. Special consideration may therefore be warranted in this regard.

A5.3.38 It should be noted that significant effects need not be unacceptable or necessarily adverse and may be reversible.

**Assessing Visual Effects**

A5.5.39 Visual effects are the effects on views and visual amenity as experienced by people.

A5.5.40 Assessing the significance of visual effects requires the identification of the visual receptors, the consideration of the nature of the visual receptors (sensitivity) and the nature of the effect (magnitude) which would be experienced by each visual receptor as a result of the Proposed Development.

A5.5.41 GLVIA3 states that the nature of the visual receptors (sensitivity) should be assessed in terms of the susceptibility of the receptor to the proposed change in views and visual amenity and the value attached to particular views. The nature of the effect (magnitude) on each visual receptor should be assessed in terms of the size and scale, geographical extent, duration and reversibility of that effect.

A5.5.42 Combining these judgements together forms an overall evaluation of the significance of the effect.

**Sensitivity of Visual Receptors**

A5.5.43 The sensitivity or nature of visual receptors is defined by the professional judgement of the interaction between the value of the view experienced by the visual receptor and the susceptibility of the visual receptor (or viewer not the view) to the particular form of change likely to result from the Proposed Development. Definitions of **Very High, High, Medium** and **Low** or **Very Low** are used in this LVIA to evaluate landscape value.

**Value of View**

A5.5.44 Different groups of people attach different levels of value to particular views. Determining the value of a view therefore takes account of the following factors:

- recognition of the view through the presence of planning designations;
- importance in relation to heritage assets (such as designed views);
- popularity of the viewpoint; and
- indicators of the value attached to views by visitors through appearances in promotional tourist literature and the provision of tourist facilities.

A5.5.45 Value can also be attributed to the numbers of people using a route receptor or visiting an attraction. For example, a popular attraction is often considered more sensitive than a less visited attraction. However, there are exceptions to this such as motorways and railways which have a higher number of people but are considered to be of lower value; or more remote locations with fewer people visiting but are considered to be of higher sensitivity.

A5.5.46 Views from individual private residential properties are considered to be highly valued by residents.

### Susceptibility of visual receptors to change

A5.5.47 This aspect of the nature of the receptor refers to the susceptibility of the viewer to the proposed change, not the view. The susceptibility of visual receptors to changes in views is a function of the occupation or activity of people experiencing the view and the extent to which their attention is focused on views.

A5.5.48 Viewers of higher susceptibility to changes in views are generally those whose attention or interest is focused on their surroundings, including residents, walkers and visitors to attractions.

A5.5.49 Viewers of lower susceptibility to changes in views include people travelling on non-scenic routes and people at their place of work whose attention is not on their surroundings and where setting is not important to their quality of working life.

### Determination of Visual Sensitivity

A5.5.50 The sensitivity of visual receptors is defined by the relationship between the value of views and the susceptibility of different types of viewer to the proposed change. This is not formulaic and can be a complex relationship with different combinations possible. Professional judgement is used to evaluate this complex relationship between value and susceptibility to determine the overall sensitivity of the visual receptor to the Proposed development. Magnitude of Visual Change

A5.5.51 The nature or magnitude of the effect on visual receptors considers the size and scale, geographical extent, duration and reversibility of the change likely to result from the Proposed Development.

A5.5.52 The worst-case scenario is considered during the assessment of the nature (magnitude) of all visual effects. All changes to views are considered as they would occur in winter conditions with minimal screening by vegetation and deciduous trees. ZTVs and wireframes are similarly displayed on the basis of bare ground and therefore demonstrate the maximum extent of theoretical visibility possible, in the absence of buildings, modified landform or vegetation.

### Size & Scale

A5.5.53 The size and scale of a visual change refers to the amount of change that is likely to occur as a result of the Proposed Development and depends on the following factors:

- The scale of the change in 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;
- Distance of the view;
- The degree of contrast or integration of any new features or changes in the view with the existing elements in the view and their characteristics in terms of form, scale and mass, line, height, colour and texture;

- The nature of the view of the Proposed Development, in terms of how long the view of the proposal would last along sequential routes and whether views will be full, partial or glimpses; and
- The angle of view of the Proposed Development, either direct view or oblique view including the horizontal field of view and movement.

A5.5.54 Existing wind farms form part of the existing view and the size and scale of change also considers the relationship between the Proposed Development and these other wind farms. This considers issues such as the arrangement of wind farms in the 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 different wind farms in terms of turbine height and number; the position of the wind farms (e.g. on the skyline); distances between wind farms and from the viewer; and ultimately whether the Proposed Development fits comfortably with the overall existing pattern of wind farm development or whether it intensifies the presence of wind farms by 'infilling' a gap and leading to a greater combined effect.

A5.5.55 Visual receptors which experience no change to the view as a result of the Proposed Development are not assessed in this LVIA.

### Geographical extent

A5.5.56 This refers to the geographical extent over which the visual changes will be visible and whether these are unique views allowing only glimpsed views of the development or whether it is a typical example of a widespread view such as a representative viewpoint.

A5.5.57 For specific, promoted viewpoints, geographical extent may be assessed either as the proportion of a specific area from where a change in view is possible; for example, a small part of a historic designed landscape or as the extent of change within the overall view; for example, the change occurs in a narrow vista rather than across the full panorama or the extent of a route receptor such as a footpath affected.

### Duration and Reversibility

A5.5.58 The duration of changes to views are classified as permanent, temporary or reversible. This can be described as long term (generally lasting over 10 years, including effects that will persist for the 35 year operational lifespan of the wind farm), medium term (generally lasting 5-10 years) and short term (generally lasting 0-5 years, e.g. limited to during construction).

A5.5.59 Reversibility is related to the duration of the change and whether the change can be reversed at the end of the development (including the end of construction or decommissioning which would be short term reversible.) For example, operational visual effects related to the presence of turbines are considered to be reversible as they will be removed during decommissioning at the end of the operational lifespan.

### Determination of magnitude of visual change

A5.5.60 The relationship between all three of the above factors is assessed to determine the overall nature of the visual change resulting from the introduction of the Proposed Development. This results in four levels of magnitude: **Substantial, Moderate, Slight** and **Negligible**, which is outlined in Table A5.5.2. Each effect is judged on its own merit and the following table is used as a guide only.

Table A5.5.2: Levels of magnitude of potential effect defined by size and scale

Level of Magnitude	Definition of Magnitude
<b>Substantial</b>	Major visual change which causes a complete or substantial change in the view as a result of loss of important features or the addition of significant new ones, to the extent that the composition of the view is substantially altered. The change is experienced from many locations across the study area, from the majority of a linear route or from most areas within a specific location and/or by a large number of viewers. Changes would last for 35 years or more and are deemed permanent or irreversible.
<b>Moderate</b>	Moderate visual change which causes a noticeable change in the view as a result of the loss of features or the addition of new ones, to the extent that the composition of the view is altered to a moderate degree. The change is experienced from a moderate number of locations across the study area, from a moderate part of a linear route or from a moderate proportion of an area within a specific location and/or by a moderate number of viewers. Changes would be long term, between 10 and 25 years but theoretically reversible.
<b>Slight</b>	Minor visual change which causes a perceptible change in the view as a result of the loss of features or the addition of new ones, to the extent that this partially alters the composition of the view. The change is experienced from a small number of locations across the study area, from only limited sections of a linear route or from a small proportion of an area within a specific location and/or by a small number of viewers. Changes would be wholly or partially reversible and would be medium term, lasting for up to ten years.
<b>Negligible</b>	Negligible visual change which causes a barely perceptible change in the view as a result of the loss of features or the addition of new ones, to the extent that this barely alters the composition of the view. The change is either not visible, or seen by viewers from only one or two locations across the study area, from very limited sections of a linear route or from hardly any locations within a specific area and/or by only a very small number of viewers. Changes would be reversible, deemed temporary and would last between 0 and 5 years.

### Overall significance of visual effects

- A5.5.61 An overall judgement is made on the nature (sensitivity) of the receptor and the likely change (magnitude) resulting from the Proposed Development. This judgement is based on evaluations of the individual aspects of value, susceptibility, size and scale, geographical extent, duration and reversibility. Four main levels of visual effect that are used in this LVIA: **Major**, **Moderate**, **Minor** and **Negligible**, and three intermediate combinations are also used for determining landscape effects; **Major/moderate**, **Moderate/minor** and **Minor/negligible**. The table is not a prescriptive tool and the evaluation of potential effects makes allowance for the use of professional judgement and experience.
- A5.5.62 Landscape Institute advice, contained in GLVIA3 statement of clarification 1/13 (June 2013), states that following the determination of magnitude and sensitivity, 'the assessor should then establish (and it is for the assessor to decide and explain) the degree or level of change that is considered to be significant'. In accordance with this advice, this LVIA establishes at what level in the assessor's opinion, 'significant' effects arise, as referred to in the EIA (Scotland) Regulations 2017.
- A5.5.63 Those effects considered to be **Major**, **Major/moderate** and some **Moderate** effects by virtue of the more sensitive receptors and the greater magnitude of effects, are considered to be **Significant Visual Effects**. Some **Moderate**,

and all **Moderate/minor**, **Minor**, **Minor/negligible** and **Negligible** effects are considered to be **Not Significant Visual Effects**.

A5.5.64 A significant visual effect is considered to be a change in the view that would markedly change the composition and geographical extent of that view.

A5.5.65 It should be noted that significant effects need not be unacceptable or necessarily negative and may be reversible.

## A5.6 CUMULATIVE METHODOLOGY

### Introduction

A5.6.1 The aim of the Cumulative Landscape and Visual Impact Assessment (CLVIA) is to identify, predict and evaluate potential key effects arising from the addition of the Proposed Development to a theoretical landscape baseline which includes the existing baseline situation of operational wind farms and those under construction and additionally includes wind farms currently being considered within the planning system, and that may or may not be present in the landscape in the future.

A5.6.2 The methodology for CLVIA follows good practice guidance as set out in the GLVIA3 and *Assessing the Cumulative Effects of Onshore Wind Energy Developments* (SNH, 2012). The cumulative assessment also takes cognisance of the consultation with South Lanarkshire Council, Dumfries & Galloway Council and NatureScot.

### Differences between LVIA and CLVIA

A5.6.3 Although both LVIA and CLVIA look at the effects of the Proposed Development on views and on the landscape character of the surrounding area, there are differences in the baseline against which the assessments are carried out. For the LVIA, the baseline includes existing wind farm developments which are present in the landscape at the time of undertaking the assessment, which may be either operational or under construction. In CLVIA the baseline is partially speculative and includes (in addition to existing wind farms):

- Consented wind farms which have been granted planning consent but are not yet constructed; and
- Submitted valid wind farm applications (including those at appeal) which are currently awaiting determination by the relevant consenting authority.

### Cumulative approach

A5.6.4 SNH guidance (2012) defines cumulative effects as 'the additional changes caused by a proposed development in conjunction with other similar developments or as the combined effect of a set of developments, taken together.'

A5.6.5 The LVIA assesses the incremental effect associated with the addition of the Proposed Development to the cumulative baseline scenario, and not the overall accumulation of wind farm developments across the study area. This is highlighted in GLVIA3 which states: 'Some of those involved may tend to favour a limited view focussed on the additional effects of the project being assessed, on top of the cumulative baseline. Some stakeholders may however be more interested in the combined effects of all the past, present and future proposals, including the proposed scheme...Assessing combined effects of different proposals at different stages in the planning process can be very complex. Furthermore the assessor will not have assessed the other schemes and cannot therefore make a fully informed judgement. A more comprehensive overview of the cumulative effects must rest with the competent authority.'

### Types of Cumulative Effect

A5.6.7 As with the LVIA, the CLVIA deals with the effects on landscape and visual receptors separately.

### Cumulative landscape effects

- A5.6.8 Cumulative landscape effects are defined as effects on either the physical fabric, aesthetic aspects of the landscape or overall character of the landscape, or any special values attached to it.
- A5.6.9 Cumulative effects on the physical fabric of the landscape arise when two or more developments affect the landscape components or features such as woodland, dykes or hedgerows;
- A5.6.10 Cumulative effects on the aesthetic aspects of the landscape arise when two or more developments affect the aesthetic or perceptual components of landscape character including scale, sense of enclosure, diversity, pattern and colour and perceptual or experiential attributes such as naturalness, remoteness or tranquillity.
- A5.6.11 Cumulative effects on the landscape character can arise when a new proposal results in a progression from a landscape which contains one development which forms an individual, isolated feature, to a landscape in which two or more developments are evident and may form a significant or dominant characteristic. NatureScot in Siting and Designing Wind Farms in the Landscape (Version 3a (2017) refers to landscapes that can be distinguished as 'landscapes with wind farms' and 'wind farm landscapes'.

### Cumulative visual effects

- A5.6.12 Cumulative visual effects are defined as effects that can be caused by combined visibility, which occurs where the observer is able to see two or more developments from one viewpoint or sequential effects which occur when the observer has to move to another viewpoint to see different developments. (i.e. along linear routes or journeys)
- A5.6.13 Combined visibility can occur as simultaneous visibility, where more than one development is visible in the same angle of view or successive visibility where two or more developments are present in views from the same viewpoint but cannot be seen at the same time as they are not in the same angle of view. (i.e. the viewer has to turn their head to see the other developments which become visible in succession.)
- A5.6.14 Sequential visibility occurs where two or more developments are not present in views from the same viewpoint and cannot, therefore, ever be seen at the same time. The observer has to move to another viewpoint to see the other developments so they will then appear in sequence. Sequential effects are most common along linear routes and journeys. Sequential effects range from 'frequently sequential' when the developments keep appearing regularly and with short time lapses between, depending on speed of travel and distance between the viewpoints, to 'occasionally sequential', where there may be long time lapses between appearances, because the observer is moving very slowly and/or there are large distances between the areas of visibility.

### Significance of cumulative effects

- A5.6.15 Those effects considered to be **Major**, **Major/moderate** and some **Moderate** effects by virtue of the more sensitive receptors and the greater magnitude of effects, are considered to be **Significant Cumulative Effects**. Some **Moderate**, and all **Moderate/minor**, **Minor**, **Minor/negligible** and **Negligible** effects are considered to be **Not Significant Cumulative Effects**.

### Cumulative Sites

- A5.6.16 An initial cumulative search area of 60 km from the Proposed Development was delineated and a list was prepared including all operational, those developments under construction, consented developments, those developments in the planning system as valid applications and those at the scoping stage within this search area. Recently withdrawn sites have not been included and those sites registered with a Pre-Application Notice (PAN), are not finalised applications and have therefore not been included as a valid application but have been included as a pre-application/scoping scheme.

- A5.6.17 Using this initial Search Area list of developments, an initial cumulative desktop and site assessment was carried out to identify a suitable cumulative baseline (or Cumulative Study Area). In accordance with SNH guidance (2012), the initial Search Area list was therefore refined to establish which turbine developments were of most relevance to the cumulative assessment for the proposal. As the guidance states '*the key principle for all cumulative impact assessments is to focus on the likely significant effects and in particular those which are likely to influence the outcome of the consenting process*'.<sup>5</sup> (para 33 SNH, 2012).
- A5.6.18 The Cumulative Study Area or cumulative baseline for wind farms was therefore defined to include those developments most likely to contribute to a cumulative significant effect. These included all operational, consented and valid planning applications within the 45 km study area and one scoping site in close proximity (Harestanes South, 9.9 km to the south) of the Proposed Development.
- A5.6.19 It should be noted that the cumulative baseline represents the '*maximum development scenario*.' It considers the effects of the proposal in addition to other developments that do not yet exist in the current landscape, but which may or may not exist in the future. This results in a high level of uncertainty in the cumulative baseline as not all of the other undetermined proposals will necessarily gain planning approval.
- A5.6.20 Owing to this uncertainty with regard to the maximum development scenario, the cumulative baseline is split into different scenarios with a decreasing likelihood of becoming operational.

### Cumulative baseline

- A5.6.21 The cumulative baseline is divided into different scenarios which reflect which groups of wind farm developments are assumed to be present in the landscape. The existing scenario of operational wind farms and those under construction is assessed in the LVIA and is referred to as Scenario 1. The CLVIA considers the following scenarios:
- **Scenario 2:** considers the addition of the Proposed Development in the context of operational wind farms, those under construction and additionally those developments currently consented. This represents the likely future scenario; and
  - **Scenario 3:** the addition of the Proposed Development in the context of operational, under construction, consented, undetermined planning applications and one scoping site and wind farm developments currently at appeal i.e. a less certain future scenario.
- A5.6.22 A further scenario for other sites currently at Scoping or Pre-Application stage has not been included as not all scoping developments would reach planning application stage and not all planning applications would necessarily be approved. However, one site has been included in Scenario 3 due to its proximity to the Proposed Development.

### Assessing Cumulative Effects

- A5.6.23 The methodology for the CLVIA follows that of the LVIA as set out in Sections A5.1 – A5.5 of this Appendix. The key additional steps in the CLVIA are as follows:
- Preparation of ZTV maps for each of the other existing or proposed wind farms and combining them to inform the assessment of scenarios and relationships; and
  - Particular attention to the relationships between wind farms in the baseline for each scenario, and how those relationships will change with the addition of the Proposed Development.
- A5.6.24 The susceptibility of receptors may be affected by the presence of other wind energy developments. Some viewers may consider that susceptibility is reduced because other wind farms are '*already there*', but for others it may be that sensitivity is increased because more development would be '*too much*'. However, to retain a consistent and objective approach, the susceptibility of receptors used for the cumulative assessment is taken to be the same as

<sup>5</sup> Assessing the Cumulative Effects of Onshore Wind Energy Developments, (SNH, 2012)

<sup>4</sup> Siting and Designing Wind Farms in the Landscape Version 3a (SNH, 2017)

that identified in the LVIA. The value of the receptor would also remain the same in the cumulative assessment and therefore the overall sensitivity of the receptor is considered to be the same as judged in the LVIA.

A5.6.25 In this CLVIA, cumulative effects are reported as the additional or combined effects of the introduction of the Proposed Development, should other cumulative schemes be present in the different baseline scenarios, over and above the effects identified in the LVIA (Scenario 1). For each receptor, it is clarified as to whether the effect has increased or decreased relative to the LVIA assessment, and where necessary the CLVIA states where there will be no cumulative effects over and above those identified in the LVIA assessment.

### Assessing cumulative landscape effects

A5.6.26 Assessing the significance of cumulative landscape effects requires the identification of the landscape receptors, the consideration of the nature of the landscape receptors (sensitivity) as identified in the LVIA and the determination of the nature of the effect (magnitude) which would be experienced by each landscape receptor as a result of the addition of the Proposed Development to each baseline scenario.

#### Landscape receptors of cumulative effects

A5.6.27 The cumulative landscape assessment considers all the LCTs and designated landscapes assessed in the LVIA.

#### Overall significance of cumulative landscape effects

A5.6.28 An overall judgement is made on the nature of the receptor and the likely change resulting from the addition of the Proposed Development. This judgement is based on evaluations of the individual aspects of value and susceptibility of the receptor as identified in the LVIA and the size and scale, geographical extent, duration and reversibility of the cumulative change. Four main levels of cumulative landscape effect are used in this CLVIA; **Major**, **Moderate**, **Minor** and **Negligible**. Three intermediate combinations are also used; **Major/moderate**, **Moderate/minor** and **Minor/negligible**. The evaluation of potential effects makes allowance for the use of professional judgement and experience.

A5.6.29 There are varying degrees of cumulative landscape effect. These are as follows;

- Multiple wind farms are viewed as separate isolated features within the LCT/LCA, too infrequent and of insufficient significance to be perceived as a characteristic of the area;
- Multiple wind farms are viewed as a key characteristic of the landscape, but not of sufficient dominance to be a defining characteristic of the area;
- Multiple windfarms appear as a dominant characteristic of the area, seeming to define the character type as a 'wind farm landscape character area'; and
- Wind farms cross different character types, reducing the distinction between the different types.

A5.6.30 The appropriateness of such effects will depend on the value of a landscape, the objectives for change as defined in local capacity studies and scale of that effect, i.e. whether affecting a local LCT/LCA or occurring at a regional level.

A5.6.31 A significant cumulative landscape effect is considered to be a **Major** or **Major/moderate** and **some Moderate** landscape effects. Some **Moderate**, and all **Moderate/minor**, **Minor**, **Minor/negligible** and **Negligible** effects are considered to be Not Significant Visual Effects.

A5.6.32 It should be noted that significant cumulative effects need not be unacceptable or necessarily negative and may be reversible. Each effect is evaluated on its own merit.

### Assessing cumulative visual effects

A5.6.33 Assessing the significance of cumulative visual effects requires the identification of the visual receptors, the consideration of the nature of the visual receptors (sensitivity) as identified in the LVIA and the determination of the nature of the effect (magnitude) which would be experienced by each visual receptor as a result of the addition of the Proposed Development to each baseline scenario.

#### Visual receptors of cumulative effects

A5.6.34 The cumulative visual assessment considers all the sequential routes and static locations such as viewpoints or settlements that have theoretical visibility (as shown in the ZTVs) of cumulative wind farm developments and were considered in the LVIA to have more than negligible effects.

A5.6.35 Cumulative wind farms are shown in the visualisations as required by SNH good practice guidance.<sup>6</sup> In addition, a ZTV to blade tip height of each wind farm proposal has been prepared and then combined with the ZTV of the proposed scheme to create 'paired ZTVs' which illustrate the areas of mutual visibility, i.e. where the Proposed Development and other proposals are both visible from. ZTVs showing the combined visibility of each cumulative baseline scenario have also been prepared to illustrate the total visibility for each scenario.

#### Magnitude of cumulative visual change

A5.6.36 The nature or magnitude of the cumulative effect on visual receptors as with the LVIA considers the size and scale, geographical extent, duration and reversibility of the change likely to result from the addition of the Proposed Development to the different baseline scenarios. With particular regard to cumulative effects, the following factors are also considered in determining the magnitude of cumulative visual change from each visual receptor:

- the number of wind energy developments visible;
- The prominence of the developments likely to be seen;
- The arrangement of wind energy developments e.g. developments seen in one direction or in only part of the view, or seen in all directions;
- The relationship of the scale of the wind energy developments including size and number of turbines which may also be expressed as the horizontal and vertical angle occupied by turbines;
- The position of the turbine developments in the view e.g. on the skyline, against the backdrop of land;
- The distances from the viewer and between developments;
- The landscape setting, context and separation or coalescence / overlapping of wind energy developments; and
- Potential screening by landcover such as vegetation and local variations in topography

#### Overall significance of cumulative visual effects

A5.6.37 An overall judgement is made on the nature of the receptor and the likely change resulting from the addition of the Proposed Development. This judgement is based on evaluations of the individual aspects of value and susceptibility of the receptor as identified in the LVIA and the size and scale, geographical extent, duration and reversibility of the cumulative change. Four main levels of cumulative visual effect are used in this CLVIA; **Major**, **Moderate**, **Minor** and **Negligible**. Three intermediate combinations are also used; **Major/moderate**, **Moderate/minor** and **Minor/negligible**. The evaluation of potential effects makes allowance for the use of professional judgement and experience.

A5.6.38 A significant cumulative visual effect is considered to be a **Major** or **Major/moderate** and **some Moderate** visual effects and would result in a view whose composition would be markedly changed by the addition of the proposed Development to the scenarios (1-3) of other / combined windfarm development.

<sup>6</sup> SNH (2017) Visual Representation of Wind Farms, Version 2.2. Landscape Institute.

A5.6.39 It should be noted that significant cumulative effects need not be unacceptable or necessarily negative and may be reversible. Each effect is evaluated on its own merit.

## A5.7 NIGHT-TIME ASSESSMENT

A5.7.1 The night-time assessment is conducted during periods of dawn and dusk and assess the night time environment against the proposed artificial lighting. The assessment follows the same methodology used for the LVIA and CLVIA set out in this Appendix.

A5.7.2 It should be noted, the night-time assessment undertaken for this LVIA and CLVIA, is not a technical lighting impact assessment based on quantitative measurement of light levels. This assessment relies solely on professional judgement of what the human eye can reasonably perceive.

A5.7.3 As with the LVIA and CLVIA, the sensitivity of the receptor to the Proposed Development and the magnitude of change are combined to determine the level of effect likely to result from the aviation warning lights. The evaluation of significance and the nature of these effects is described following the methodology used for the LVIA and CLVIA.

A5.7.4 The night-time assessment focusses on the areas of the landscape where receptors are likely to receive a significant effect and is supported by four night-time visualisations. The night-time viewpoint analysis involves visiting each viewpoint location during periods of dawn or dusk and viewing wireframes and photomontages prepared for each viewpoint location. The fieldwork was conducted during periods of clear visibility and considers worst-case scenario i.e. clear conditions during winter time when there is limited vegetation cover.

A5.7.5 The night-time assessment is supported by ZTV mapping highlighting the different lighting intensities that would be experienced in the landscape

### Night-time Baseline

A5.7.6 During site visits, the night-time baseline conditions were recorded at each viewpoint and visual receptor assessed. This established the existing light levels in order to determine their sensitivity to change. The following observations were recorded:

- Direct artificial lighting (where the light source is directly visible from the viewpoint/receptor location);
- Indirect artificial lighting (where the light source is not visible but the light emanating from the light source is visible such as 'sky glow' given off by settlements within valleys);
- Static lighting, for example emanating from a residential property, street light, security light;
- Mobile or transient lighting, for example lights associated with moving vehicles, trains or aircraft at varying intensities and directions; and
- Areas with very little natural or artificial light where darkness where darkness is the defining characteristic.

## A5.8 ZTV AND VISUALISATION PRODUCTION

A5.8.1 To aid the understanding of the visual impact of the Proposed Development, Zone of Theoretical Visibility (ZTV) analysis, wirelines and photomontages were generated, these are all completed to the standards set out in the guidelines on "*Visual Representation of Wind Farms*" Version 2.2. (SNH, 2017).

### Photography

A5.8.2 Baseline photography has been undertaken for the assessment of viewpoints and residential properties in accordance with the above guidance document. This requires the following:

- Full frame sensor SLR camera with a 50 mm fixed lens;
- Tripod with panoramic head; and
- GPS to record grid reference at each location.

A5.8.3 A 360 degree panorama is undertaken at 1.5 m above ground ensuring a 50% overlap between photographs to minimise distortion when stitching the photographs together. Photographs are taken in landscape format, unless locations are close where photographs will then be taken in portrait format to enable the vertical extent of the turbines to be included in the photograph.

A5.8.4 At night-time, baseline photography is recorded at either dawn, approximately 30 minutes prior to sunrise or dusk, approximately 30 minutes after sunset. The objective for night-time viewpoint photography is to represent, as far as is practical, the baseline lighting levels as they would be perceived by the human eye. To achieve this, camera settings are used to meet this requirement, and settings which artificially brighten the image are not be used.

### ZTV Production

A5.8.5 Freely available Digital Terrain Model (DTM) data from Ordnance Survey (OS) at a resolution of 50 m was used within GIS software to complete Viewshed analysis. The tip height of the proposed turbines was used with an observer height of 2 m to determine the number of turbines visible within 45 km of the Proposed Development at the observer height. The tool outputs were coloured in bands to represent the number of turbines visible. This tool was run again using the turbine hub heights to determine the number of hubs visible within 45 km. Cumulative sites were assessed in the same manner to allow for an assessment of the complete visibility of all wind farm sites within the study area.

### Visualisation Production

A5.8.6 To accompany the ZTV analysis wind farm modelling software was used to generate wirelines and photomontages for the agreed viewpoint locations. Again, the OS 50 m resolution DTM data was used, to generate the terrain model around the Proposed Development within the software. The proposed turbine locations and dimensions were then used to draw a wire representation of the turbines. Using this information, the software then generated a horizontal view wireline of the Proposed Development from selected viewpoints. These were exported as images at a number of viewcone angles, typically at 90° and 53.5° for the best representation of what a person will see. Additionally, photomontages were generated for the same viewpoint locations. To complete this, photography was taken at the viewpoint locations and included a complete 360° view, these photos were then imported and lined up to match the viewcone defined for the wireline. Once the photos are aligned with the view the turbines were rendered onto the photo and again exported as images.

A5.8.7 NatureScot recognise that night-time assessment and the production of night-time photomontages is an emerging area of study and assessment. It is difficult to achieve technically accurate lighting photomontages and it is acknowledged that night-time visualisations are an 'artistic impression' due to the limitations in being able to model light intensity over distance in variable atmospheric conditions of light and darkness.

A5.8.8 The rendering or visual representation of the proposed aviation lights has been achieved using Adobe Photoshop and a comparative study of photography of actual turbine lighting in similar lighting conditions and viewing distances.

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