

Appendix 6.1: Methodology for Landscape and Visual Impact Assessment

This page is intentionally blank.

Appendix 6.1 Methodology for LVIA

Introduction

This methodology has been prepared by chartered landscape architects at Optimised Environments Ltd (OPEN) and describes in detail the methodology that has been used to carry out the Landscape and Visual Impact Assessment (LVIA). The LVIA identifies and assesses the significance of changes resulting from the Proposed Development on landscape elements, on landscape character and on people's views and visual amenity.

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 Scottish Natural Heritage (2002). Landscape Character Assessment Guidance for England and Scotland;
- Scottish Natural Heritage (2012) Assessing the Cumulative Impact of Onshore Wind Energy Developments;
- Scottish Natural Heritage (2017) Siting and Designing Wind Farms in the Landscape Version 3a;
- Scottish Natural Heritage (2017). Visual Representation of Wind Farms, Version 2.2;
- Landscape Institute (2019). Visual representation of Development Proposals: Landscape Institute Technical Guidance Note 06/19; and
- Landscape Institute (2019). Residential Visual Amenity Assessment (RVAA) Technical Guidance Note 2/19.

GLVIA3

OPEN's LVIA methodology accords with the guidance set out in the 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 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 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 as short, medium or long-term and temporary or permanent. They 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.

Information and data sources

The assessment is initiated through a desk study of the site 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 (WLAs), operational and potential cumulative wind farms, and views from settlements and routes, including roads, railway lines, National Cycle Routes and long distance walking routes.

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

Settlements within the study area are identified using information presented in the Orkney Local Development Plan (2017) and The Caithness and Sutherland Local Development Plan (2018).

Landscape characterisation information and data has been obtained from the SNH website.

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 SNH, 2017).

The rationale for the LVIA study area is explained in full in Section 6.5 of Chapter 6 of the EIA Report and shown in Figure 6.1. A 40 km search area is defined for consideration of potential receptors and cumulative wind farms, which has been considered appropriate for this LVIA.

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.

Types of Landscape and Visual Effects

The LVIA is intended to determine any likely significant 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 effects, each of which is briefly described as follows.

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 alteration to ground cover or removal of trees. This category of effects is made up of landscape elements, which are the components of the landscape, such as agricultural land or trees, 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/units and landscape designations.

Assessment of effects on visual amenity

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).
- 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.

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.

Baseline operational and under construction cumulative wind farms are taken into consideration in the solus assessment and cumulative assessment of the Proposed Development, as presented in Sections 6.12 and 6.13.

Consented and application-stage wind farms are considered in the cumulative assessment, presented also in Sections 6.12 and 6.13, along with operational and under construction wind farms.

Significance of effects

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 Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (the EIA Regulations) the LVIA effects are assessed to be either significant or not significant and does not define intermediate levels of significance as the Regulations do not provide for these.

The significance of effects is assessed through a combination of two considerations: the sensitivity to change of the landscape element, landscape character receptor or visual receptor; and the magnitude of change that would result from the Proposed Development.

OPEN's methodology requires the application of reasoned professional judgement in accordance with the Landscape Institute's GLVIA3. Although OPEN's methodology and judgement it is not reliant on the use of a matrix, the following matrix (Table 1) has been included to illustrate how combinations of the ratings for sensitivity and magnitude of change can give rise to significant effects, as well as to give an understanding of the threshold at which significant effects may arise.

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; as either short, medium or long-term and as temporary or permanent. They are

considered as part of the drawing together of 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.

Table A6.1.1 – Assessment of significance matrix

Magnitude: Sensitivity:	High	Medium - high	Medium	Medium - low	Low	Negligible or no change
High	Significant	Significant	Significant	Significant or not significant	Not significant	Not significant
Medium - high	Significant	Significant	Significant or not significant	Significant or not significant	Not significant	Not significant
Medium	Significant	Significant or not significant	Significant or not significant	Not significant	Not significant	Not significant
Medium - low	Significant or not significant	Significant or not significant	Not significant	Not significant	Not significant	Not significant
Low	Significant or not significant	Not significant	Not significant	Not significant	Not significant	Not significant

Effects that are assessed within the dark grey boxes in the matrix are assessed to be significant in terms of the requirements of the EIA Regulations. Those effects that are assessed within the light grey boxes may be significant, or not significant, depending on the specific factors and effect that is assessed in respect of a particular landscape or visual receptor. Those effects that are assessed within the white boxes are not significant. Experienced professional judgement is applied to the assessment of all effects and reasoned justification is presented in respect of the findings in each case.

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 wind farms 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.

Assessment of 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).

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 alteration to ground cover or removal of trees. 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.

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.

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
- No change, 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.

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.

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.

Landscape Baseline

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 scope 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 wind farms 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.

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.

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.

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, 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 high 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.

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.

Magnitude of Change on Landscape Character Receptors

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.

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:

- 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;
- 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;

- The degree to which landscape character receptors would be changed by the addition of the Proposed Development in place of or in addition to baseline wind energy developments that are already present in the landscape. If the Development is located in a landscape receptor that is already affected by wind energy development, this may reduce the magnitude of change, particularly if there is a high level of integration and the developments form a unified and cohesive feature in the landscape. The converse could also be applicable;
- The landscape context in which the Proposed Development and other wind energy development are located. If the Proposed Development is located in a similar landscape context, the magnitude of change is likely to be lower as they relate consistently to key landscape characteristics. If developments are located in different landscape settings, this can lead to a perception that wind energy development is unplanned and uncoordinated, affecting a wide range of landscape characters and blurring the distinction between them;
- The scale of the landscape, landform and patterns of the landscape. A large-scale landscape can provide a more appropriate receiving environment than a more intimate, small-scale setting where development may result in uncomfortable scale comparisons and increase the magnitude of change;
- The distance between the landscape character receptor and the Proposed Development. Generally, the greater the distance, the lower the scale of change as the Development would constitute a less apparent influence on the landscape character; and
- The extent of the Proposed Development that would be seen from the landscape receptor. Visibility of the Proposed Development may range from one turbine blade tip to all of the turbines, and generally the greater the extent of the Proposed Development that can be seen, the greater the change.

Geographical Extent

The geographic 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.

Duration and Reversibility

The duration and reversibility of landscape effects are based on the period over which the Proposed Development is likely to exist and the extent to which the Proposed Development would be removed, and its effects reversed at the end of that period. Duration and reversibility are not incorporated into the overall magnitude of change and are stated separately in relation to the assessed effects.

Magnitude of Change Rating

An overall assessment of the magnitude of change resulting from the Proposed Development on the landscape receptor is made by combining the assessments of size or scale of change and geographical extent. The basis for the assessment of magnitude for each receptor is made clear using evidence and professional judgement. The levels of magnitude of change that can occur are defined as follows:

- High; the Proposed Development would result in a major alteration to the baseline characteristics of the landscape, providing the prevailing influence and/or introducing elements that are uncharacteristic in the receiving landscape;
- Medium; the Proposed Development would result in a moderate alteration to the baseline characteristics of the landscape, providing a readily apparent influence and/or introducing elements potentially uncharacteristic in the receiving landscape;
- Low; the Proposed Development would result in a minor alteration to the baseline characteristics of the landscape, providing a slightly apparent influence and/or introducing elements that are characteristic in the receiving landscape;
- Negligible; the Proposed Development would result in a negligible alteration to the baseline characteristics of the landscape, providing a barely discernible influence and/or introducing elements that are substantially characteristic in the receiving landscape; and
- None; the Proposed Development would result in no change to the baseline characteristics of the landscape.

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

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 1 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 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.

Assessment of Visual Effects

The assessment of visual effects is an assessment of how the introduction of the Proposed Development would affect the views available to people and their visual amenity during daylight hours. 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 objective of the assessment of effects on visual receptors is to determine what the likely effects of the Proposed Development would be on the people experiencing views across the study area, and whether these effects would be significant or not significant. The methodology for the assessment of visual effects involves the undertaking of a baseline study, evaluation of sensitivity, magnitude of change and an assessment of significance.

Visual Baseline and Scope 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 ZTV.

An overview of the visual baseline is described and a scope 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 or 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 or 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 wind farms 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.

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.

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.

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.

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.

Magnitude of Change on Views

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.

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:

- 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;
- 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;
- 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 wind farm or it may appear close to or as an extension to an existing wind farm and its scale of change is assessed in the context of these existing views;
- The field of view available and the proportion of the view that is affected by the Proposed Development. Generally, the more of a 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 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;

- 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 Development;
- 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 wind farm developments in the views, as they are more likely to appear as relatively simple and logical components of the landscape;
- The uniformity of appearance of the Proposed Development in different views. If the Proposed Development appears relatively uniform and consistent in appearance from different viewpoints and viewing angles, in a similar setting and familiar form, this tends to reduce the magnitude of change. If, on the other hand, it appears inconsistent in image, scale and appearance, or from a variety of different angles, and is seen in a different form and setting, the magnitude of change is likely to be higher as it would be a variable and less familiar component of views;
- The extent of the wind energy developed skyline. If the Proposed Development would add notably to the wind energy developed skyline in a view, extending the lateral spread of development or increasing the perceived connection between other wind farms, the magnitude of change would tend to be higher;
- 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 magnitude of change would be, whereas an extension to an existing wind farm would tend to result in a lower magnitude of change than a separate, new wind farm; and
- The scale and form comparison between developments. If the Proposed Development is of a similar scale and form to other visible developments, particularly those seen in closest proximity to it, the 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.

Geographical Extent

The geographic area over which the visual effects would be experienced is also assessed, which is distinct from the size or scale of effect. 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 the Proposed Development from visual receptors, to assess the geographical extent of the receptor that would be affected, based on the following criteria:

- The extent of the visual receptor (a road, footpath or settlement for example) that would experience changes through visibility of the Proposed Development;
- If the Proposed Development is visible from extensive areas, the overall change is likely to be higher than if it is visible from a limited part of a receptor; and
- The extent to which the change would affect views, whether this is unique to a particular viewpoint or if similar visual changes occur over a wider area represented by the viewpoint.

Magnitude of Change Rating

An overall assessment of the magnitude of change resulting from the Proposed Development on each visual receptor is made by combining the assessment of size or scale and geographical extent. The basis of the assessment is made clear using evidence and professional judgement. The levels of magnitude of change that can occur on views are defined as follows:

- High, the Proposed Development would result in a major alteration to the baseline view, providing the prevailing influence and/or introducing elements that are substantially uncharacteristic in the receiving view;
- Medium, the Proposed Development would result in a moderate alteration to the baseline view, providing a readily apparent influence and/or introducing elements potentially uncharacteristic in the receiving view;
- Low, the Proposed Development would result in a minor alteration to the baseline view, providing a slightly apparent influence and/or introducing elements that are characteristic in the receiving view;
- Negligible, the Proposed Development would result in a negligible alteration to the baseline view, providing a barely discernible influence and/or introducing elements that are substantially characteristic in the receiving view; and
- None, the Proposed Development would in no change to the baseline characteristics of the view.

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

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 1 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 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.

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.

Nature of 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 wind farms are difficult to categorise in either of these brackets as, unlike other disciplines, there are no definitive criteria by which the effects of wind farms 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 wind farm 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.

In this assessment, all landscape and visual effects are considered to be adverse unless otherwise stated.

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; and
- 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 fundamentally reversible, in that the wind turbines and infrastructure can be removed and their effects largely reversed at the end of the operational period, however, there is no proposal to limit the lifetime of the Proposed Development, therefore the assessment considers the operational effects of the Proposed Development without time limitation and to be operational in perpetuity. The effect of the operation of the Proposed Development is therefore assessed as permanent and long-term in this LVIA.

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.

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 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.

Assessment of Cumulative Landscape and Visual Effects

Introduction

Assessment of cumulative effects is required by the European EIA Directive and by the associated 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 Proposed 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."*

SNH's guidance, 'Assessing the Cumulative Impact of Onshore Wind Energy Developments' (SNH, 2012) 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.

The guidance defines the following types of cumulative effects:

- cumulative landscape effects are those effects that 'can impact on either the physical fabric or character of the landscape, or any special values attached to it' (SNH, 2012, p10); and
- cumulative visual effects are those effects that can be caused by combined visibility, which 'occurs where the observer is able to see two or more developments from one viewpoint' and/or sequential effects which 'occur when the observer has to move to another viewpoint to see different developments' (SNH, 2012, p11).

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

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

Scope of the Cumulative Assessment

The purpose of the Cumulative Landscape and Visual Impact Assessment (CLVIA) *"is to describe, visually represent and assess the ways in which a Proposed Development would have additional impacts when considered in addition to other existing, under construction, consented or Proposed Developments. It should identify the significant cumulative effects arising from the proposed wind farm."* (SNH, 2012, p12).

In accordance with the aforementioned guidance, the CLVIA 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 50m in height are unlikely to result in significant cumulative effects with the Proposed Development.

A cumulative search area base plan was produced to cover a 40 km radius around the Proposed Development (Figure 6.11). The extent of 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'. Wind farm projects within influencing distance which are assessed in detailed in the CLVIA are listed in the LVIA Chapter and shown in Figure 6.11.

This detailed assessment area for the CLVIA in line with guidance (SNH, 2012, p15) "*At every stage in the process the focus should be on the key cumulative effects which are likely to influence decision making, rather than an assessment of every potential cumulative effect*". The CLVIA focuses on identifying cumulative effects which are likely to be a key consideration in determining the application, rather than an assessment of every potential cumulative effect.

Cumulative ZTVs have been produced for other wind farms, considered as being material to the assessment of particular landscape and visual receptors, and are shown in Figures 6.12 to 6.18. Cumulative wirelines are prepared for all relevant viewpoints to illustrate the Proposed Development in the context of other wind energy developments, with all developments within the LVIA study area shown in the wirelines.

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 set a cut-off date when the sites and layouts to be included are fixed. The CLVIA includes operational, consented and application stage wind energy developments as of 15th September 2020. Any changes in the cumulative situation after this date are not incorporated in the assessment.

In terms of the timescale of proposals for inclusion both SNH 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. There may be specific occasions where the inclusion of such scoping stage schemes is considered to be necessary by the statutory consultees, however this has not been considered necessary in this LVIA.

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*".

There will be potential for cumulative impacts to arise with the existing baseline of operational and under-construction wind farms. The LVIA in Sections 6.12 and 6.13 assesses both the project alone impact of the Proposed Development, and its impact cumulatively with the existing baseline of operational and under-construction wind farms. These effects are assessed on a receptor by receptor basis, with the presence of certain operational and under-construction wind farms having the potential to influence the assessment of effects on particular landscape and visual receptors, to a greater or lesser degree, depending on the interaction between the Proposed Development, these other wind farms and the particular receptor.

While the baseline presented in the LVIA would be altered by the introduction of further wind farms, the cumulative map in Figure 6.11, combined with the cumulative ZTVs in Figures 6.12 to 6.18, and the cumulative wirelines in Figures 6.19 to 6.29, together illustrate the very limited influence of any consented or application wind farms. The potential for cumulative effects in respect of consented and application wind farms is, nonetheless, covered in Sections 6.12 and 6.13 of the LVIA chapter.

Pre-application stage wind farms are identified as part of the cumulative search but are not assessed in any detail due to the difficulty in gathering information, the likelihood of scoping stage layouts being changed during the EIA process or pre-application schemes not ultimately being submitted as planning applications.

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. The CLVIA does not examine the total effect arising from a number of developments, but considers the additional incremental effect resulting from the Proposed Development in addition to other 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.

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. In accordance with guidance (SNH, 2012), the LVIA for each receptor assesses the effect arising from the addition of the Proposed Development to the cumulative situation, and not the overall or combined effect of all wind farms on the landscape resource.

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 or other relevant development influence, an evaluation of sensitivity, magnitude of change and the resulting significance of cumulative effects.

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.

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 or 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 wind farm/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 wind farm 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.

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 addition to 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 wind farms 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 wind farm 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 wind farm development, wind farms 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 wind farm, or the overlapping of several wind farms 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 wind farms/developments and/or an increase in the number of wind farms/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 wind farm 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 wind farm 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.

In accordance with guidance (SNH, 2012), the LVIA for each receptor assesses the effect arising from the addition of the Proposed Development to the cumulative situation, and not the overall or combined effect of all wind farms on the landscape and visual resource. 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 the conclusions of the LVIA.

Visual Representations

Zone of Theoretical Visibility (ZTV)

The ZTV has been generated using Geographic Information System (GIS) software (ESRI ArcGIS Version 10.7.1) to demonstrate the number of turbines that may theoretically be seen from any point in the study area. The ZTVs, show the number of turbines (blade tips) that are theoretically visible around the study area (based on the maximum blade tip heights as described in Chapter 3). The Hub Height ZTVs, show the number of turbine hubs theoretically visible in the study area (hub heights are derived from the maximum turbine rotor dimension listed for maximum blade tip heights in Chapter 3). When used in conjunction with the Blade Tip ZTV, the Hub Height ZTV provides an indication of the degree to which the wind turbines may be visible.

There are limitations in this theoretical production, and these should be considered in the interpretation and use of the ZTV:

- the ZTV illustrates the 'bare ground' situation, and does not take into account the screening effects of vegetation, buildings, or other local features that may prevent or reduce visibility;

- the ZTVs are based on theoretical visibility from 2m above ground level;
- the 45 km ZTVs are based on a 50 m data grid (Ordnance Survey (OS) Digital Terrain Model (DTM)) and the 15 km ZTVs are based on 5 m data grid (OS Terrain 5), therefore relatively small changes in elevation may not be accounted for;
- the Blade Tip ZTV does not indicate the decrease in visibility that occurs with increased distance from the Proposed Development. The nature of what is visible from 3 km away would 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; and
- 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 large numbers of turbines may gain views of the smallest extremity of blade tips, or of many full turbines. This can make a considerable difference in the effects of the Proposed Development on that area. The Hub Height ZTV should be used in conjunction with the Blade Tip ZTV to provide an indication of the degree to which the wind turbines are visible.

These limitations mean that while the ZTV is used as a starting point in the assessment, providing an indication of where the Proposed Development would theoretically be visible, the information drawn from the ZTV is checked in the field, to ensure that the assessment conclusions represent the visibility of the Proposed Development reasonably accurately.

Visualisations

The viewpoint assessment is illustrated by a range of visualisations, including photographs and photomontages, which accord with SNH's Visual Representation of Wind Farms Version 2.2 (SNH, 2017). Visualisations of wind farms have a number of limitations when using them to form a judgement on a wind farm proposal. These include:

- a visualisation can never show exactly what the wind farm would 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 turbines and the distance to the turbines, 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 wind farm proposal these images are best viewed at the viewpoint location shown; and
- the visualisations must be printed at the correct size to be viewed properly.

The photographs used to produce the photomontages have been taken using Canon EOS 5D and 6D Digital SLR cameras, with a fixed lens and a full-frame (35 mm negative size) CMOS sensor. The photographs are taken on a tripod with a pano-head at a height of approximately 1.5 m above ground.

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 would 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 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. In some views, more than one 53.5 degree field of view panorama is prepared, in order to accommodate the full width of the Proposed Development.

Wireline representations that illustrate the Proposed Development model set within a computer-generated image of the landform are used in the assessment to predict the theoretical appearance of the turbines. These are produced with Resoft Wind farm software and are based on a terrain model with a combination of OS Terrain 50 and OS terrain 5 (Figures 6.19 – 6.29). There are limitations in the accuracy of DTM data so that landform may not be picked up precisely and may result in turbines 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 turbines visible this refers to the illustrations generated and therefore the reality may differ to a degree from these impressions.

Photomontages have been produced for all views, again using Resoft Wind farm software, to provide a more realistic image of the appearance of the Proposed Development. In most views these include the introduction of the turbines only as these are the elements that create the greatest change in views and are likely to be most visible from the surrounding area. Where there is notable visibility of Site infrastructure and where practical, this is shown in the photomontages and is generated using a combination of 3D software such as Topos, Visual Nature Studio, Sketchup and 3D Studio Max.

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 SNH guidance. These are cylindrically projected images and should be viewed flat at a comfortable arm's length.

The 53.5 degree field of view wirelines and photomontage 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 turbines are shown with the central turbines facing the viewer directly, with the full rotor diameter visible at its tallest extent. In the photomontages, the turbine rotors are shown with a random appearance with the central turbines facing the viewer directly.

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 would be 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.

References

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 Scottish Natural Heritage (2002). Landscape Character Assessment Guidance for England and Scotland;

Scottish Natural Heritage (2012) Assessing the Cumulative Impact of Onshore Wind Energy Developments;

Scottish Natural Heritage (2017) Siting and Designing Wind Farms in the Landscape Version 3a;

Scottish Natural Heritage (2017). Visual Representation of Wind Farms, Version 2.2;

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

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