Cloud Hill Wind Farm

Technical Appendix 6.1: LVIA Methodology

August 2023

Project No.: 0669769

The business of sustainability

ERM

Page intentionally left blank

CONTENTS

List of Tables

1. INTRODUCTION

This technical appendix (TA) of the Environmental Impact Assessment Report (EIA Report) presents the methodology used within the landscape and visual impact assessment (LVIA) of the Proposed Development presented in Chapter 6: LVIA in Volume 1 of the EIA Report.

The LVIA identifies and assesses the likely significant effects resulting from the Proposed Development on both the landscape as an environmental resource and on people's views and visual amenity.

The LVIA methodology presented in this TA is structured as follows:

- introduction;
- guidance, data sources and surveys;
- overview of LVIA methodology;
- types of landscape and visual effects;
- evaluation of significance
- assessing landscape effects;
- assessing visual effects;
- assessing night-time visual effects;
- assessing cumulative landscape and visual effects; and
- nature of effects;
- visual representations.

2. GUIDANCE, DATA SOURCES AND SURVEYS

2.1 Guidance

The following sources have been used in the formulation of methodology for the assessment and the presentation of visual representations:

- Landscape Institute with the Institute of Environmental Management and Assessment (2013). Guidelines for Landscape and Visual Impact Assessment, Third Edition (GLVIA3);
- Carys Swanwick Department of Landscape University of Sheffield and Land Use Consultants for The Countryside Agency and NatureScot (2002). Landscape Character Assessment Guidance for England and Scotland;
- NatureScot (2021) Assessing the Cumulative Impact of Onshore Wind Energy Developments;
- NatureScot (2020). Assessing impacts on Wild Land Areas - Technical Guidance;
- NatureScot (2017) Siting and Designing Wind Farms in the Landscape Version 3a;
- NatureScot (2017). Visual Representation of Wind Farms, Version 2.2;
- Landscape Institute (2019) Technical Guidance Note 2/19 Residential Visual Amenity Assessment; and
- Landscape Institute (2019). Visual representation of Development Proposals: Landscape Institute Technical Guidance Note 06/19.

2.2 GLVIA3

The LVIA has been undertaken in accordance with the Landscape Institute and IEMA (2013) Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3). OPEN's LVIA methodology generally follows the guidance set out in GLVIA3. Where it diverges from specific aspects of the guidance, in a small number of areas, reasoned professional justification for this is provided as follows.

GLVIA3 sets out an approach to the assessment of magnitude of change in which three separate considerations are combined within the magnitude of change rating. These are the size or scale of the effect, its geographical extent and its duration and reversibility. This approach is to be applied in respect of both landscape and visual receptors. OPEN considers that the process of combining all three considerations in one rating can distort the aim of identifying significant effects of windfarm development. For example, an increased magnitude of change, based on size or scale, may be reduced to a lower rating if it occurred in a localised area and for a short duration. This might mean that a potentially significant effect would be overlooked if effects are diluted down due to their geographical extents and/or duration or reversibility.

OPEN has chosen to keep the consideration of the size or scale of the effect, its geographical extent and its duration and reversibility separate, by basing the magnitude of change on size or scale to determine where significant and not significant effects occur, and then describing the geographical extents of these effects and their duration and reversibility separately. Duration and reversibility are stated separately in relation to the assessed effects (i.e. as short/medium/long-term and temporary/permanent) and are considered as part of drawing conclusions about significance, combining with other judgements on sensitivity and magnitude, to allow a final judgement to be made on whether each effect is significant or not significant.

OPEN's assessment methodology utilises six word scales of magnitude of change – high, medium-high, medium, medium-low, low and negligible; which are preferred to the 'maximum of five categories' suggested in GLVIA3 (3.27), as a means of clearly defining and summarising magnitude of change judgements.

These are not new diversions and follow practice established on other large scale onshore wind farm projects.

2.3 Information and Data Sources

The assessment is initiated through a desk study of the Proposed Development and the LVIA Study Area. This desk study identifies aspects of the landscape and visual resource that are considered in the LVIA, including landscape related planning designations, landscape character typology, wild land areas, operational and potential cumulative windfarms, and views from routes and settlements.

The desk study utilises Geographic Information System (GIS) and ReSoft WindFarm software to explore the potential visibility of the Proposed Development. The resultant Zone of Theoretically (ZTV) diagrams and wirelines provide an indication of which landscape and visual receptors are likely to be key in the assessment.

Landscape characterisation information and data has been obtained from the following sources:

- Dumfries and Galloway Council (February 2020). Dumfries and Galloway Local Development Plan 2 Supplementary Planning Guidance: Part 1 Wind Energy Development: Development Management Considerations Appendix 'C' - Dumfries and Galloway Wind Farm Landscape Capacity Study.
- East Ayrshire Council (2018) East Ayrshire Landscape Wind Capacity Study (EALWCS).
- South Lanarkshire Council area – South Lanarkshire Landscape Capacity Study for Wind Energy, 2016 (SLLCS).

2.4 Desk Based and Site Survey Work

The assessment is initiated through a desk study of the Proposed Development boundary and LVIA study area. ZTV analysis of the Proposed Development has been carried out, as has mapping of landscape character, landscape related designations and principal visual receptors.

The LVIA undertaken as part of the EIA Report has been informed by desk-based studies, stakeholder consultations and field survey work undertaken within the LVIA Study Area. The landscape and visual baseline have been informed by desk-based review of landscape character assessments, publications describing the special qualities of designated landscapes, visual receptor mapping and the ZTV, to identify receptors that may be affected by the Proposed Development and produce written descriptions of their key characteristics and value.

The landscape of the site was assessed for any particular features that contribute to the landscape character of the site or are important to the wider landscape setting. In particular, the form and pattern of the land was assessed from the site and surrounding area to better understand its character and to take these qualities into account in the siting and design of the Proposed Development. The landscape character types for the Study Area were reviewed and the key characteristics of the landscape were identified. The field surveys provided an experience of the character types of the Study Area and verification of how these areas might be affected by the Proposed Development.

Visual amenity was surveyed including both static and sequential views from receptors representative of the range of views and viewer types likely to experience the Proposed Development. Views from a variety of distances, aspects, elevations and extents were included. Receptor types include individual properties and settlements; main transport routes; main visitor locations; areas of cultural significance; the range of landscape character types within the Study Area; and the cumulative effects of the Proposed Development in combination with other existing or proposed wind farms in the Study Area.

Interactions have been identified between the Proposed Development and landscape and visual receptors, to predict potentially significant effects arising. For those receptors where a detailed assessment is required, primary data acquisition has been undertaken through a series of surveys. These surveys include field survey verification of the ZTV from landscape character types (LCTs),

micro-siting of viewpoint locations, panoramic baseline viewpoint photography and visual assessment surveys from representative viewpoints and principal visual receptors. Site surveys allow the assessors to judge the likely scale, distance, extent and prominence of the Proposed Development directly. These surveys were undertaken between May 2022 and February 2023.

3. OVERVIEW OF LVIA METHODOLOGY

3.1 Introduction

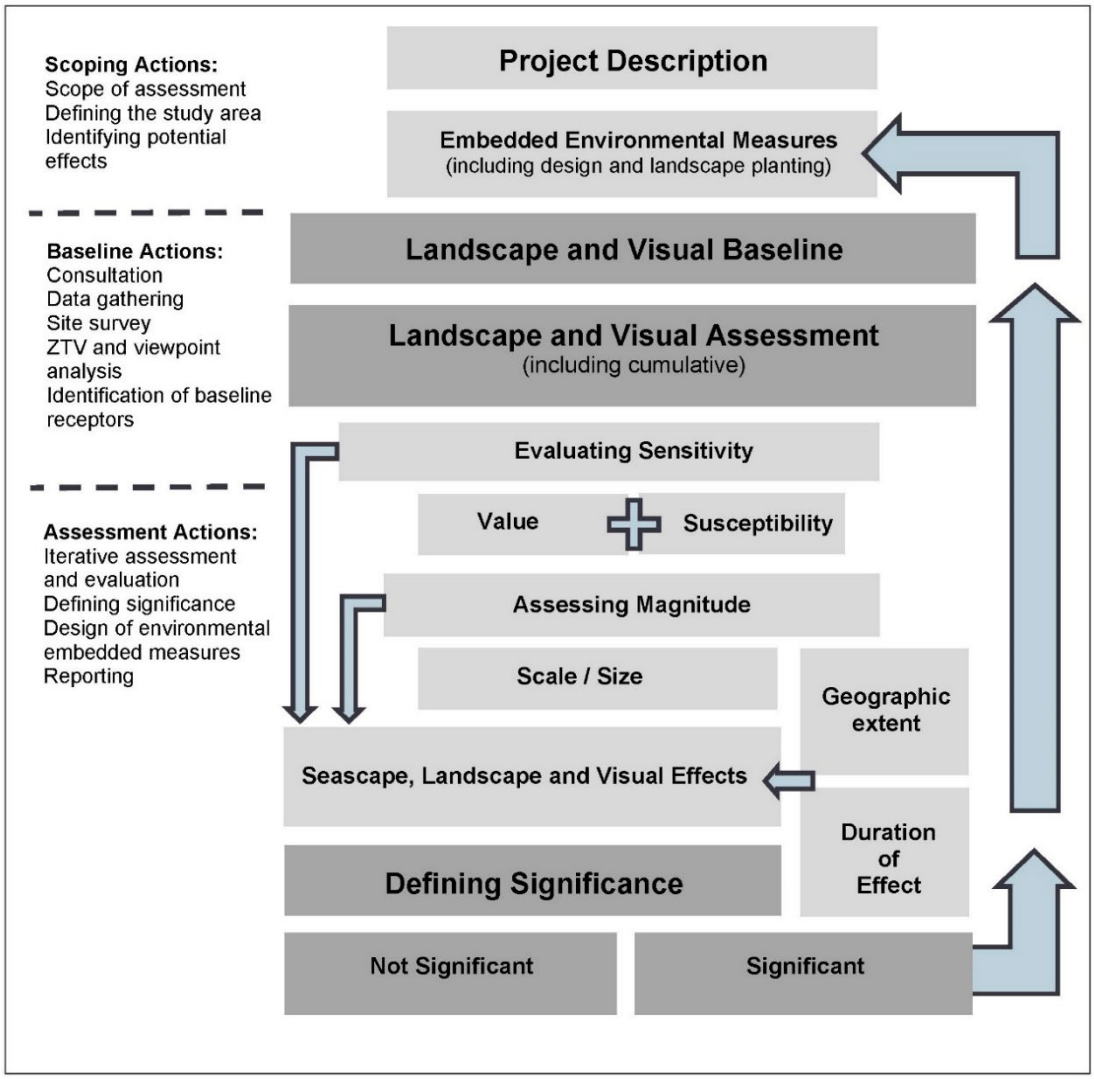
The LVIA is based on the project description in Chapter 4: Description of the Proposed Development.

The LVIA assesses the likely effects that the construction and operation of the Proposed Development on the landscape and visual resource, encompassing physical landscape, effects on landscape character and designated landscapes, visual effects and cumulative effects.

The assessment is undertaken through an evaluation of sensitivity of landscape and visual resource, taking account of the value and susceptibility of the receptor to the Proposed Development. This is combined with an assessment of the magnitude of change resulting from the Proposed Development, which takes account of the size and scale of the proposed change. By combining assessments of sensitivity and magnitude of change, a level of landscape or visual effect can be evaluated and determined. The resulting level of effect is described in terms of whether it is significant or not significant, and the geographical extent, duration and the type of effect is described as either direct or indirect; temporary or permanent (reversible); cumulative; and beneficial, neutral or adverse.

An overview or summary of the LVIA process is provided here and illustrated, diagrammatically in Table A6.1.1.

Table A6.1.1: Overview of Approach to the LVIA



3.2 Defining the LVIA Study Area

The definition of a Study Area for the LVIA is an important and established part of LVIA, which is recommended in LVIA guidance (Landscape Institute, 2013 and NatureScot, 2017).

The LVIA study area covers a radius of 45 km from the Proposed Development, as illustrated in Figure 6.1 as agreed in the EIA Scoping Opinion and stakeholder consultations.

The LVIA Study Area is defined based on guidance, relevant legislation, consultation feedback, the ZTV for the Proposed Development and the emerging findings of the LVIA to ensure that is an appropriate Study Area based on the threshold of significance, defining an outer limit within which significant effects could occur using professional judgement.

Institute of Environmental Management and Assessment Guidance (IEMA, 2015 and 2017) recommends a proportionate EIA focused on the significant effects. An overly large LVIA study area may be considered disproportionate if it makes the understanding of the key impacts of the Proposed Development more difficult.

This is supported by Landscape and Visual Impact Assessment (LVIA) Guidance produced by the Landscape Institute (GLVIA3) (Landscape Institute, 2013) (para 3.16). This guidance recommends that *'The level of detail provided should be that which is reasonably required to assess the likely significant effects'*. Para 5.2 and p70 also states that '*The study area should include the site itself and the full extent of the wider landscape around it which the Proposed Development may influence in a significant manner'.*

Other wind farm specific guidance, such as NatureScot's Visual Representation of Wind Farms Guidance (NatureScot, 2017) recommends that ZTV distances are used for defining study area based on wind turbine height. This guidance recommends a 45 km radius for wind turbines greater than 150 m to blade tip (para 48, p12).

The LVIA focuses on locations from where it may be possible to see the Proposed Development, as defined by the blade tip Zone of Theoretical Visibility (ZTV), which is presented in Figure 6.5a and 6.5b. Consideration of the blade tip ZTV indicates that theoretical visibility of the Proposed Development mainly occurs within 45 km and that beyond this distance, the geographic extent of visibility will become very restricted.

At distances over 45 km, the horizontal spread of the Proposed Development will also occupy a small portion of available views and the apparent height (or 'vertical angle') of the wind turbines would also appear very small, therefore significant visual effects are unlikely to arise at greater than this distance, even if the wind turbines are theoretically visible.

Landscape and visual effects as a result of the Proposed Development are scoped out beyond 45 km as agreed in the EIA Scoping Opinion and stakeholder consultations.

Large sections of the Study Area between 20 km and 45 km have limited or no theoretical visibility of the Proposed Development, where theoretical visibility is shown on the ZTV potentially significant effects are limited by distance and intervening woodland or forestry. ECU, DGC and NatureScot agreed in their scoping responses that the landscape character assessment be focussed on a 20 km Study Area. Taking all of this into account and in order to focus the assessment on potential for significant effects, the LVIA identified an area of 20 km around the Proposed Development within which the tailed assessment of effects on landscape character and cumulative effects assessment are undertaken.

Visual receptors have been considered within a 45 km Study Area, with a more detailed focus for those receptors found closer to the site i.e. Public Rights of Way and local recreational routes within 10 km. For individual properties, a Residential Visual Amenity Assessment (RVAA) has been carried out within a 2 km Study Area, in accordance with Landscape Institute (LI) guidance. See Appendix A6.2 for further description of the RVAA Study Area.

4. TYPES OF LANDSCAPE AND VISUAL EFFECTS

The LVIA is intended to determine the effects that the Proposed Development would have on the landscape and visual resource.

For the purpose of assessment, the potential effects on the landscape and visual resource are grouped into three categories: landscape effects, visual effects and cumulative landscape and visual effects, each of which is briefly described as follows.

4.1 Landscape Effects

The LVIA considers the effects of the Proposed Development on the landscape as a resource. Landscape effects are either direct effects on the physical fabric of the site, or effects on landscape character. The assessment of landscape effects is carried out as follows:

- Assessment of physical effects: physical effects are direct effects on the physical fabric of the site, such as the removal of trees and alteration to ground cover. This category of effects is made up of landscape elements, which are the components of the landscape such as hedgerows or woodland that may be physically affected by the Proposed Development.
- Assessment of effects on landscape character: landscape character is the distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape, and the way that this pattern is perceived. Effects on landscape character arise either through the introduction of new elements that alter this pattern of elements, or through visibility of the Proposed Development, which may alter the way in which the pattern of elements is perceived. This category of effects is considered in terms of landscape character receptors, which fall into two groups; landscape character types/areas and landscape designations.

4.2 Visual Effects

The LVIA considers the effect of the Proposed Development on views and visual amenity. Visual effects include effects on visual receptors, i.e. groups of people that may experience an effect, and views (viewpoints). The visual assessment is carried out as follows:

- An assessment of the effects of the Proposed Development on views from principal visual receptors, including residents of settlements, motorists using roads, people using recreational routes, features and attractions throughout the Study Area (as ascertained through the baseline study); and
- An assessment of the effects of the Proposed Development on representative viewpoints that have been selected to assess the effect on locations relevant to these visual receptors and from specific viewpoints, chosen because they are key or promoted viewpoints in the landscape.

4.3 Cumulative Effects

Cumulative landscape and visual effects arise where the study areas for two or more wind farms overlap so that both are experienced at proximity where they may have a greater incremental effect, or where wind energy developments may combine to have a sequential effect, irrespective of any overlap in study areas. This means that the addition of the Proposed Development to a situation where other wind farms are apparent in the baseline or a potential future baseline landscape and visual context may result in a greater effect than where the Proposed Development is seen in isolation. The main assessment of the effects of the Proposed Development takes into account its addition to a baseline landscape that contains the operational/under construction wind farms.

5. EVALUATION OF SIGNIFICANCE

The objective in assessing the effects of the Proposed Development is to predict the significant effects of the Proposed Development on the landscape and visual resource. In accordance with the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (the EIA Regulations) the LVIA effects are assessed to be either significant or not significant.

The significance of effects is assessed through a combination of the sensitivity of the landscape receptor or view and the magnitude of change that would result from the addition of the Proposed Development. While this methodology is not reliant on the use of a matrix to determine the conclusion of a significant or not significant effect, a matrix is included in Table A6.1.2 below to illustrate how combinations of sensitivity and magnitude of change ratings can give rise to significant effects. On this basis potential impacts are assessed as of Negligible, Minor, Moderate-Minor, Moderate, Moderate-Major and Major. In those instances where the magnitude has been assessed as 'no change' and the level of effect is recorded as 'no effect'.

For the purposes of this assessment, any effects with a significance level of Major and Moderate-Major have been deemed significant in EIA terms (dark grey shaded boxes in Table A6.1.2). 'Moderate' levels of effect have the potential, subject to the assessor's professional judgement, to be considered as significant or not significant, depending on the sensitivity and magnitude of change factors evaluated (light grey shaded boxes in Table A6.1.2). These assessments are explained as part of the assessment, where they occur. Significance can therefore occur at a range of levels depending on the magnitude and sensitivity, however in all cases, a significant effect is considered more likely to occur where a combination of the variables results in the Proposed Development having a defining effect on the landscape character or view. Definitions are not provided for the individual categories of significance shown in the matrix and the reader should refer to the detailed definitions provided for the factors that combine to inform sensitivity and magnitude.

Effects assessed as being either Moderate-Minor, Minor or Negligible level are assessed as not significant (white boxes in Table A6.1.2).

In line with the emphasis placed in GLVIA3 upon the application of professional judgement, an overly mechanistic reliance upon a matrix is avoided through the provision of clear and accessible narrative explanations of the rationale underlying the assessment made for each landscape and visual receptor.

Table A6.1.2 – Matrix used to guide determination of effect significance

Magnitude of Change	**Sensitivity of Resource or Receptor**				
	High	**Medium-high**	**Medium**	**Medium-low**	**Low**
High	Major (significant)	Major (significant)	Major-moderate (significant)	Moderate (Significant or Not Significant)	Moderate (Significant or Not Significant)
Medium-high	Major (significant)	Major-moderate (significant)	Moderate (Significant or Not Significant)	Moderate (Significant or Not Significant)	Moderate-minor (Not significant)
Medium	Major-moderate (significant)	Moderate (Significant or Not Significant)	Moderate (Significant or Not Significant)	Moderate-minor (Not significant)	Minor (Not significant)
Medium-low	Moderate (Significant or Not Significant)	Moderate (Significant or Not Significant)	Moderate-minor (Not significant)	Minor (Not significant)	Minor (Not significant)
Low	Moderate-minor (Not significant)	Moderate-minor (Not significant)	Minor (Not significant)	Minor (Not significant)	Negligible (Not significant)
Negligible	Minor (Not significant)	Minor (Not significant)	Minor (Not significant)	Negligible (Not significant)	Negligible (Not significant)

Significant effects occur where the Proposed Development would provide a defining influence on a landscape element, landscape character receptor or view; or where changes of a lower magnitude occur on a landscape element, landscape character receptor or view that is of particularly high sensitivity.

A not significant effect occurs where the effect of the Proposed Development is not material, whereby the baseline characteristics of the landscape element, landscape character receptor or view continue to provide the definitive influence, or where the small scale of change experienced by a high sensitivity receptor is such as to be considered not significant.

Significant cumulative effects occur where the addition of the Proposed Development to the baseline under consideration (which may include other wind energy developments), leads to windfarms becoming a prevailing landscape and visual characteristic or where the Proposed Development adversely contrasts with the scale or design of an existing or proposed development.

6. ASSESSING LANDSCAPE EFFECTS

Landscape character is the distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape, and the way that this pattern is perceived. Effects on landscape character arise either through the introduction of new elements that physically alter this pattern of elements, or through visibility of the Proposed Development, which may alter the way in which the pattern of elements is perceived. This category of effects is made up of physical effects and effects on landscape character (landscape character types and designated areas).

6.1 Assessment of Physical Effects

The physical effects of the Proposed Development are restricted to the area of the site where existing landscape elements may be changed. Physical effects are the direct effects as a result of the Proposed Development on the fabric of the site, such as the removal of trees and alteration to ground cover. The objective of the assessment of physical effects is to determine what the likely physical effects of the Proposed Development would be, which landscape elements would be affected, and whether these effects would be significant or not significant. The variables considered in the sensitivity of landscape elements and the magnitude of change that the Proposed Development would have on them are described as follows.

6.1.1 Sensitivity of Landscape Elements

The sensitivity of a landscape element is an expression of its value and quality, and the potential to mitigate the effect.

- The value of a landscape element is a reflection of its importance in the pattern of elements which constitute the landscape character of the area. For example, the value of woodland is likely to be increased if it provides an important component of the local landscape character. If a landscape element is particularly rare, as a remnant of an historic landscape layout for example, its value is likely to be increased; and
- The susceptibility of a landscape element is a reflection of the degree to which the element can be restored, replaced or substituted. For example, it may be possible to restore ground cover following the excavation required for the building of turbine foundations, and this would reduce the sensitivity of this element.

The evaluation of sensitivity is described for each receptor in the assessment. Levels of sensitivity: high, medium-high, medium, medium-low and low, are applied. The sensitivity of each receptor is a product of the specific combination of value, quality and potential for mitigation as evaluated by professional judgement.

6.1.2 Magnitude of Change on Landscape Elements

The magnitude of change on landscape elements is quantifiable and is expressed in terms of the degree to which a landscape element would be removed or altered by the Proposed Development, the extent of existing landscape elements that would be lost and the contribution of that element to the character of the landscape. Definitions of magnitude of change are applied in order that the process of assessment is made clear. These are:

- **High**: where the Proposed Development would result in the complete removal or substantial alteration of a landscape element;
- **Medium**: where the Proposed Development would result in the removal of a notable part of a landscape element or a notable alteration to a landscape element;
- **Low**: where the Proposed Development would result in the removal of a minor part of a landscape element or a minor alteration to a landscape element;

- **Negligible**: where the Proposed Development would result in the removal of a negligible amount of a landscape element or is barely discernible; and
- **None**: where the Proposed Development would result in no change to the landscape element.

There may also be intermediate levels of magnitude of change, such as medium-high or medium-low, where the change falls between definitions.

6.1.3 Significance of Effects on Landscape Elements

The significance of the effect on landscape elements is dependent on all of the factors considered in the sensitivity of the receptor and the magnitude of change upon it, and by applying professional judgement to assess whether or not the Proposed Development would have an effect that is significant or not significant.

A significant effect would occur where the degree of removal or alteration of the landscape element is such that the landscape element would be redefined (although the landscape character may not necessarily be redefined). If the landscape element is of a high sensitivity, a significant effect can occur with a limited degree of removal or alteration. A not significant effect would occur where the form of the landscape element is not redefined as a result of the Proposed Development. If the landscape element is of lower sensitivity, it may undergo a higher level of removal or alteration yet remain as a not significant effect.

6.2 Assessment of Effects on Landscape Character

The objective of the assessment of effects on landscape character is to determine what the likely effects of the Proposed Development would be, which landscape character receptors would be affected, and whether these effects would be significant or not significant. The methodology for the assessment of effects on landscape character involves the undertaking of a baseline study, evaluation of sensitivity, magnitude of change and an assessment of significance.

6.2.1 Landscape Baseline and Preliminary Assessment

The landscape baseline provides an understanding of the landscape in the area that may be affected - its constituent elements, its character, distinctiveness, condition and value, and the way this varies spatially. The landscape baseline describes aspects of the landscape that may be significantly affected, as defined in Schedule 4 of the EIA Regulations. Establishing the landscape baseline will, when reviewed alongside the description of the Proposed Development, form the basis for the identification and description of the landscape effects of the Proposed Development. The baseline description of the landscape that may be affected is primarily determined by the physical footprint of the Proposed Development components and their ZTV.

An overview of the landscape baseline is described, and a preliminary assessment identifies landscape receptors that may experience significant effects, which require to be assessed in full. A detailed description of the baseline is provided for each landscape receptor that may experience significant effects, allowing the full baseline to be described for landscape receptors that may be significantly affected. Those receptors which are identified as not having the potential to undergo significant effects and significant cumulative effects are not included in the subsequent detailed assessment but are noted with reasons given for their exclusion.

The baseline study of each landscape character receptor collates and presents information relevant to the assessment drawn from a combination of desk study and fieldwork. The baseline study covers the following issues:

- the description of the landscape character receptor drawn from the relevant documentation such as the Landscape Character Assessment or citations in respect of landscape designations;
- a description of the landscape character receptor based on field work to determine how typical or not the landscape character receptor is in relation to documented descriptions;

- those features and patterns of the landform, land-cover and land use which make the landscape character receptor distinctive;
- the visual and sensory experience of the landscape and how it associates with other landscapes including, in particular, the landscape character receptor where the Proposed Development is located; and
- how change in this landscape character receptor, either through natural or human processes, is presently affecting character and how they are predicted to affect character in the future. This may include operational windfarms where they are a feature of the baseline landscape context.

The landscape baseline also describes current pressures that may cause change in the landscape in the future, in particular drawing on information for wind energy developments that are not yet present in the landscape but are at other stages in the Proposed Development and consenting process. Operational and under construction wind energy developments are regarded as part of the baseline landscape character of the area. Any changes resulting from the Proposed Development are assessed within this context in the assessment of landscape and visual effects.

6.2.2 Sensitivity of Landscape Character Receptors

The sensitivity of a landscape character receptor is an expression of the combination of the judgements made about the susceptibility of the receptor to the specific type of change or the development proposed, and the value related to that receptor.

6.2.2.1 Value of the Landscape Receptor

The value of a landscape character receptor is a reflection of the value which society attaches to that landscape. The assessment of the landscape value is classified as high, medium-high, medium, medium-low or low and the basis for this assessment is made clear using evidence and professional judgement, based on the following range of factors:

- **Landscape designations**: A receptor that lies within the boundary of a recognised landscape related planning designation will be of increased value, depending on the proportion of the receptor that is covered and the level of importance of the designation; international, national, regional or local. It is important to note that the absence of designations does not preclude local resource value, as an undesignated landscape character receptor may be important as a resource in the local or immediate environment, particularly when experienced in comparison with other nearby landscapes.
- **Landscape quality**: The quality of a landscape character receptor is a reflection of its attributes, such as scenic quality, sense of place, rarity and representativeness and the extent to which these attributes have remained intact. A landscape with consistent, intact and well-defined, distinctive attributes is generally considered to be of higher quality and, in turn, higher value, than a landscape where the introduction of inappropriate elements has detracted from its inherent attributes.
- **Landscape experience**: The experience of the landscape character receptor can add to its value and relates to a number of factors including the perceptual responses it evokes, the cultural associations that may exist in literature or history, or the iconic status of the landscape in its own right, the recreational value of the landscape for outdoor pursuits, and the contribution of other values relating to the nature conservation or archaeology of the area.

6.2.2.2 Susceptibility to Change

The susceptibility of a landscape character receptor to change is a reflection of its ability to accommodate the changes that would occur as a result of the addition of the Proposed Development. The assessment of the susceptibility of the landscape receptor to change is classified as high,

medium-high, medium, medium-low or low and the basis for this assessment is made clear using evidence and professional judgement, based on the following criteria:

The specific nature of the Proposed Development: The susceptibility of landscape receptors is assessed in relation to change arising from the specific development proposed, including the specific components and features of the Proposed Development proposed, its size, scale, location, context and characteristics.

- **Landscape character**: The key characteristics of the existing landscape character of the receptor is considered in the evaluation of susceptibility as they determine the degree to which the receptor may accommodate the influence of the Proposed Development. For example, a landscape that is of a particularly wild and remote character may have a higher susceptibility to the influence of the Proposed Development due to the contrast that it would have with the landscape, whereas a developed, industrial landscape, where built elements and structures are already part of the landscape character, may have a lower susceptibility. However, there are instances when the quality of a landscape may have been degraded to an extent whereby it is considered to be in a fragile state and therefore a degraded landscape may have a higher susceptibility to the Proposed Development.
- **Landscape association**: The extent to which the Proposed Development would influence the character of the landscape receptors across the Study Area, relates to the associations that exist between the landscape receptor where the Proposed Development is located and the landscape receptor from which the Proposed Development is being experienced. In some situations this association would be strong where the landscapes are directly related, for example the influence on a valley landscape by an enclosing upland landscape where the Proposed Development is set along the skyline, and in other situations weak where the landscape association is less important; for example, where the Proposed Development lies inland of a coastal landscape that has its main focus outwards over the sea.

6.2.2.3 Sensitivity Rating

An overall sensitivity assessment of the landscape receptor is made by combining the assessment of the value of the landscape character receptor and its susceptibility to change. An overall level of sensitivity is applied for each landscape receptor: high, medium-high, medium, medium-low and low; by combining individual assessments of the value of the receptor and its susceptibility to change. The basis for the assessments is made clear using evidence and professional judgement in the evaluation of sensitivity for each receptor. Criteria that tend towards higher or lower sensitivity are set out in Table A6.1.3.

Table A6.1.3 – Landscape Sensitivity to Change Criteria

Sensitivity factor	Higher	Lower
Value	Designation: Designated landscapes with national policy level protection or defined for their natural beauty.	Landscapes without formal designation. Despoiled or degraded landscape with little or no evidence of being valued by the community.
	Quality: Higher quality landscapes with consistent, intact and well-defined, distinctive attributes.	Lower quality landscapes with indistinct elements or features that detract from its inherent attributes.
	Rarity: Rare or unique landscape character types, features or elements.	Widespread or ‘common’ landscape character types, features or elements.
	Aesthetic / scenic: Valued perceptual aspects, or designated wildlife, ecological or cultural heritage features that contribute to landscape character.	Limited aesthetic / perceptual aspects, wildlife, ecological or cultural heritage features, or limited contribution to landscape character.
	Perceptual qualities: Landscape with perceptual qualities of wildness, remoteness or tranquillity.	Landscape where potential qualities of wildness, remoteness or tranquillity are no longer present or experienced, often

Sensitivity factor	Higher	Lower
		as a result of existing development influences.
Susceptibility	Strength and robustness: Fragile landscape vulnerable and lacking the ability to accommodate change.	Robust landscape that is capable of reasonably accommodating change without undue adverse effects.
	Landscape scale: A smaller scale landscape, with complex, distinctive or small-scale coastal landforms.	A landscape of a suitably large enough scale to accommodate the development, with simple, broad and homogenous coastal landforms.
	Openness / enclosure: Openness may increase susceptibility if there is wider visibility, however open landscape may also be larger scale and simple which would decrease susceptibility.	Enclosed landscapes can offer more screening potential, limiting visibility to a smaller area, however they may also be smaller scale and more complex which would increase susceptibility
	Skyline: Distinctive undeveloped skylines with landmark features.	Developed, non-distinctive skylines without landmark features.
	Relationship with other development: Little association with other contemporary development, or strong associations occur with smaller scale or historic development.	Strong or direct association with other similar contemporary developments and landscape character influenced by development.
	Perceptual qualities: Perceptual qualities associated with particular scenic qualities, wildness or tranquillity.	Contemporary, cultivated / settled or developed landscapes with fewer perceptual qualities are likely to have a lower susceptibility.
	Landscape association: Adjacent landscape character context connected by associated character and views.	Host landscape character is separate from surrounding / adjacent landscape character with weak association.
Sensitivity to change	High ◄——► Medium ◄——► Low	

6.2.3 Landscape Magnitude of Change

The magnitude of change on views is an expression of the scale of the change that would result from the Proposed Development and is dependent on a number of variables regarding the size or scale of the change. An assessment is also made of the geographical extent of the area over which this would occur and the duration and reversibility of such changes. The basis for this assessment is made clear using evidence and professional judgement, based on the following criteria.

6.2.3.1 Size or Scale of Change

This criterion relates to the size or scale of change to the landscape that would arise as a result of the Proposed Development, based on the following factors:

- **Landscape elements**: the degree to which the pattern of elements that makes up the landscape character would be altered by the Proposed Development, through removal or addition of elements in the landscape, in this instance. The magnitude of change would generally be higher if key features that make up the landscape character are extensively removed or altered, and if many new components are added to the landscape;
- **Landscape characteristics**: the extent to which the Proposed Development would change, physically or perceptually, the characteristics that may be important in the creation of the distinctive character of the landscape. This may include the scale of the landform, its relative simplicity or irregularity, the nature of the landscape context, the grain or orientation of the landscape, the degree to which the receptor is influenced by external features and the juxtaposition of the Proposed Development with these key characteristics;
- **Landscape designation**: In the case of designated landscapes, the degree of change is considered in light of the effects on the special landscape qualities which underpin the

designation and the effect on the integrity of the designation. All landscapes change over time and much of that change is managed or planned. Often landscapes will have management objectives for 'protection' or 'accommodation' of development. The scale of change may be localised, or occurring over parts of an area, or more widespread affecting whole landscape receptors and their overall integrity.

- **Distance**: The size and scale of change is also strongly influenced by the proximity of the Proposed Development to the receptor and the extent to which the development can be seen as a characterising influence on the landscape. Consequently, the scale or magnitude of change is likely to be lower in respect of landscape receptors that are distant from the Proposed Development and / or screened by intervening landform, vegetation and built form to the extent that the scale of their influence on landscape receptors is small or limited. Conversely, landscapes closest to the development are likely to be most affected. Host landscapes (where the development is located within a 'host' landscape character unit) will be directly affected whilst adjacent areas of landscape character will be indirectly affected.
- **Amount and nature of change**: The amount of the Proposed Development that will be seen. Visibility of the Proposed Development may range from one wind turbine blade tip to all of the wind turbines; generally, the greater the amount of the Proposed Development that can be seen, the higher the scale of change. The degree to which the Proposed Development is perceived to be on the horizon or 'within' the landscape. Generally, the magnitude of change is likely to be lower if the Proposed Development is largely perceived to be on the horizon at distance, rather than 'within' the landscape.

6.2.3.2 Geographical Extent

The geographical extent over which the landscape effects would be experienced is also assessed, which is distinct from the size or scale of effect. This evaluation is not combined in the assessment of the level of magnitude, but instead expresses the extent of the receptor that would experience a particular magnitude of change and can therefore affect the geographical extents of the significant and non-significant effects.

The extent of the effects would vary depending on the specific nature of the Proposed Development and is principally assessed through analysis of the extent of visibility of physical change to the landscape or the extent to which the landscape character would change through visibility of the Proposed Development.

6.2.3.3 Duration and Reversibility

The duration and reversibility of landscape effects has been based on the period over which Proposed Development are likely to exist (during construction and operation) and the extent to which these elements has been removed (during decommissioning) and its effects reversed at the end of that period. Long-term, medium-term and short-term landscape effects are defined as follows:

- long-term – more than 10 years (may be defined as permanent or reversible);
- medium-term – 6 to 10 years; and
- short-term – 1 to 5 years.

6.2.3.4 Magnitude of Change Rating

The 'magnitude' or 'degree of change' resulting from the Proposed Development is described as 'High', 'High-medium', 'Medium', 'Medium-low' 'Low' or 'Negligible'. In assessing magnitude of change, the assessment focuses on the size or scale of change. The geographic extent, duration and reversibility are stated separately in relation to the assessed effects (i.e., as short/medium / long-term and temporary/permanent). The basis for the assessment of magnitude for each receptor has been

made clear using evidence and professional judgement. The levels of magnitude of change that can occur are defined in Table A6.1.4.

Table A6.1.4 – Landscape Magnitude of Change Definitions

Magnitude of change	Definition
High	The Proposed Development will result in a high level of alteration to the baseline characteristics or special qualities of the landscape, forming the prevailing influence and/or introducing elements that are uncharacteristic in the baseline landscape. The addition of the Proposed Development will result in a large-scale change, loss or addition to the baseline landscape.
Medium-high	Intermediate rating with combination of criteria from high magnitude (described above) and medium magnitude (described below).
Medium	The Proposed Development will result in a medium level of alteration to the baseline characteristics or special qualities of the landscape, forming a readily apparent influence and/or introducing elements that are potentially uncharacteristic in the baseline landscape. The addition of the Proposed Development will result in a medium-scale change, loss or addition to the baseline landscape.
Medium-low	Intermediate rating with combination of criteria from medium magnitude (described above) and low magnitude (described below).
Low	The Proposed Development will result in a low level of alteration to the baseline characteristics or special qualities of the landscape, providing a slightly apparent influence and/or introducing elements that are characteristic in the baseline landscape. The addition of the Proposed Development will result in a small-scale change, loss or addition to the baseline landscape.
Negligible	The Proposed Development will result in a negligible alteration to the baseline characteristics or special qualities of the landscape, providing a barely discernible influence and/or introducing elements that are substantially characteristic in the baseline landscape. The addition of the Proposed Development will result in negligible change, loss or addition to the baseline landscape.

6.2.4 Significance of Effects on Landscape Character Receptors

The significance of the effect on each landscape character receptor is dependent on all of the factors considered in the sensitivity of the receptor, and the magnitude of change resulting from the Proposed Development. These judgements on sensitivity and magnitude are combined to arrive at an overall assessment as to whether the Proposed Development would have an effect that is significant or not significant on the landscape character receptor. An assessment of the factors considered in the evaluation of the sensitivity of each landscape character receptor and the magnitude of the change resulting from the Proposed Development are presented in the assessment in order that the relevant considerations which have informed the significance can be considered transparently. The matrix shown in Table A6.1.2 helps to inform the threshold of significance when combining sensitivity and magnitude to assess significance.

A significant effect would occur where the combination of the variables results in the Proposed Development having a defining effect on the landscape character receptor, or where changes of a lower magnitude occur on a landscape character receptor that is of particularly high sensitivity. A not significant effect would occur where the effect of the Proposed Development is not definitive, and the landscape character of the receptor continues to be characterised principally by its baseline characteristics, or where the small scale of change experienced by a high sensitivity receptor is such as to be considered not significant. A major loss or irreversible effect over an extensive area, on elements and/or perceptual aspects that are key to the character of nationally valued landscapes are likely to be of greatest significance. Reversible effects, over a restricted area, on elements and/or perceptual aspects that contribute to but are not key characteristics of the character of landscapes that are of lower value, are likely to be of least significance.

OPEN has chosen to keep the consideration of the size or scale of the effect, its geographical extent and its duration and reversibility separate, by basing the magnitude of change on size or scale to determine where significant and not significant effects occur, and then describing the geographical

extents of these effects and their duration and reversibility separately. Duration and reversibility are therefore stated separately in relation to the assessed effects (i.e. as short/medium/long-term and temporary/permanent) and are considered as part of drawing conclusions about significance, combining with other judgements on sensitivity and magnitude, to allow a final judgement to be made on whether each effect is significant or not significant.

7. ASSESSING VISUAL EFFECTS

7.1 Introduction

Visual effects are concerned wholly with the effect of the Proposed Development on views, and the general visual amenity available to people and are defined by the Landscape Institute in GLVIA 3, paragraphs 6.1 as follows: *"An assessment of visual effects deals with the effects of change and development on views available to people and their visual amenity. The concern ... is with assessing how the surroundings of individuals or groups of people may be specifically affected by changes in the context and character of views."*

Visual effects are identified for different receptors (people) who will experience the view at their place of residence, within their community, during recreational activities, at work, or when travelling through the area. Visual effects may include changes to an existing static view, sequential views, or wider visual amenity as a result of development or the loss of particular landscape elements or features already present in the view.

The level of visual effect (and whether this is significant) is determined through consideration of the sensitivity of each visual receptor (or range of sensitivities for receptor groups) and the magnitude of change that will be brought about by the construction, operation and decommissioning of the Proposed Development.

The assessment of visual effects is carried out in two parts:

- an assessment of the effects that the Proposed Development would have on a series of viewpoints that have been selected to represent the views available to people from representative or specific locations within the Study Area; and
- an assessment of the effects that the Proposed Development would have from principal visual receptors, including residents of settlements, motorists using roads and people using recreational routes, features and attractions throughout the Study Area.

The LVIA therefore includes viewpoint analysis prepared for a series of representative viewpoints and presented as supporting assessment in the LVIA. The viewpoint analysis assists in defining the direction, elevation, geographical spread and nature of the potential visual effects and identify areas where significant effects are likely to occur. This approach seeks to provide clarity and confidence to consultees and decision makers by allowing the detailed judgements on the magnitude of visual change to be more readily scrutinised and understood. The viewpoint analysis is used to assist the visual assessment of visual receptors reported in the LVIA.

7.2 Visual Baseline and Preliminary Assessment

The visual baseline establishes the area in which the Proposed Development may be visible, the different groups of people who may experience views of the Proposed Development, the viewpoints where they would be affected and the nature of the views at those points. The visual baseline describes aspects of the visual amenity that may be significantly affected, as defined in Schedule 4 of the EIA Regulations. The baseline description of the groups of people (referred to as visual receptors) and viewpoints that may be affected is primarily determined by the Zone of Theoretical Visibility (ZTV).

Plans mapping the ZTV are used to analyse the extent of theoretical visibility of the Proposed Development, across the Study Area and to assist with viewpoint selection. The ZTV does not however, take account of the screening effects of buildings, localised landform and vegetation, unless specifically noted (see individual figures). As a result, there may be roads, tracks and footpaths within the study area which, although shown as falling within the ZTV, are screened or filtered by built form and vegetation, which will otherwise preclude visibility. The ZTV provides a starting point in the assessment process and accordingly tend towards giving a 'worst case' or greatest calculation of the theoretical visibility.

An overview of the visual baseline is described, and a preliminary assessment identifies visual receptors that may experience significant effects, which require to be assessed in full. A full description of the baseline is provided for each visual receptor that may experience significant effects, allowing the full baseline to be described for visual receptors that may be significantly affected. Those receptors which are identified as not having the potential to undergo significant effects are not included in the subsequent detailed assessment but are noted with reasons given for their exclusion.

The baseline study establishes the visual baseline, including the area from which the Proposed Development may be visible, the different groups of people who may experience views of the Proposed Development (visual receptors), the viewpoints where they would be affected and nature of views at these points. The baseline study establishes the visual baseline in relation to the following matters:

- the area from which the Proposed Development may be visible, that is land from which it may potentially be seen, is established and mapped using an initial ZTV of the Proposed Development;
- the location, type and number of visual receptors experiencing visibility of the Proposed Development, the likely views experienced and the activity / occupation they are engaged in;
- selection of viewpoints from within the ZTV, including representative viewpoints selected to represent the experience of different types of visual receptor and specific viewpoints selected because they are key/promoted viewpoints in the landscape;
- the location, character and type of each viewpoint with an indication of the type of visual receptor likely to be experiencing the view from each viewpoint;
- the nature of the view in terms of both the direction of view towards the Proposed Development as well as the wider available view, making reference to the principal orientation, focal features, and visible extents in terms of both horizontal degrees and distance;
- the character of the view in terms of its content and composition, its horizontal and vertical scale as well as depth and sense of perspective, important attributes such as prominent skylines and focal points and ultimately identifying the defining patterns and features which characterise the view; and
- the influence of human intervention and how the addition of artefacts and modification through land use affect the baseline situation. This may include operational windfarms where they are a feature of the baseline visual context.

The visual baseline also describes current pressures that may cause change to the visual amenity of the area in the future, in particular drawing on information for wind energy developments that are not yet present in the landscape but are at other stages in the project and consenting process. Operational and under construction wind energy developments are regarded as part of the baseline visual context. Any changes resulting from the Proposed Development are assessed within this context in the assessment of landscape and visual effects.

7.3 Sensitivity of Visual Receptors

The sensitivity of visual receptors is determined by a combination of the value of the view and the susceptibility of the visual receptors to the change that the Proposed Development would have on the view.

7.3.1 Value of the View

The value of a view or series of views is a reflection of the recognition and the importance attached either formally through identification on mapping or being subject to planning designations, or informally through the value which society attaches to the view(s). The value of a view is classified as

high, medium-high, medium, medium-low or low and the basis for this assessment is made clear using evidence and professional judgement, based on the following criteria:

- **Formal recognition**: The value of views can be formally recognised through their identification on OS or tourist maps as formal viewpoints, sign-posted and with facilities provided to add to the enjoyment of the viewpoint such as parking, seating and interpretation boards. Specific views may be afforded protection in local planning policy and recognised as valued views. Specific views can also be cited as being of importance in relation to landscape or heritage planning designations, for example the value of a view would be increased if it presents an important vista from a designed landscape or lies within or overlooks a designated area such as a National Scenic Area, which implies a greater value to the visible landscape.
- **Informal recognition**: Views that are well-known at a local level can have an increased value, even if there is no formal recognition or designation. Views or viewpoints are sometimes informally recognised through references in art or literature and this can also add to their value. A viewpoint that is visited or used by a large number of people would tend to have greater importance than one gained by very few people, although this is not always the case.

7.3.2 Susceptibility to Change

Susceptibility relates to the nature of the viewer experiencing the view and how susceptible they are to the potential effects of the Proposed Development. A judgement to determine the level of susceptibility therefore relates to the nature of the viewer and their experience from that particular viewpoint or series of viewpoints, as follows:

- **Nature of the viewer**: The nature of the viewer is described by the occupation or activity which they are engaged in at the viewpoint or series of viewpoints. The most common groups of viewers considered in the visual assessment include residents, road-users, workers and walkers. Viewers whose attention is focused on the landscape, walkers, for example are likely to have a higher sensitivity, as would residents of properties that gain constant views of the Proposed Development. Viewers travelling in cars or on trains would tend to have a lower sensitivity as their view is transient and moving. The least sensitive viewers are usually people at their place of work as they are less sensitive to changes in the view; however, this also depends on the nature of their work and the workplace which they occupy.
- **Experience of the viewer**: The experience of the visual receptor relates to the extent to which the viewer's attention or interest may be focused on the view and the visual amenity they experience at a particular location. The susceptibility of the viewer to change arising from the Proposed Development may be influenced by the viewer's attention or interest in the view, which may be focused in a particular direction, from a static or transitory position, over a long or short duration, and with high or low clarity. For example, if the principal outlook from a route is aligned directly towards the Proposed Development, the experience of the visual receptor would be altered more notably than if the experience related to a glimpsed view seen at an oblique angle from a car travelling at high speed. The visual amenity experienced by the viewer varies depending on the presence and relationship of visible elements, features or patterns experienced in the view and the degree to which the landscape in the view may accommodate the influence of the Proposed Development.

7.3.3 Sensitivity Rating

An overall level of sensitivity is applied for each visual receptor or view: high, medium-high, medium, medium-low, low; by combining individual assessments of the value of the receptor and its susceptibility to change. Each visual receptor, meaning the particular person or group of people likely to be affected at a specific viewpoint, is assessed in terms of their sensitivity. The basis for the assessments is made clear using evidence and professional judgement in the evaluation of each receptor. Criteria that tend towards higher or lower sensitivity are set out in Table A6.1.5.

Table A6.1.5 – Sensitivity to Change Criteria

Sensitivity factor	Higher	Lower
Value	Specific viewpoint identified in OS maps and / or tourist information and signage.	Viewpoint not identified in OS maps or tourist information and signage.
	Facilities provided at viewpoint to aid the enjoyment of the view.	No facilities provided at viewpoint to aid enjoyment of the view.
	View afforded protection in planning policy.	View is not afforded protection in planning policy.
	View is within or overlooks a designated landscape, which implies a higher value to the visible landscape.	View is not within, nor does it overlook, a designated landscape.
	View has informal recognition and well-known at a local level, as having particular scenic qualities.	View has no informal recognition and is not known as having particular scenic qualities.
	View or viewpoint is recognised through references in art or literature.	View or viewpoint is not recognised in references in art or literature.
	View has high scenic qualities relating to the content and composition of the visible landscape.	View has low scenic qualities relating to the content and composition of the visible landscape.
Susceptibility	Viewer who is likely or liable to be influenced by the Proposed Development.	Viewer who is unlikely or not liable to be influenced by the Proposed Development.
	Viewers such as walkers, or tourists, whose main attention and interest are on their surroundings.	Viewers whose main attention is not focused on their surroundings, such as people at work, or specific forms of recreation.
	Residents that gain static, long-term views of the Proposed Development in their principal outlook.	Viewers who are transient and dynamic, such as those travelling in cars or on trains, where the view is of short duration.
	Viewpoint is visited or used by a large number of people.	View is visited or gained by very few people.
	A view that is focused in a specific directional vista, with notable features of interest in a particular part of the view.	Open views with no specific point of interest, or specific directional vista away from direction of the Proposed Development.
	Viewers are focused on the experience of a high level of visual amenity at the location due to its overall pleasantness as an attractive visual setting or backdrop to activities.	The visual amenity experienced at the location by viewers is less pleasant or attractive than might otherwise be the case. Presence of existing built element features influence visual amenity experienced.
Sensitivity to change	High ◄———	Medium ———► ◄——— Low

7.4 Visual Magnitude of Change

The magnitude of change on views is an expression of the scale of the change that would result from the Proposed Development and is dependent on a number of variables regarding the size or scale of the change. A separate assessment is also made of the geographical extent of the area over which this would occur and the duration and reversibility of such changes.

7.4.1 Size or Scale

An assessment is made about the size or scale of change in the view that is likely to be experienced as a result of the Proposed Development, based on the following criteria:

- **Distance**: the distance between the visual receptor or viewpoint and the Proposed Development. Generally, the greater the distance, the lower the magnitude of change, as the Proposed Development would constitute a smaller scale component of the view;

- **Size**: the amount and size of the Proposed Development that would be seen. Visibility may range from one blade tip to all of the turbines. Generally, the larger the Proposed Development appears in the view, and the more of the Proposed Development that can be seen, the higher the magnitude of change;
- **Scale**: 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. The Proposed Development may appear in a similar part of the view to that which includes an operational windfarm or it may appear close to or as an extension to an existing windfarm and its scale of change is assessed in the context of these existing views;
- **Field of view**: the vertical / horizontal field of view available and the proportion of the view that is affected by the Proposed Development. Generally, the more of the proportion of view that is affected, the higher the magnitude of change would be. If the Proposed Development extends across the whole of the open part of the outlook, the magnitude of change would generally be higher as the full view would be affected; Conversely, if the Proposed Development covers just a part of an open, expansive and wide view, the magnitude of change is likely to be reduced as the Proposed Development would not affect the whole open part of the outlook;
- **Contrast**: the scale and character of the context within which the Proposed Development would be seen and the degree of contrast or integration of any new features with existing landscape elements, in terms of scale, form, mass, line, height, colour and motion. Contrasts and changes may arise particularly as a result of the more notable rotation movement of the wind turbine blades, as a characteristic that gives rise to effects of the Proposed Development;
- **Consistency of image**: the consistency of image of the Proposed Development in relation to other developments. The magnitude of change of the Proposed Development is likely to be lower if its wind turbine height, arrangement and layout design are broadly similar to other windfarm developments in the views, as they are more likely to appear as relatively simple and logical components of the landscape;
- **Skyline/background**: whether the Proposed Development will be viewed against the skyline or a background landscape may affect the level of contrast and magnitude. If the Proposed Development add to an already developed skyline the magnitude of change will tend to be lower.
- **Number**: generally, the greater the number of separate Proposed Development seen simultaneously or sequentially, the higher the magnitude of change. Further effects will occur in the case of separate developments and their spatial relationship to each other will affect the magnitude of change. For example, development that appears as an extension to an existing development will tend to result in a lower magnitude of change than a separate, new development.
- **Nature of visibility**: the nature of visibility is a further factor for consideration. The Proposed Development may be subject to various phases of development change and the way the Proposed Development may be viewed could be intermittent or continuous and / or seasonally, due to periodic management or leaf fall.

7.4.2 Geographical Extent

The geographic extent over which the visual effects will be experienced has also been assessed. This is distinct from the size or scale of effect and is described in terms of the physical area or location over which it will be experienced (described as a linear or area measurement). The extent of the effects will vary according to the specific nature of the Proposed Development and is principally assessed through ZTV, field survey and viewpoint analysis of the extent of visibility likely to be experienced by visual receptors. The geographical extent of visual effects is described as per the following examples.

The geographical extent can be described as an area measurement or proportion of the total area of the receptor affected. For example, effects on people within a particular area such as a country park or area of common land can be illustrated via a 'representative viewpoint' that represents a similar visual effect, likely to be experienced by larger numbers of people within that area. The geographical extent of that visual effect can be expressed as approximately '5 hectares' or '10%' of an area of land or defined recreational area.

The geographical extent can be described as a linear measurement (m or km) according to the length of route affected. For example, effects on people travelling on a route through the landscape such as a road or footpath can be illustrated via a 'representative viewpoint' that represents a similar visual effect, likely to be experienced by larger numbers of people along that route. The geographical extent of that visual effect can be expressed as approximately '2 km' or '10%' of the total length of the route.

The geographical extent of a visual effect experienced from a specific viewpoint may be limited to that location alone, for example a public viewpoint recommended in tourist literature such as a well visited hill summit or a particular location within a built up or well vegetated area, where an uncharacteristically open or restricted view exists.

7.4.3 Duration and reversibility

The duration and reversibility of visual effects are based on the period over which the Proposed Development are likely to exist (during construction and operation) and the extent to which the Proposed Development will be removed (during decommissioning), with effects reversed at the end of that period.

Long-term, medium-term and short-term visual effects are defined as follows:

- long-term – more than 10 years (may be defined as permanent or reversible);
- medium-term – 6 to 10 years; and
- short-term – 1 to 5 years.

7.4.4 Visual magnitude of change rating

The 'magnitude' or 'degree of change' resulting from the Proposed Development is described as 'High', 'High-medium', 'Medium', 'Medium-low' 'Low' and 'Negligible' as defined in Table A6.1.6. The basis for the assessment of magnitude for each receptor has been made clear using evidence and professional judgement.

Table A6.1.6 – Visual Magnitude to Change Definitions

Magnitude of change	Definition
High	The Proposed Development will result in a high level of alteration to the existing view, forming the prevailing influence and/or introducing elements that are uncharacteristic in the baseline view. The addition of the Proposed Development will result in a large-scale change, loss or addition to the baseline view.
Medium-high	Intermediate rating with combination of criteria from high magnitude (described above) and medium magnitude (described below).
Medium	The Proposed Development will result in a medium level of alteration to the existing view, forming a readily apparent influence and/or introducing elements that are potentially uncharacteristic in the baseline view. The addition of the Proposed Development will result in a medium-scale change, loss or addition to the baseline view.
Medium-low	Intermediate rating with combination of criteria from medium magnitude (described above) and low magnitude (described below).
Low	The Proposed Development will result in a low level of alteration to the existing view, providing a slightly apparent influence and/or introducing elements that are characteristic in the baseline view. The addition of the Proposed Development will result in a small-scale change, loss or addition to the baseline view.

Magnitude of change	Definition
Negligible	The Proposed Development will result in a negligible alteration to the existing view, providing a barely discernible influence and/or introducing elements that are substantially characteristic in the baseline view. The addition of the Proposed Development will result in negligible change, loss or addition to the baseline view.

Examples of criteria that tend towards higher or lower magnitude of change that can occur on views and visual receptors are set out in Table A6.1.7.

Table A6.1.7 – Visual Magnitude to Change Criteria

Magnitude of change	Definition
High	The Proposed Development will be the prevailing feature, forming the major focus of visual attention due to its large vertical scale and lateral spread, filling a large proportion of the field of view, with contrasts in form, line, colour, texture, luminance or motion contributing to the prevailing influence. • Size and Scale: A large scale and prevailing change to the view. • Number: Involving the loss/addition of a large number of features / elements. • Distance: Typically appearing closer to the viewer in the fore to middle ground. • FoV: Affecting a large vertical angle and wide horizontal FoV. • Nature of Visibility: Multiple phase development, continuously and sequentially visible. • Contrast: Strong degree of contrast with surroundings with little or no screening. • Skyline: Visible on the skyline as a new feature. • Consistency of Image: Contrasting with other developments, lacking in visual rationale. Typically experienced from representative viewpoints illustrating a visual effect likely to be experienced by larger numbers of people, relative to the activity, and may also be experienced from a specific viewpoint.
Medium	The Proposed Development will be plainly visible, so will not be missed by casual observers, but will not strongly attract visual attention or dominate the view because of its apparent size. The Proposed Development is obvious and will have sufficient size to contrast with other seascape/landscape elements, but with insufficient visual contrast to strongly attract visual attention and insufficient size to occupy most of an observer's field of view. • Size and Scale: A medium scale and readily apparent change to the view. • Number: Involving the loss/addition of a number of features / elements. • Distance: Typically appearing in the middle ground. • FoV: Affecting a medium vertical angle and moderate horizontal FoV. • Nature of Visibility: Multiple phase development, intermittently and sequentially visible. • Contrast: Contrast with surroundings and may benefit from some screening. • Skyline: Visible on the skyline along with other features. • Consistency of Image: Different from other developments, some visual rationale. Typically experienced from representative viewpoints illustrating a visual effect likely to be experienced by a medium number of people, relative to the activity, and may also be experienced from a specific viewpoint.
Low	The Proposed Development will be visible when scanning in its general direction; otherwise it may be missed by casual observers. Small and/or faint, but when the observer is scanning the horizon or looking more closely at an area, can be detected and sometimes noticed by casual observers; however, most people would not notice it without some active looking. • Size and Scale: A small scale and slightly apparent change, could being missed by the casual observer. • Number: Involving the loss/addition of a small number of features / elements. • Distance: Typically appearing in the background. • FoV: Affecting a small vertical angle and narrow horizontal FoV. • Nature of Visibility: Simple, single development, intermittently and infrequently visible. • Contrast: Some parity / 'fits' with surroundings and may benefit from screening. • Skyline: Partly visible on a developed skyline or not visible on the skyline. • Consistency of Image: Similar from other developments with visual rationale, appearing reasonably well accommodated within its surroundings.

Magnitude of change	Definition
	Typically experienced from illustrative viewpoints likely to be experienced by low numbers of people, relative to the activity and may also be experienced from a specific viewpoint.
Negligible	The Proposed Development will be visible only after extended viewing and is near the limit of visibility or is barely visible, such that it would not be seen by a person who was unaware of it in advance and therefore looking for it. Even under those circumstances, it may be seen only after looking at it closely for an extended period. • Size and Scale: A very small scale or barely negligible change, need to 'look for it'. • Number: Involving the loss/addition of a small number of features / elements. • Distance: Typically appearing in the far distance. • FoV: Affecting a very small vertical and narrowest horizontal FoV. • Nature of Visibility: Simple, single development, intermittently and infrequently visible. • Contrast: Blends with surroundings and / or is well screened. • Skyline: Partly visible on a developed skyline or not visible on the skyline. • Consistency of Image: Similar from other developments with strong visual rationale, appearing well accommodated within its surroundings. Typically experienced from illustrative viewpoints likely to be experienced by low numbers of people, relative to the activity and may also be experienced from a specific viewpoint.

7.4.5 Significance of Effects on Views

The significance of the effect on each view is dependent on all of the factors considered in the sensitivity of the view, and the magnitude of change resulting from the Proposed Development. These judgements on sensitivity and magnitude are combined to arrive at an overall assessment as to whether the Proposed Development would have an effect that is significant or not significant on the visual receptor.

Table A6.1.2 helps to inform the threshold of significance when combining sensitivity and magnitude to assess the significance of effect.

A significant effect would occur where the combination of the variables results in the Proposed Development having a defining effect on the view or where changes of a lower magnitude occur on a view or visual receptor that is of particularly high sensitivity. A not significant effect would occur where the appearance of the Proposed Development is not definitive, and the view continues to be defined principally by its baseline characteristics or where the small scale of change experienced by a high sensitivity receptor is such as to be considered not significant. Irreversible, long-term effects on people who are particularly sensitive to changes in views and visual amenity are more likely to be significant, as are effects on people at recognised viewpoints. Large-scale changes which introduce new, non-characteristic or discordant elements into the view are also more likely to be significant than small changes or changes involving features already present within the view.

OPEN has chosen to keep the consideration of the size or scale of the effect, its geographical extent and its duration and reversibility separate, by basing the magnitude of change on size or scale to determine where significant and not significant effects occur, and then describing the geographical extents of these effects and their duration and reversibility separately. Duration and reversibility are therefore stated separately in relation to the assessed effects (i.e. as short/medium/long-term and temporary/permanent) and are considered as part of drawing conclusions about significance, combining with other judgements on sensitivity and magnitude, to allow a final judgement to be made on whether each effect is significant or not significant.

The assessment of visual effects assumes clear weather and optimum viewing conditions. This means that effects that are assessed to be significant may be not significant under different, less clear conditions. Viewing conditions and visibility tend to vary considerably and therefore the likelihood of effects resulting from the Proposed Development would vary greatly dependent according to the prevailing viewing conditions.

8. ASSESSING NIGHT-TIME VISUAL EFFECTS

8.1 Introduction

The assessment of night-time visual effects is based on the description of proposed wind turbine lighting set out in Chapter 4: Description of the Proposed Development and the relevant ICAO/CAA regulations and standards, including Air Navigation Order 2016: Civil Aviation (CAA, 2016).

The Civil Aviation Authority (CAA) requires that 'en-route obstacles' at or above 150 m above ground level are lit with visible lighting to assist their detection by aircraft. As such, there is potential that parts of the Proposed Development may be visible at night. The effect of the Proposed Development at night would result from visible lighting located on the nacelles, and on the towers, of all turbines. The LVIA assesses the visual effects of visible aviation lighting in Appendix A6.3 which includes specific lighting ZTVs and night time visualisations.

Specific requirements for aviation and navigational lighting would be agreed with the relevant stakeholders post-consent and prior to construction. The CAA requires that all obstacles at or above 150 m above ground level are fitted with visible lighting and in the case of wind turbines these should be located on the nacelle. There is an additional requirement for lights to be provided at an intermediate level of half the nacelle height. These would need to be fitted around the towers to allow for 360-degree horizontal visibility.

A description of the turbine lighting requirements and a proposed turbine lighting is found within Chapter 4: Description of the Proposed Development in Volume 1 of the Cloud Hill Wind Farm EIA Report. Based on this, the lighting scenario assessed in Appendix 6.3 is represents the Worst Case Aviation Lighting Scheme, which assumes visible aviation lighting located on all turbine hubs and intermediate lighting on all towers.

Technical Appendix A6.3 describes the lighting parameters and approach to assessing night time effects in more detail in relation to the Proposed Development.

8.2 Representative Night-Time Viewpoints

Guidance on night-time viewpoints is presented in NatureScot's 'Visual Representation of Wind Farms Version 2.2' which states that;

"Where an illustration of lighting is required, a basic visualisation showing the existing view alongside an approximation of how the wind farm might look at night with aviation lighting may be useful. This is only likely to be required in particular situations where the wind farm is likely to be regularly viewed at night (eg from a settlement, transport route) or where there is a particular sensitivity to lighting (eg in or near a Dark Sky Park or Wild Land Area). ***Not all viewpoints will need to be illustrated in this way."*** (bold effect presented in original text).

An appropriate number of representative night-time viewpoints is considered to be three and this number is used in the majority of LVIAs produced, unless additional viewpoints are expressly requested by statutory consultees.

8.3 Night-time visual effects

The effect of the visible lights will be dependent on a range of factors, including the intensity of lights used, the clarity of atmospheric visibility and the degree of negative/positive vertical angle of view from the light to the receptor. In compliance with EIA regulations, the likely significant effects of a 'worst-case' scenario for WTG lighting are assessed and illustrated in this visual assessment.

A worst-case approach is applied to the assessment that considers the potential effects of medium-intensity 2,000 cd lights in clear visibility. It should be noted however, that medium intensity lights are only likely to be operated at their maximum 2,000 cd during periods of poor visibility. A further assessment of the likely residual effects is therefore made factoring in embedded mitigation, i.e. that the 2,000 cd aviation lights will be dimmed to 10% of their value (200 cd) if meteorological conditions

permit (when visibility is greater than 5 km). This scenario also covers the effects that may arise for receptors that view the turbine aviation lights from locations that are 1.5 degrees below the horizontal, where the Air Navigation Order 2016 (CAA, 2016) allows aviation lights to be reduced to 10% peak intensity (200 cd). Photomontages showing both 2,000 cd and 200 cd are provided from representative viewpoints to support these assessments.

It should be noted that the WTGs would also include infra-red lighting on the WTG hubs, which would not be visible to the human eye. Details of the lighting would be agreed with the MoD. The focus of the night-time visual assessment in this assessment is on the visible lighting requirements of the Proposed Development.

The assessment of the lighting of the Proposed Development is intended to determine the likely effects on the visual resource i.e. it is an assessment of the visual effects of aviation lighting on views experienced by people at night. The assessment of WTG lighting does not consider effects of aviation lighting on landscape character (i.e. landscape or seascape effects).

ICAO indicates a requirement for no lighting to be switched on until 'Night' has been reached, as measured at 50 cd/m^2 or darker. It does not require 2,000 cd medium intensity to be on during 'twilight', when landscape character may be discerned. The aviation navigational lights may be seen for a short time during the twilight period when some recognition of landscape features/ profiles/ shapes and patterns may be possible. It is considered however, that level of recognition does not amount to an ability to appreciate in any detail landscape character differences and subtleties, nor does it provide sufficient natural light conditions to undertake a landscape character assessment.

The proposed aviation lighting will not have significant effects on the perception of landscape or seascape character, which is not readily perceived at night in darkness, particularly in rural areas. The matter of visible aviation navigation lighting assessment is wholly a visual concern and the assessment presented focusses on that premise.

8.4 Significance criteria for night-time visual effects

The nature of the daytime and night-time effects from visible aviation navigation lighting are clearly very different, in that during day light hours visibility of moving WTG rotors gives rise to effects that are very different to the pinpoint effects of lighting at night. It is considered therefore, that the same criteria should not be used to assess these differences in daytime and night-time effect.

In relation to the sensitivity of visual receptors, this is defined through the application of professional judgement in relation to 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.

The factors weighed in reaching a decision on 'value' of the view are not all applicable at night-time, in the same way they may be during the day. It is not appropriate, for example, to attribute value to views at night when the detail of the view, or of elements that add value to it within a landscape, cannot readily be discerned. Furthermore, the popularity of a viewpoint during the day may be completely different to its use at night. Value factors assessed for day-time viewpoints may therefore be of less relevance to the value judgement for night-time viewpoints, which is factored into the following assessments.

In reaching a view on the significance of the likely visual effects from the visible aviation lighting, it is relevant to consider what parts of the landscape - where darkness qualities are well displayed - are likely to be affected by visibility of the aviation lights and, in turn, to understand what people might be doing in these areas at night to be susceptible to visibility of aviation lights. Descriptions of 'susceptibility' provided for daytime viewpoints and receptors in Section 7 are considered appropriate for the purposes of establishing receptor sensitivity at night-time, however the susceptibility of people experiencing night-time views will depend on the degree to which their perception is affected by existing baseline lighting. In brightly lit areas, or when travelling on roads from where sequential

experience of lighting may be experienced, the susceptibility of receptors is likely to be lower than from within areas where the baseline contains no or limited existing lighting.

In relation to the other key component in determining significance of effect, the magnitude of change, reference to 'loss of important features' and 'composition of the view' are not readily discernible or relevant at night and, on this basis, a distinct set of criteria to explain the magnitude of change at night, as a consequence of the appearance of aviation lights, is set out in Table A6.1.8 below.

Table A6.1.8: Magnitude of change definitions for night-time visual effects

Magnitude of change	Definition
High	Addition of aviation navigation lighting results in large scale of change/large intrusion to the existing night-time baseline conditions/darkness in the view, due to a full and/ or close range view of visible aviation lighting and/ or a high degree of contrast/ low degree of integration with level of baseline lighting in the view. Results in obtrusive light which compromises or diminishes the view of the night sky.
Medium	Addition of aviation lighting results in moderate scale of change/moderate intrusion to the existing night-time baseline conditions/ darkness in the view, due to partial and/ or middle distance view of visible aviation lighting and/ or moderate level of contrast/ integration with level of baseline lighting in the view. Results in light that may partially compromise or diminish the view of the night sky, but which is not considered obtrusive.
Low	Addition of aviation navigation lighting results in small scale of change/minor intrusion to the existing night-time baseline conditions/ darkness in the view, due to limited and/ or distant view of aviation lighting and/ or low degree of contrast/ high degree of integration with level of baseline lighting in the view. Results in light that does not compromise or diminish the view of the night sky, nor is it considered obtrusive.
Negligible	Addition of aviation navigation lighting results in a largely indiscernible change/negligible intrusion to the existing night-time baseline conditions/ darkness in the view, due to glimpsed view of lighting and/ or slight degree of contrast/ very high degree of integration with level of baseline lighting in the view. Results in light that does not compromise or diminish the view of the night sky, nor is it considered obtrusive.

The significance of effects of aviation navigation lighting is assessed through a combination of the sensitivity of the visual receptor and the magnitude of change that would result from the visible aviation lighting, taking into account the considerations described above, and informed by the matrix in Table A6.1.2, which gives an understanding of the threshold at which significant effects may arise.

A significant effect occurs where the aviation navigation lighting would provide a defining influence on a view or visual receptor. A not significant effect would occur where the effect of the aviation navigation lighting is not material, and the baseline characteristics of the view or visual receptor continue to provide the definitive influence. In this instance the aviation lighting may have an influence, but this influence would not be definitive.

In determining significance, particular attention is paid to the potential for 'Obtrusive Light' i.e. whether the lighting impedes a particular view of the night sky; creates sky glow, glare or light intrusion (ILP, 2011) in a prominent, incongruous or intrusive way.

9. ASSESSING CUMULATIVE LANDSCAPE AND VISUAL EFFECTS

9.1 Introduction

Assessment of cumulative effects is required by the EIA Regulations. Cumulative effects have been defined in a broad generic sense as "impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project" (Hyder, 1999, p7).

In GLVIA3 (Landscape Institute and IEMA, 2013, p120) the guidelines define cumulative landscape and visual effects as those that "result from additional changes to the landscape and visual amenity caused by the Development in conjunction with other developments (associated with or separate to it), or actions that occurred in the past, present or are likely to occur in the foreseeable future."

NatureScot's guidance, 'Assessing the Cumulative Impact of Onshore Wind Energy Developments' (2021) is widely used across the UK to inform the specific assessment of the cumulative effects of wind farms. This guidance provides the basis for the methodology for the cumulative assessment.

NatureScot's guidance, Assessing the Cumulative Impact of Onshore Wind Energy Developments (NatureScot 2021) is widely used across the UK to inform the specific assessment of the cumulative effects of windfarms. Both GLVIA3 and NatureScot's guidance provide the basis for the methodology for the cumulative LVIA undertaken. NatureScot (2021) presents the following guidance:

"The purpose of a Cumulative Landscape and Visual Impact Assessment (CLVIA) is to describe, visually represent and assess the ways in which a proposed wind farm would have additional impacts when considered with other consented or proposed wind farms. It should identify the significant cumulative impacts arising from the proposed wind farm."

"The assessment should be proportionate to the likely impacts and all CLVIA should accord with the guidelines within GLVIA3. The emphasis should be on the production of relevant and useful information, highlighting why the proposals assessed have been included and why others have been excluded, rather than the provision of a large volume of information."

In line with guidance (NatureScot 2021), the LVIA focuses on the key cumulative impacts which are likely to influence decision making, rather than assessing every potential cumulative effect.

The degree to which cumulative effects occur, or may occur, as a result of more than one wind farm development being constructed or becoming operational are a result of:

- The distance between individual wind farms/relevant developments;
- The interrelationship between their ZTVs;
- The overall character of the landscape and its sensitivity to wind farms/other relevant development;
- The siting, scale and design of the wind farms/developments themselves; and
- The way in which the landscape is experienced.

9.2 Scope of the Cumulative Assessment

GLVIA3, p120 highlights that 'the focus of the cumulative assessment will be on the additional effect of the project in conjunction with other developments of the same type (as for example, in the case of wind farms)'.

In accordance with this guidance, the cumulative assessment focuses on the addition of the Proposed Development to other wind farm development. Wind energy development data was sourced directly from relevant local authorities, a range of wind energy developer web sites and local authority online planning application portals. The cumulative assessment includes all wind turbine developments that are operational, under construction, consented or at planning application stage and are over 50 m to

tip in height. It is considered that turbines below 50 m in height are unlikely to result in significant cumulative effects with the Proposed Development.

The cumulative Study Area covers a radius of 45 km. The extent of the detailed cumulative assessment within this area is then defined relative to key landscape and visual receptors and anticipated effects, focussing on potential significant cumulative effects, and refining to a list of projects to those within ‘influencing distance’.

Based on surrounding topography and the locations of wind farm developments within this 45 km Study Area it is considered that there is no likelihood of significant cumulative effects between the Proposed Development and any of the cumulative sites that lie beyond 20 km of the Proposed Development. For this reason, the detailed assessment within the LVIA has focussed on the cumulative sites within 20 km of the Proposed Development. Cumulative ZTVs have been produced for existing and under construction wind farms plus consented and undetermined wind farm applications within 20 km. Where wind farms are in close proximity to each other they have been grouped for ZTV production to help illustrate the theoretical visibility of the existing baseline.

Cumulative wirelines are prepared for all 22 LVIA viewpoints and additional four wirelines, with all developments within the 45 km search area shown in the wirelines to illustrate the Proposed Development in the wider context of other wind energy developments and support the approach to cumulative assessment.

The cumulative situation changes frequently as applications are made or withdrawn, and the layouts of submitted application wind farms are changed. It is therefore necessary to decide and agree on a cut-off date when the sites and layouts to be included are fixed. The cumulative assessment includes operational, consented and application stage wind energy developments as of November 2022. Any changes in the cumulative situation after this date are not incorporated in the assessment.

Cumulative wind farms within the 45 km Study Area are shown on Figure 6.12. Diagrams showing Cumulative Zone of Theoretical Visibility (CZTV) for those relevant developments within 20 km of the Proposed Development are shown on Figures 6.13a to 6.13j.

In terms of the timescale of proposals for inclusion, both NatureScot guidance and GLVIA3 advise in their guidance that the assessment of the cumulative impacts associated with the Proposed Development should encompass the effects of the proposal in combination with existing, under construction, consented and application stage wind farms awaiting determination.

Schemes that are at the pre-planning or scoping stage are not generally considered in the assessment of cumulative effects because firm information on which to base the assessment is not available. Scoping stage sites are mapped on Figure 6.12 for reference but are not considered further due to layout and design uncertainties at the pre-application stages.

9.3 Cumulative Development Scenarios

GLVIA3 (Landscape Institute and IEMA, 2013, p120) advises in relation to the baseline, taking 'the Proposed Development' to mean the main proposal that is being assessed, "it is considered that existing schemes and those which are under construction should be included in the baseline for both landscape and visual effects assessments (the LVIA baseline). The baseline for assessing cumulative landscape and visual effects should then include those schemes considered in the LVIA and in addition potential schemes that are not yet present in the landscape but are at various stages in the development and consenting process". The LVIA follows this approach and the cumulative effects that would potentially arise from the addition of the Proposed Development into a context that includes existing or under construction wind farms are assessed, with the effects considered against the landscape and visual baseline.

The likely significant cumulative effects of the Proposed Development are assessed in relation to three relevant scenarios within the cumulative assessment:

- The consented scenario: the cumulative assessment assesses the effect of the Proposed Development in addition to wind farms already present in the landscape (operational/under construction wind farms) and wind farms that are likely to soon be present (consented wind farms) ('the consented scenario'). This scenario assumes that all consented wind energy developments have become operational and are part of a theoretical baseline situation. The cumulative assessment in the consented scenario identifies the magnitude of change that would arise due to the contribution of the Proposed Development, when considered with operational, under construction and consented wind energy developments in the landscape. The effects identified are considered as having some likelihood to arise, on the assumption that consented wind farms will be built and become operational; however, it is often the case that consented wind farms are not ultimately built, which reduces the likelihood of consented scenario effects arising.
- The application stage scenario: a further hypothetical scenario is also assessed, that not only takes into the account the operational, under construction and consented wind farms, but also those that have valid (but as yet underdetermined) planning applications ('the application stage scenario'). The application stage scenario assumes that all application stage wind energy developments have become operational and are part of a theoretical baseline situation. The cumulative assessment in the application stage scenario identifies the magnitude of additional cumulative change that would arise due to the contribution of the Proposed Development, when considered with operational, consented and application stage wind energy developments in the landscape. The effects identified are considered as being less likely to arise, as it is unlikely that all application stage wind farms will gain consent.

9.4 Types of Cumulative Effect

The aim of the cumulative assessment is to identify the additional changes which would be brought about by the Proposed Development when considered in conjunction with other wind farms. In accordance with guidance (NatureScot, 2021), the LVIA for each receptor considered assesses the effect arising from the addition of the Proposed Development to the cumulative situation, and not the overall effect of multiple wind farms. Adjacent developments may complement one another, or may be discordant with one another, and it is the increased or reduced level of significance of effects which arises as a result of this change that is assessed in the cumulative assessment.

However, in considering the detailed cumulative effects described within the LVIA, a broad statement relating to the combined cumulative effect of multiple wind farms in the area has also been provided in Section 6.8 of the LVIA chapter.

9.4.1 Cumulative Landscape Effects

The cumulative development of wind farms within a particular area may build up to create different types of landscape. Significant cumulative landscape effects may arise where a 'Landscape with wind farms' is created, as a result of the addition of the Proposed Development to other existing or proposed wind farms, which results in wind turbines becoming sufficiently prolific that they become a prevailing or key landscape and visual characteristic.

The significance of the cumulative landscape effect from the addition of the Proposed Development reflects the intensification of wind farms within the landscape, which is assessed as follows:

- The Proposed Development forms a separate isolated feature from other wind farms within the landscape, too infrequent and of insufficient influence to be perceived as a characteristic of the area. The cumulative landscape effect of the Proposed Development is unlikely to be significant;
- The addition of the Proposed Development results in wind farms forming a key characteristic of the landscape, exerting sufficient presence as to establish or increase the extent of a 'landscape with wind farms', but not of sufficient dominance to be a defining characteristic of the area. The cumulative landscape effect of the Proposed Development may be significant or not significant,

depending on the sensitivity of the receptor, magnitude of the change and specific effects arising from the Proposed Development; and

- The addition of the Proposed Development results in wind farms forming the prevailing characteristic of the landscape, seeming to define the landscape as a 'wind farm landscape' character type. The cumulative landscape effect of the Proposed Development is likely to be significant.

These effects can occur at varying scales, for example, effecting a local character type, or at a regional level, which is assessed as part of the geographic extent assessment in the LVIA.

9.4.2 Cumulative Visual Effects

Cumulative visual effects consist of combined and sequential effects:

- Combined visibility occurs where the observer is able to see two or more developments from one viewpoint. Combined visibility may either be 'in combination', where several wind farms are within the observer's main angle of view at the same time, or 'in succession', where the observer has to turn to see the various wind farms. The cumulative visual effect of the Proposed Development may be significant or not significant depending on factors influencing the cumulative magnitude of change, such as the degree of integration and consistency of image with other wind farms in combined views; and the position of the development relative to other wind farms and the landscape context in successive views.
- Sequential visibility occurs when the observer has to move to another viewpoint to see different developments. Sequential effects are assessed along regularly used routes such as major roads, railway lines and footpaths. The occurrence of sequential effects range from 'frequently sequential' (the features appear regularly and with short time lapses between, depending on speed of travel and distance between the viewpoints) to 'occasionally sequential' (long time lapses between appearances, because the observer is moving slowly and/or there are large distances between the viewpoints). The cumulative visual effect of the Proposed Development is more likely to be significant when frequently sequential.

The methodology for the assessment of cumulative landscape and visual effects involves the undertaking of a baseline study of the existing and potential future wind farm/other relevant development influence, an evaluation of sensitivity, magnitude of change and the resulting significance of cumulative effects.

9.4.3 Cumulative Sensitivity of Landscape and Visual Receptors

In evaluating cumulative sensitivity, the value component of the assessments of sensitivity would not change, however, in an evolving wind farm/other relevant development context, the susceptibility of a landscape and visual receptor to the introduction of the Proposed Development may increase or decrease. This is therefore re-evaluated based on the criteria contained in the landscape and visual susceptibility criteria sections of this methodology.

9.4.4 Cumulative Magnitude of Change

The cumulative magnitude of change is an expression of the degree to which landscape character receptors and visual receptors/views would be changed by the addition of the Proposed Development to wind farms/other relevant developments that are already operational, consented or at application stage. Where required, scoping stage wind farms and other early stage developments may exceptionally be included. The cumulative magnitude of change is assessed according to a number of criteria, described as follows:

- The location of the Proposed Development in relation to other wind farm developments. If the Proposed Development is seen in a part of the view or setting to a landscape receptor that is not affected by other development, this would generally increase the cumulative magnitude of

change as it would extend influence into an area that is currently unaffected by development. Conversely, if the Proposed Development is seen in the context of other sites, the cumulative magnitude of change may be lower as development is not being extended to otherwise undeveloped parts of the outlook or setting. This is particularly true where the scale and layout of the Proposed Development is similar to that of the other sites as where there is a high level of integration and cohesion with an existing site the various developments may appear as a single site;

- The extent of the developed skyline. If the Proposed Development would add notably to the developed skyline in a view, the cumulative magnitude of change would tend to be higher as skyline development can have a particular influence on both views and landscape receptors;
- The number and scale of developments seen simultaneously or sequentially. Generally, the greater the number of clearly separate developments that are visible, the higher the cumulative magnitude of change would be. The addition of the Proposed Development to a view or landscape where a number of smaller developments are apparent would usually have a higher cumulative magnitude of change than one or two large developments as this can lead to the impression of a less co-ordinated or strategic approach;
- The scale comparison between developments. If the Proposed Development is of a similar scale to other visible developments, particularly those seen in closest proximity to it, the cumulative magnitude of change would generally be lower as it would have more integration with the other sites and would be less apparent as an addition to the cumulative situation;
- The consistency of image of the Proposed Development in relation to other developments. The cumulative magnitude of change of the Proposed Development is likely to be lower if its turbine height, arrangement and layout design are broadly similar to other developments in the landscape, as they are more likely to appear as relatively simple and logical components of the landscape;
- The context in which the developments are seen. If developments are seen in a similar landscape context, the cumulative magnitude of change is likely to be lower due to visual integration and cohesion between the sites. If developments are seen in a variety of different landscape settings, this can lead to a perception that wind farm development is unplanned and uncoordinated, affecting a wide range of landscape characters and blurring the distinction between them; and
- The magnitude of change of the Proposed Development as assessed in the main assessment. The lower this is assessed to be, the lower the cumulative magnitude of change is likely to be. Where the Proposed Development itself is assessed to have a negligible magnitude of change on a view or receptor there would not be a cumulative effect as the contribution of the Proposed Development would equate to the 'no change' situation.

Definitions of cumulative magnitude of change are applied in order that the process of assessment is made clear. These are:

- High: where the addition of the Proposed Development to the landscape or view would result in a major incremental change, loss or addition to the cumulative wind farm/development situation;
- Medium: where the addition of the Proposed Development would result in a moderate incremental change, loss or addition to the cumulative windfarm/development situation;
- Low: where the addition of the Proposed Development would result in a minor incremental change, loss or addition to the cumulative situation;
- Negligible: where the addition of the Proposed Development to other wind energy developments in the landscape or view would result in a negligible incremental change, loss or addition to the cumulative situation; and

- None: where the addition of the Proposed Development to other wind energy developments in the landscape or view would have no change to the cumulative windfarm situation and its addition equates to a 'no change' situation.

There may also be intermediate levels of cumulative magnitude of change: medium-high and medium-low; where the change falls between two of the definitions.

9.4.5 Significance of Cumulative Effects

The objective of the cumulative assessment is to determine whether any effects that the Proposed Development would have on landscape receptors and visual receptors, when seen or perceived in combination with other existing and proposed sites, would be significant or not significant. Significant cumulative landscape and visual effects arise where the addition of the proposed wind turbines or other similar/large scale development to a specific baseline, leads to windfarms becoming a prevailing landscape and visual characteristic of a receptor that is sensitive to such change. Cumulative effects may evolve as follows:

- A small scale, single windfarm would often be perceived as a new or 'one-off' landscape feature or landmark within the landscape. Except at a local site level, it usually cannot change the overall existing landscape character, or become a new characteristic element of a landscape;
- With the addition of further windfarm development, windfarms can become a characteristic element of the landscape, as they appear as landscape elements or components that are repeated. Providing there was sufficient 'space' or undeveloped landscape/skyline between each windfarm, or the overlapping of several windfarms was not too dense; the Proposed Developments or other similar/large scale developments would appear as a series of developments within the landscape and would not necessarily become the dominant or defining characteristic of the landscape nor have significant cumulative effects; and
- The next stage would be to consider larger commercial windfarms/developments and/or an increase in the number of windfarms/developments within an area that either overlap or coalesce and/or 'join-up' along the skyline. The effect is to create a landscape where the windfarm element is a prevailing characteristic of the landscape. The result would be to materially change the existing landscape character of a landscape type, or the landscape in a view and resulting in a significant cumulative effect. A landscape characterised by windfarm development may already exist as part of the baseline landscape context.

Less extensive, but nevertheless significant cumulative landscape and visual effects may also arise as a result of the addition of the Proposed Development where it results in a landscape or view becoming defined by the presence of more than one wind farm or similar/large scale development, so that other patterns and components are no longer definitive, or where the Proposed Development contrasts with the scale or design of an existing or Proposed Development. Higher levels of significance may arise from cumulative landscape and visual effects related to the Proposed Development being in close proximity to other wind farms when they are clearly visible together in views, however provided that the Proposed Development is designed to achieve a high level of visual integration, with few notable visual differences between wind farms, these effects may not necessarily be significant. In particular, the effects of a wind farm extension are often less likely to be significant, where the effect is concentrated, providing that the design of the wind farms are compatible and that the overall capacity of the landscape is not exceeded.

The capacity of the landscape or view may be assessed as being exceeded where the landscape or visual receptor becomes defined by wind farm development, or if the Proposed Development extends across landscape character types or clear visual/topographic thresholds in a view. More substantial cumulative effects may result from wind farms that have some geographical separation, but remain highly inter-visible, potentially resulting in extending effects into new areas, such as an increased presence of wind farm development on a skyline, or the creation of multiple, separate wind farm defined landscapes.

10. NATURE OF EFFECTS

10.1 Overview

The nature of effects refers to whether the landscape and/or visual effect of the Proposed Development is positive or negative (herein referred to as ‘beneficial’ and ‘adverse’).

The EIA Regulations 2017 state that the EIA Report should define *‘the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development’*.

Cumulative effects have been described in Section 9, and *‘short-term, medium-term and long-term, permanent and temporary’* effects are described in Section 6 and 7 under the heading ‘Duration of Effect’.

Transboundary effects are scoped out of the LVIA as the LVIA study area does not overlap with EU member states.

10.2 Direct and indirect effects

Direct landscape effects relate to the host landscape and concern both physical and perceptual effects on the receptor.

Indirect landscape effects relate to those landscapes and receptors which separated by distance or remote from the development and therefore are only affected in terms of perceptual effects. The Landscape Institute also defines indirect effects as those which are not a direct result of the development but are often produced away from it or as a result of a complex pathway.

Visual effects are considered as direct effects, as the view itself may be directly altered by the Proposed Development.

10.3 Positive and negative effects

The nature of effects refers to whether the landscape and/or visual effect of the Proposed Development is positive or negative (herein referred to as 'beneficial' and 'adverse').

Guidance provided by the Landscape Institute on the nature of effect in GLVIA3 states that "in the LVIA, thought must be given to whether the likely significant landscape and visual effects are judged to be positive (beneficial) or negative (adverse) in their consequences for landscape or for views and visual amenity", but it does not provide guidance as to how that may be established in practice. The nature of effect is therefore one that requires interpretation and, where applied, this involves reasoned professional opinion.

In relation to many forms of development, the LVIA will identify 'beneficial' and 'adverse' effects by assessing these under the term 'Nature of Effect'. The landscape and visual effects of windfarms are difficult to categorise in either of these brackets as, unlike other disciplines, there are no definitive criteria by which the effects of windfarms can be measured as being categorically 'beneficial' or 'adverse'. In some disciplines, such as noise or ecology, it is possible to quantify the effect of a windfarm in numeric terms, by objectively identifying or quantifying the proportion of a receptor that is affected by the Proposed Development and assessing the nature of that effect in justifiable terms. However, this is not the case in relation to landscape and visual effects where the approach combines quantitative and qualitative assessment.

Generally, in the development of 'new' wind farms, a precautionary approach is adopted by OPEN, which assumes that significant landscape and visual effects will be weighed on the adverse side of the planning balance. Unless it is stated otherwise, the effects considered in this assessment are considered to be adverse. Beneficial or neutral effects may, however, arise in certain situations and are stated in the assessment where relevant, based on the following definitions:

- Beneficial effects contribute to the landscape and visual resource through the enhancement of desirable characteristics or the introduction of new, beneficial attributes. The Proposed Development contributes to the landscape by virtue of good design, even if it contrasts with the existing character. The removal of undesirable existing elements or characteristics can also be beneficial, as can their replacement with more appropriate components;
- Neutral effects occur where the Proposed Development fits with the existing landscape character or visual amenity. The Proposed Development neither contributes to nor detracts from the landscape and visual resource and can be accommodated with neither beneficial or adverse effects, or where the effects are so limited that the change is hardly noticeable. A change to the landscape and visual resource is not considered to be adverse simply because it constitutes an alteration to the existing situation; and
- Adverse effects are those that detract from the landscape character or quality of visual attributes experienced, through the introduction of elements that contrast, in a detrimental way, with the existing characteristics of the landscape and visual resource, or through the removal of elements that are key in its characterisation.

10.4 Duration and Reversibility

The EIA Regulations (2017) require a description of the likely significant effects on factors including (among other things) 'short-term, medium-term and long-term, permanent and temporary effects'.

Duration (short, medium or long-term) and reversibility (permanent or temporary) are separate but linked considerations. Duration of effects are judged on a scale as long-term, medium-term and short-term effects, defined in this methodology as follows:

- Long-term – more than 10 years;
- Medium-term – 5 to 10 years.
- Short-term – 1 to 4 years.

Reversibility is a judgement about the degree of permanence or temporary nature of an effect, determined by the prospects and the practicality of the particular effect being reversed and the time period over which this may occur. Some forms of development can be considered permanent, while others can be considered temporary or reversible since they have a limited operational life and would be removed and/or the land reinstated.

The effect of the Proposed Development is considered to be long term and reversible, in that the wind turbines and infrastructure can be removed and their effects largely reversed at the end of the 30 year operational period.

The effect of the construction of the Proposed Development is assessed as temporary and short-term in this LVIA. Other infrastructure and operations such as the construction processes and plant (including tall cranes and heavy machinery for turbine erection) and construction and storage compounds would be apparent only during the initial construction period of the Proposed Development and are assessed as short-term and reversible effects. Borrow pit excavation would also be short-term as borrow pits would be restored at the end of the construction process, although a permanently altered ground profile may remain evident.

GLVIA3 sets out an approach to the assessment of magnitude of change in which three separate considerations are combined within the magnitude of change rating. These are the size or scale of the effect, its geographical extent and its duration and reversibility. OPEN considers that the process of combining all three considerations in one magnitude of change rating can distort the aim of identifying significant effects of wind farm development. For example, an increased magnitude of change, based on size or scale, may be reduced to a lower rating if it occurred over a localised geographic extent and for a short duration. This might mean that a potentially significant effect would be overlooked if effects are diluted down due to their geographical extents and/or duration or reversibility.

OPEN has chosen to keep these the consideration of the size or scale of the effect, its geographical extent and its duration and reversibility separate, by basing the magnitude of change on size or scale to determine where significant and not significant effects occur, and then describing the geographical extents of these effects and their duration and reversibility separately. Duration and reversibility are therefore stated separately in relation to the assessed effects (i.e. as short/medium/long-term and temporary/permanent) and are considered as part of drawing conclusions about significance, combining with other judgements on sensitivity and magnitude, to allow a final judgement to be made on whether each effect is significant or not significant.

Should decommissioning of any part of the Proposed Development be required e.g. failure of a wind turbine beyond economic repair, it is considered that any effects would be less than those resulting from construction of the Proposed Development, and as such this potential for decommissioning has been scoped out of further assessment.

11. VISUAL REPRESENTATIONS

11.1 Overview

Zones of Theoretical Visibility (ZTVs) and visualisations (wirelines or wirelines and photomontages) are graphical images produced to assist and illustrate the LVIA and the cumulative assessment. The methodology used for viewpoint photography and photomontages has been produced in accordance with the NatureScot guidance on Visual Representation of Wind Farms, Version 2.2 (2017), the Guidelines for Landscape and Visual Impact Assessment, Third Edition (GLVIA 3) (Landscape Institute and IEMA, 2013) and the Landscape Institute Technical Guidance Note on Visual Representation of Development Proposals (2019).

11.2 Zone of Theoretical Visibility (ZTV)

The ZTVs in Figures 6.5 to 6.11 have been calculated using GIS software to generate a ZTV of the Proposed Development to demonstrate the theoretical extent of visibility from any point in the study area.

The ZTVs are based on Ordnance Survey Terrain 5 digital terrain model (DTM) data, to produce detailed ZTV plots to assess particular effects, such as along the coastline. The computer model will include the entire study area and takes account of atmospheric refraction and the Earth's curvature. The resulting ZTV plots have been overlaid on Ordnance Survey mapping at an appropriate scale and presented as figures using desktop publishing or graphic design software.

Cumulative ZTV plots based on the intervisibility of the Proposed Development and other relevant developments within the study area have also been produced.

There are limitations which should be considered in the interpretation and use of the ZTV as follows:

- Where the ZTV has been calculated using Ordnance Survey Terrain 5 DTM, this will not account for the screening effects of vegetation or built form unless added in the form of OS Vectormap data or digitally added and stated on the figure.
- The ZTVs are based on theoretical visibility from 2 m above ground level.
- The Blade Tip ZTV does not indicate the decrease in visibility that occurs with increased distance from the array area. The nature of what is visible from 3 km away will differ markedly from what is visible from 10 km away, although both are indicated on the Blade Tip ZTV as having the same level of visibility.
- There is a wide range of variation within the visibility shown on the ZTV, for example, an area shown on the blade tip ZTV as having visibility of seven WTGs may gain views of the smallest extremity of blade tips, or of seven full WTGs. This can make a considerable difference in the effects of the Proposed Development on that area.

These limitations mean that while the ZTV is used as a starting point in the assessment, providing an indication of where the Proposed Development will be theoretically visible and tending to present a worst-case or over-estimate the actual visibility. The information drawn from the ZTV is checked by field survey observation.

The LVIA includes a Horizontal Angle ZTV to show the horizontal field of view (in degrees) that may be affected by views of the wind turbines.

11.3 Baseline photography

11.3.1 Overview

Once a view has been selected, the location is visited, confirmed, and assessed with the aid of a wireline or similar visualisation in the field. A photographic record is taken to record the view and the

details of the viewpoint location and associated data are recorded to assist in the production of visualisations and to validate their accuracy.

The following photographic information is recorded:

- date, time, weather conditions and visual range;
- GPS recorded 12 figure grid reference accurate to ~5-10 m;
- GPS recorded Above Ordnance Datum (AOD) height data;
- use of a fixed 50 mm focal length lens is confirmed;
- horizontal field of view (in degrees); and
- bearing to Proposed Development.

The photographs used to produce the photomontages were taken at the times of day and locations agreed with the consultees using Canon EOS 5D and 6D Digital SLR cameras, with a fixed lens and a full-frame (35 mm negative size) complementary metal oxide semiconductor (CMOS) sensor. The photographs were taken on a tripod with a pano-head at a height of approximately 1.5 m above ground.

Whilst no two-dimensional image can fully represent the real viewing experience, the visualisation aims to provide a realistic representation of the offshore elements, based on current information and photomontage methodology.

Guidelines for LVIA (GLVIA3) para 8.22 state – *'In preparing photomontages, weather conditions shown in the photographs should (with justification provided for the choice) be either:*

- *representative of those generally prevailing in the area; or*
- *taken in good visibility, seeking to represent a maximum visibility scenario when the development may be highly visible'.*

In preparing photomontages for the LVIA, photographs have been taken in favourable weather conditions during periods of 'very good' or 'excellent' visibility conditions - seeking to represent a maximum visibility scenario when the Proposed Development may be most visible.

11.4 Visualisations

Photomontages have been produced in accordance with NatureScot Visual Representation of Windfarms Guidance (NatureScot, 2017) and Landscape Institute (2019) Technical Guidance Note (TGN) 06/19 Visual Representation of Development Proposals.

A photomontage is a visualisation which superimposes an image of a Proposed Development upon a photograph or series of photographs. Photomontage is a widespread and popular visualisation technique, which allows changes in views and visual amenity to be illustrated and assessed, within known views of the 'real' landscape.

To create the baseline panorama, the frames are individually cylindrically projected and then digitally joined to create a fully cylindrically projected panorama using Adobe Photoshop or PTGui software. This process avoids the wide-angle effect that will result should these frames be arranged in a perspective projection, whereby the image is not faceted to allow for the cylindrical nature of the full 360-degree view but appears essentially as a flat plane.

Tonal alterations are made using Adobe software to create an even range of tones across the photographs once joined.

The baseline photographs and cumulative wireline visualisations shown for each viewpoint cover a 90-degree field of view (or in some cases, up to 360-degree), which accords with NatureScot guidance. These are cylindrically projected images and should be viewed flat at a comfortable arm's length.

The photographs are also joined to create planar projection panoramas using PTGui software. These are used in the creation of the 53.5 degree field of view photomontages.

Wireline representations that illustrate the Proposed Development and set within a computer-generated image of the landform are used in the assessment to predict theoretical appearance of the WTGs. These are produced with Resoft WindFarm software and are based on OS Terrain 5 DTM. There are limitations in the accuracy of digital terrain model (DTM) data so that landform may not be picked up precisely and may result in WTGs being more or less visible than is shown, however, the use of OS Terrain 5 minimises these limitations. Where descriptions within the assessment identify the numbers of WTGs visible this refers to the illustrations generated and therefore the reality may differ to a degree from these impressions.

Daytime visualisations and wirelines show a wind turbine model which represents the maximum development scenario of the Proposed Development and allow the potential proportions of the wind turbines to be appreciated from the visualisations.

Fully rendered photomontages have been produced for the agreed viewpoints using Resoft WindFarm software, to provide a photorealistic image of the appearance of the Proposed Development. In the daytime photomontages modelled representations are combined with the baseline view photographs to create a photorealistic rendered photomontage image of the development.

'Panoramic photomontages' are produced in the LVIA with a 53.5° HFoV, based on relevant guidance (NatureScot, 2017) and due to their suitability to encompass the horizontal spread of the Proposed Development and show the turbines at a representative scale and distance. In some views, two adjacent 53.5° photomontages will be required to capture the horizontal spread of the Proposed Development.

The 53.5 degree field of view wirelines and photomontages are prepared using a planar projected image and should also be viewed flat at a comfortable arm's length. These images are each printed on paper 841 x 297 mm (half A1) which provides for a relatively large scale image.

In the wirelines, the wind turbines are shown with the central WTGs facing the viewer directly, with the full rotor diameter visible at its tallest extent. In the photomontages, the WTG rotors are shown with a random appearance with the central wind turbines facing the viewer directly.

Rendering of the wind turbines in the photomontages is as photorealistic as possible to the conditions shown in each viewpoint photograph. There may be some variation in the appearance and visibility of the wind turbines between the viewpoints, as they are rendered to suit the conditions shown in each of the different viewpoint photographs, which have some unavoidable degree of variation in terms of lighting and weather conditions. The key requirement is that the wind turbines need to be rendered with sufficient contrast against the skyline backdrop to illustrate their maximum visibility scenario in each image. Photomontages have been prepared to depict how the Proposed Development will appear to illustrate the worst-case. The full suite of viewpoint photomontages should be viewed to gain an impression of the likely visual effects of the Proposed Development.

11.5 Night-time visualisations

The visual effect of the Proposed Development at night has been assessed in Appendix A6.3, informed by the night-time photomontage visualisations produced from representative viewpoints, to visually represent aviation lighting at night. Photomontages showing aviation lighting at both 2,000 cd and 200 cd aviation are provided to support the assessment.

Night-time visualisations have been produced using a combination of using Resoft's WindFarm software's aviation module software for positioning of the lights, 3D modelling software that can simulate lighting conditions, referencing existing lighting imagery/atmospheric conditions from the baseline photographs and professional judgement using photoshop.

The appearance of the lights in the night-time photomontages emulates how lights appear in the other parts of the baseline photographs. A light shown in a photograph tends to have a slight 'halo' (or bokeh) around it due to the way a camera lens renders out-of-focus points of light. This is not the way lights are seen in reality, as they tend to much more defined as point sources. However, the proposed lighting has been shown in this way for consistency with the lights in the baseline photographs.

11.6 Information on limitations of visualisations

The photographs and other graphic material such as wirelines and photomontages used in this assessment are for illustrative purposes only and, whilst useful tools in the assessment, are not considered to be completely representative of what has been apparent to the human eye. The assessments are carried out from observations in the field and therefore may include elements that are not visible in the photographs. Limitations of photomontages are set out further below.

The photomontage visualisations of the Proposed Development (and any wind farm proposal) have a number of limitations when using them to form a judgement on visual impact. These include the following:

- a visualisation can never show exactly what the Proposed Development will look like in reality due to factors such as: different lighting, weather and seasonal conditions which vary through time and the resolution of the image;
- the images provided give a reasonable impression of the scale of the WTGs and the distance to the WTGs but can never be 100% accurate;
- a static image cannot convey turbine movement, or flicker or reflection from the sun on the turbine blades as they move;
- the viewpoints illustrated are representative of views in the area, but cannot represent visibility at all locations;
- to form the best impression of the impacts of the Proposed Development proposal these images are best viewed at the viewpoint location shown;
- the images must be printed and viewed at the correct size (260 mm by 820 mm);
- images should be held flat at a comfortable arm's length. If viewing these images on a wall or board at an exhibition, stand at arm's length from the image presented to gain the best impression;
- it is preferable to view printed images rather than view images on screen. Images on screen should be viewed using a normal PC screen with the image enlarged to the full screen height to give a realistic impression; and
- there are practical limitations to shooting viewpoint photographs only in very good or excellent visibility and at particular times of day. The photographs shown in the visualisations show the most favourable weather conditions available during photographic survey work.

Planning conditions are likely to allow the locations of the turbines to be horizontally micro-sited to a small degree and the levels of the turbine bases have not yet been established in detail as this will be determined through site investigations and engineering design. Both of these factors may alter the base and therefore the tip heights of the turbines above ground level from those that are assumed in the assessment and shown on Figures. Such variation may also affect ZTVs.

The EIAR takes into account the potential for turbines to be horizontally micro-sited up to 50 m. While micro-sting might lead to an increase in the base height of turbines and, therefore, the blade tip height, such vertical as well as horizontal movements will be incremental and will not alter the findings of the assessment.

11.7 Technical methodology - visualisations

In accordance with the requirements of Landscape Institute (2019) Technical Guidance Note 06/19 Table A6.1.9 sets out the technical information for the preparation of the visualisations contained in EIA Report Volume 2.

Table A6.1.9: Technical methodology - Visualisations

Category	Details
Photography	
Visualisation type	Type 4 – where survey of viewpoint locations is not required
Camera location	Established via hand-held Garmin GPS
Level of accuracy of location	1-3m (depending on satellites)
Camera	Canon EOS 5D Mark II and Canon EOS 6D Digital SLR. Full-frame (35mm negative size) CMOS sensor.
Lens	50mm fixed f1.4 lens
Tripod	Set to approximately 1.5m. Nodal Ninja panoramic head with Adjust Leveller. Nodal Ninja panoramic head set to take photographs at 20 degree increments
Photography process	Camera used on fully manual settings. Photographs taken in RAW image format. Bracketed exposures are taken for each view and those depicting the clearest images are selected to prepare the panoramic image
Preparation of panoramic photographs	PTGUI v12.8 is used to join and cylindrically project the images. Adobe Photoshop 2021 used to correct tonal alterations and create an even range of exposure across the photographs so that the individual photographs are not apparent. Planar panoramic images are prepared using Resoft Windfarm software or Hugin Panorama Stitcher
3D Model/Visualisations	
Topographic height data	Ordnance Survey Terrain 5 (5m resolution). Ordnance Survey Terrain 50 (50m resolution)
Use of coordinates in software	Coordinates are brought in from the surveyed GPS coordinates. Positions checked using aerial photography.
Markers for horizontal alignment	Existing OWF WTGs and their known coordinates.
Markers for vertical alignment	Existing OWF WTGs and their known coordinates.
Rendering software	Resoft Windfarm v.5.2.5.3 (Wind turbines in wirelines and photomontages). Sketchup or AutoCAD Map 3D 2018 (OSPs, Met Mast and jacket foundations). Autodesk 3ds Max 2018. Visual Nature Studio V 3.10.
Limitations	
Terrain data	There may therefore be local, small-scale landform that is not reflected in the data and subsequently the visualisation but may alter the real visibility of the Proposed Development, either by screening theoretical visibility or revealing parts of the Proposed Development that are not theoretically visible.
Movement	Static images are unable to capture the movement within the view or of the WTGs

12. REFERENCES

Civil Aviation Authority (2016). CAP393: The Air Navigation Order 2016 (SI 2016 No.765).

Civil Aviation Authority (2016) CAP 764: Policy and Guidelines on Wind Turbines.

Civil Aviation Authority, Safety & Airspace Regulation Group (2017). Policy Statement: Lighting of Onshore Wind Turbine Generators in the United Kingdom with a maximum blade tip height at or in excess of 150m Above Ground Level.

Council for the Protection of Rural England (CPRE) (2016). England's Light Pollution and Dark Skies.

Carys Swanwick Department of Landscape University of Sheffield and Land Use Consultants for The Countryside Agency and NatureScot (2002). Landscape Character Assessment Guidance for England and Scotland.

Dumfries & Galloway Council (2020) - Dumfries and Galloway Local Development Plan 2 Supplementary Planning Guidance: Part 1 Wind Energy Development: Development Management Considerations Appendix 'C' - Dumfries and Galloway Wind Farm Landscape Capacity Study.

East Ayrshire Council (2018) – East Ayrshire Landscape Wind Capacity Study.

ICAO (2018). Annex 14 to the Convention on International Civil Aviation - Volume I Aerodrome Design and Operations (ICAO, Eighth Edition).

Institute of Lighting Professionals (2011). Guidance Notes for the Reduction of Obtrusive Light (GN01:2011).

Institute of Lighting Professionals (2019). Night-time Photography.

Landscape Institute with the Institute of Environmental Management and Assessment (2013). Guidelines for Landscape and Visual Impact Assessment, Third Edition (GLVIA3).

Landscape Institute (2019). Technical Guidance Note 2/19 Residential Visual Amenity Assessment.

Landscape Institute (2019). Visual representation of Development Proposals: Landscape Institute Technical Guidance Note 06/19.

NatureScot (2021). Assessing the Cumulative Impact of Onshore Wind Energy Developments.

NatureScot (2020). Assessing impacts on Wild Land Areas - Technical Guidance.

NatureScot (2017) Siting and Designing Wind Farms in the Landscape Version 3a.

NatureScot (2017). Visual Representation of Wind Farms, Version 2.2.

South Lanarkshire Council (2016) – South Lanarkshire Landscape Capacity Study for Wind Energy.

ERM has over 160 offices across more 40 countries and territories worldwide

ERM's Edinburgh Office
6th Floor
102 West Port
EH3 9DN Edinburgh

T: +44 (0)20 3206 5200
F: +44 (0)20 3206 5440

www.erm.com

The business of sustainability

ERM