



# Rigged Hill Windfarm Repowering

Technical Appendix A6.1: Landscape and  
Visual Impact Assessment Methodology

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# 1 Landscape and Visual Impact Assessment Methodology

## 1.1 Introduction

1. This Technical Appendix describes in detail the methodology that has been used to carry out the Landscape and Visual Impact Assessment (LVIA) for the proposed Rigged Hill Windfarm Repowering, the 'Development'. The LVIA identifies and assesses the effects that the Development would have on the landscape and visual resource of the 30 km radius Study Area as set out in **Chapter 6** of Volume 1 of the Environmental Impact Assessment Report (EIA Report).

2. Some of the guidance used to inform this assessment, although developed by Scottish Natural Heritage (SNH) for Scotland has become best practice across the UK and where relevant its use has been agreed through the Scoping process.

## 1.2 Categories of Effects

3. For the purpose of assessment, the potential effects on the landscape and visual resource are grouped into four categories.

4. **Physical effects:** are restricted to the area within the Site Boundary and are the direct effects on the existing fabric of the Site, such as alteration to ground cover. This category of effects is made up of landscape elements, which are the components of the landscape such as rough grass moorland that may be directly and physically affected by the Development.

5. **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 physically alter this pattern of elements, or through visibility of the Development, which may alter the way in which the pattern of elements is perceived. This category of effects is made up of landscape character receptors, which fall into two groups: landscape character types and landscape-related designated areas.

6. **Effects on views:** the assessment of effects on views is an assessment of how the introduction of the Development would affect views throughout the Study Area. The assessment of effects on views is carried out in two parts:

- An assessment of the effects that the Development would have on a series of viewpoints around the Study Area; and
- An assessment of the effects that the Development would have on views from principal visual receptors, which are relevant settlements, routes and tourism features found throughout the Study Area.

7. **Cumulative effects:** arise where the Study Areas for two or more windfarms (or in some cases other relevant development) overlap so that both of the windfarms are experienced at a proximity where they may have a greater incremental effect, or where windfarms may combine to have a sequential effect. In accordance with guidance (SNH, 2012), the LVIA assesses the effect arising from the addition of the Development to the cumulative situation, and not the overall effect of multiple windfarms.

## 1.3 Assessment of Effects

8. The objective of the assessment of the Development is to predict the likely significant effects on the landscape and visual resource. In accordance with the Environmental Impact Assessment (Northern Ireland) Regulations 2017, landscape and visual effects are assessed to be either significant or not significant. The LVIA does not define intermediate levels of significance as the EIA Regulations do not provide for these.

9. The broad principles used in the assessment of the significance of effects on the four relevant categories listed above are the same and are described below. The detailed methodology for the assessment of significance does, however, vary for each category, and the specific criteria used are described in the following sections of this Appendix.

10. 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.

11. GLVIA 3 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.

12. OPEN considers that the process of combining all three considerations in one rating can distort the aim of identifying significant effects of windfarm development. For example, an increased magnitude of change, based on size or scale, may be reduced to a lower rating if it occurred in a localised area and for a short duration. This might mean that a potentially significant effect would be overlooked if effects are diluted down due to their geographical extents and/or duration or reversibility.

13. OPEN has chosen to keep these three considerations separate, by basing the magnitude of change on size or scale to determine where significant and not significant impacts occur, and then describing the geographical extents of these impacts and their duration and reversibility separately.

14. The significance of effect is assessed through a combination of two considerations; the sensitivity of the landscape receptor or view (baseline) and the magnitude of change that would result from the addition of the Development. The way that these two criteria are combined to result in a significant or not significant effect is shown in Table A6.1.

15. Sensitivity is an expression of the ability of the baseline landscape receptor or view to accommodate the Development. Sensitivity is determined through a combination of the value of the receptor and its susceptibility to the Development.

16. Magnitude of change is an expression of the extent of the effect on landscape receptors and views that would result from the introduction of the Development. The magnitude of change is assessed in terms of a number of variables, including the size and scale of the impact. An assessment is also made of the geographical extent of the area over which this change would occur.

17. The variables that interact to determine the levels of the sensitivity and magnitude differ depending on the receptors being assessed. These variables are set out in the following sections.

## 1.4 Assessing Significance of Effects

18. The significance of effects is assessed through a combination of the sensitivity of the landscape receptor or view and the magnitude of change that would result from the addition of the Development. While this methodology is not reliant on the use of a matrix to arrive at the conclusion of a significant or not significant effect, a matrix is included in Table A6.1 below to illustrate how combinations of sensitivity and magnitude of change ratings can give rise to significant effects. The matrix also gives an understanding of the threshold at which significant effects may arise.

**Table A6.1: Significance Matrix**

Magnitude	High	Medium-High	Medium	Medium-Low	Low	Negligible
Sensitivity						
High	Significant	Significant	Significant	Significant / Not Significant	Not Significant	Not Significant
Medium-High	Significant	Significant	Significant / Not Significant	Significant / Not Significant	Not Significant	Not Significant
Medium	Significant	Significant / Not Significant	Significant / Not Significant	Not Significant	Not Significant	Not Significant
Medium-Low	Significant / Not Significant	Significant / Not Significant	Not Significant	Not significant	Not Significant	Not Significant
Low	Significant / Not Significant	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant

19. Effects within the green boxes in the matrix are considered to be significant. Effects within the grey boxes may be significant or not significant depending on the specific relevant factors that arise at a particular landscape or visual receptor. In accordance with GLVIA3, experienced professional judgement is applied to the assessment of all effects and reasoned justification is presented in respect of the findings of each case.

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

21. Significant cumulative landscape and visual effects arise where the addition of the Development to other windfarms leads to windfarms becoming one of the prevailing landscape and visual characteristics.

22. Following this process it is assessed whether such an impact is positive, negative or neutral; whether it is permanent or reversible; long, medium or short term; and over what geographical extent this may occur.

### 1.5 Assessment of Physical Landscape Effects

23. Physical effects are the direct effects on the fabric of the Site such as the removal or alteration to ground cover and are restricted to the area of the Site. The objective of the assessment of physical effects is to determine 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 upon them, are described below.

#### 1.5.1.1 Sensitivity of Landscape Elements

24. The sensitivity of a landscape element is an expression of its ability to accommodate the Development. This is dependent on the value of the landscape element and its susceptibility to the change that would arise from the addition of the Development.

25. 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 a historic landscape layout, for example, its value is likely to be increased.

26. 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.

27. The sensitivity of each receptor is a product of the specific combination of value and susceptibility to the Development as evaluated by professional judgement. The evaluation of sensitivity is described for each receptor in the assessment, and the levels of sensitivity - high, medium or low - are applied. Interim levels of sensitivity – medium to high and medium to low - may also be applied where appropriate for the combination of value and susceptibility.

#### 1.5.1.2 Magnitude of Change on Landscape Elements

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

- High, where the Development would result in the complete removal of a landscape element or substantial alteration to a key landscape element;
- Medium, where the Development would result in the removal of a notable part of a landscape element or a notable alteration to a key landscape element;
- Low, where the Development would result in the removal of a minor part of a landscape element or a minor alteration to a key landscape element; and
- Negligible or None, where the alteration to the landscape element is barely discernible or non-existent.

29. There may also be intermediate levels of magnitude of change – medium to high and medium to low - where the change falls between two of the definitions.

### 1.5.2 Significance of Effects on Landscape Elements

30. 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. A significant effect would occur where the degree of removal or alteration of the landscape element is such that the form of the element would be redefined. If the landscape element is of a high sensitivity, a significant effect can occur with a relatively 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 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.

### 1.6 Assessment of Effects on Landscape Character

31. 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. Establishing the landscape baseline will, when reviewed alongside the description of the Development, form the basis for the identification and description of the landscape effects of the Development. The baseline description of the landscape that may be affected is primarily determined by the physical footprint of the Development and its Zone of Theoretical Visibility (ZTV).

32. An overview of the landscape baseline is described in the LVIA. A preliminary assessment identified landscape receptors that may experience significant effects, which require to be assessed in full and this was agreed through the Scoping process. A detailed description of the baseline is provided for each landscape receptor that may experience significant effects. 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.

33. The baseline study of each landscape character receptor collates and presents information relevant to the assessment drawn from a combination of desk study and field-work. The baseline study utilises descriptions of landscape character receptors from the relevant published landscape character assessments and citations in respect of some of the landscape designations. Field work has also been undertaken to verify the documented landscape character area descriptions and boundaries. The key characteristics and value of each relevant landscape receptor are set out, covering key features and patterns of the landform, land-cover and land-use which make the landscape of these areas distinctive.

34. 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 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 Development are assessed within this context in the assessment of landscape and visual effects.

35. Effects on landscape character arise through the introduction of new elements that physically alter this pattern of elements, the removal of characterising elements, or through visibility of the Development, which may alter the way in which the pattern of elements is perceived. This category of effects is considered in detail in relation to two types of landscape character receptor; landscape character areas and designated areas.

36. The objective of the assessment of effects on landscape character is to determine which receptors would be affected by the Development, and whether these effects would be significant or not significant. The assessment of effects on landscape character involves an evaluation of sensitivity and magnitude of change, and the resultant assessment of significance.

#### 1.6.1 Sensitivity of Landscape Character Receptors

37. The sensitivity of a landscape character receptor is an expression of its ability to accommodate the Development as part of its own character or as part of the visual setting or context to the character receptor. This is dependent on the value of the landscape receptor and its susceptibility to change.

##### 1.6.1.1 Value of Landscape Character Receptors

38. 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 to high, medium, medium to 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 a recognised landscape-related planning designation will generally have an 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; and

- **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.

#### 1.6.1.2 Susceptibility to Change of Landscape Character Receptors

39. 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 Development. The assessment of the susceptibility of the landscape receptor to change is classified as high, medium to high, medium, medium to low, or low and the basis for this assessment is made clear using evidence and professional judgement, based on the following criteria:

40. The specific nature of the Development: the susceptibility of landscape receptors is specific to the change arising from the particular development that is proposed, including its individual components and features, and its size, scale, location, context and characteristics;

- **Landscape character:** the key characteristics of the existing landscape character of the receptor are considered in the evaluation of susceptibility as they determine the degree to which the receptor may accommodate the influence of the Development. For example, a landscape that is of a particularly wild and remote character may have a high susceptibility to the influence of the Development due to the contrast that it would have with the landscape, whereas a developed 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 Development; and
- **Landscape association:** the extent to which the Development would influence the character of the landscape receptors across the Study Area also relates to the associations that exist between the landscape within which the Development is located and the landscape receptor from which the Development is being experienced. This association would be most important where the landscapes are directly related; for example, if the Development is located in an upland landscape that has a strong enclosing influence on an adjacent valley landscape. Elsewhere, the association may be less important; for example, where the Development lies inland of a coastal landscape that has its main focus outwards over the sea.

#### 1.6.1.3 Levels of Sensitivity

41. The sensitivity of each receptor is a product of the specific combination of value and susceptibility to the Development as evaluated by professional judgement. The sensitivity of the landscape receptor is evaluated as high, medium or low. Interim levels of sensitivity – medium to high and medium to low - may also be applied where appropriate.

#### 1.6.2 Magnitude of Change on Landscape Character Receptors

42. The magnitude of change that the Development would have on landscape receptors is assessed in terms of 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. Duration and reversibility are not incorporated into the overall magnitude of change and are stated separately.

43. The basis for this assessment is made clear using evidence and professional judgement, based on the following criteria. The key elements of the Development that would influence the level of change on landscape character are views of movement, form, material, colour and scale of the turbines, although other infrastructure is also considered.

#### 1.6.2.1 Size or Scale of Change

44. This criterion relates to the size or scale of change to the landscape that would arise as a result of the addition of the 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 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 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 Development with these key characteristics;

- The degree to which landscape character receptors would be changed by the addition of the 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 Development and other wind energy development are located. If the 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 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 Development that would be seen from the landscape receptor. Visibility of the Development may range from one turbine blade tip to all of the turbines, and generally the greater the extent of the Development that can be seen, the greater the change.

#### 1.6.2.2 Geographical Extent

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

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

#### 1.6.2.3 Duration and Reversibility

47. The duration and reversibility of landscape effects are based on the period over which the Development is likely to exist and the extent to which the 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.

#### 1.6.2.4 Levels of Magnitude of Change

48. An assessment of the magnitude of change resulting from the Development on the landscape receptor is made by assessing the size or scale of change. The geographical extent over which this change takes place is also assessed. The basis for the assessment of magnitude for each receptor is made clear using evidence and professional judgement. The magnitude of change is assessed as high, medium, low, negligible or none according to the following definitions:

- High, where the Development would result in a major alteration to the baseline character of the landscape, providing a prevailing influence and/or introducing elements that are substantially uncharacteristic in the receiving landscape;
- Medium, where the Development would result in a moderate alteration to the baseline character of the landscape, providing a readily apparent influence and/or introducing elements that may be prominent but are not uncharacteristic in the receiving landscape;
- Low, where the Development would result in a minor alteration to the baseline character of the landscape, providing a slightly apparent influence and/or introducing elements that are characteristic in the receiving landscape; and
- Negligible or None, where the alteration to landscape character is barely discernible or there would be no change.

49. There may also be intermediate levels of magnitude of change –medium to high and medium to low - where the change falls between two of the definitions.

### 1.6.2.5 Significance of Effects on Landscape Character Receptors

50. The significance of the effect on each landscape character receptor is dependent on the factors that are considered in the sensitivity of the receptor and the magnitude of change upon it. These factors are combined using professional judgement to arrive at an overall assessment as to whether the Development would have a significant or not significant effect on the receptor. The matrix shown in Table A6.1 above is also used to inform the threshold of significance when combining sensitivity and magnitude of change.

51. A significant effect would occur where the combination of the variables results in the Development having a defining effect on the receptor. A not significant effect would occur where the effect of the Development is not definitive and the landscape character of the receptor continues to be characterised principally by its baseline characteristics.

### 1.7 Assessment of Effects on Views

52. The visual baseline establishes the area in which the Development may be visible, the different groups of people who may experience views of the 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 environment that may be significantly affected. The baseline description of the groups of people concentrated within areas (referred to as principal visual receptors), and viewpoints that may be affected, is primarily determined by the ZTV of the Development.

53. An overview of the visual baseline is described and a preliminary assessment, undertaken as part of the Scoping process, identified 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 considered in a preliminary assessment, where effects are scoped out.

54. The assessment of effects on views evaluates how the introduction of the Development would affect views and visual amenity. The assessment of visual effects is carried out in two parts:

- An assessment of the effects that the Development would have on a series of viewpoints around the Study Area; and
- An assessment of the effects that the Development would have on people's views where people tend to be concentrated in relevant settlements and routes found throughout the Study Area.

55. The objective of the assessment of effects on views and visual receptors is to determine what the likely effects of the Development would be on views and visual amenity of people across the Study Area, and whether these effects would be significant or not significant. The assessment of effects on views involves an evaluation of sensitivity and magnitude of change, and the resultant assessment of significance.

#### 1.7.1 Sensitivity of Visual Receptors

56. The sensitivity of views and visual receptors is determined by a combination of the value of the view and the susceptibility of the viewer or visual receptor to the Development.

##### 1.7.1.1 Value of Views

57. The value of a view is a reflection of the recognition and the importance attached formally through identification as a viewpoint on mapping, by signposting or through planning designation; or informally through the value which society attaches to the view. The value of a view is classified as high, medium or low, based on the following factors:

- **Formal recognition:** the value of views can be formally recognised through their identification on maps as formal viewpoints, are signposted and provide facilities to facilitate the enjoyment of the view such as parking, seating and interpretation boards. Specific views may be afforded protection in local planning policy, where they are 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 may be increased if it presents an important vista from a designed landscape or lies within or overlooks a designated area such as an Area of Outstanding Natural Beauty (AONB), which implies a greater value to the visible landscape;
- **Informal recognition:** views that are well-known at a local level or have particular scenic qualities 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; and

- **Scenic quality:** the value of the view is a reflection of the scenic qualities gained in the view. This relates to the content and composition of the landscape, whereby certain patterns and features can increase the scenic quality while others may reduce the scenic quality.

##### 1.7.1.2 Susceptibility to Change

58. Susceptibility relates to the nature of the viewer and how susceptible they are to the potential effects of the Development. This is determined by the nature of the viewer, which is the occupation or activity in which the viewer is engaged at the viewpoint, and is classified as high, medium or low. The most common groups of viewers considered in the visual assessment include residents, road-users, workers and walkers.

59. **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, motorists, people taking part in recreational activity or working. Viewers whose attention is focused on the landscape, or with static long-term views, are likely to have a higher sensitivity. The views of residents tend to be of higher sensitivity due to their static nature and potential for views of long duration whilst viewers travelling in cars or on trains will 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 generally more focussed on their tasks and, therefore, less sensitive to changes in views.

60. **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 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 settlement is aligned directly towards the Development, the experience of the visual receptors would be altered more notably than if the experience relates 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 Development.

##### 1.7.1.3 Levels of Sensitivity

61. The sensitivity of each visual receptor or view is a product of the specific combination of value and susceptibility to the Development as evaluated by professional judgement. The sensitivity of the view or visual receptor is evaluated as high, medium or low by combining the value and susceptibility to change. Interim levels of sensitivity - medium to high and medium to low - may also be applied where appropriate for the combination of value and susceptibility.

#### 1.7.2 Magnitude of Change on Views

62. The magnitude of change on views is an expression of the scale of the change that would result from the Development and is dependent on a number of variables regarding the size or scale of the change. The key elements of the Development that would influence the level of change on views are the movement, form, material, colour and scale of the turbines, although infrastructure is also considered. 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.

##### 1.7.2.1 Size or Scale

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

- The distance between the visual receptor or viewpoint and the Development. Generally, the greater the distance, the lower the magnitude of change, as the Development would constitute a smaller scale component of the view;
- The amount and size of the Development that would be seen. Visibility may range from one blade tip to all of the turbines. Generally, the larger the Development appears in the view, and the more of the 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 Development may appear in a similar part of the view to that which includes the Wind Turbines of Operational Rigged Hill Windfarm or it may appear close to or as an extension to Gruig Windfarm 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 Development. Generally, the more of a view that is affected, the higher the magnitude of change would be. If the 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 Development would not affect the whole open part of the outlook;

- The scale and character of the context within which the 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 Development in relation to other developments. The magnitude of change of the Development is likely to be lower if its Wind Turbine height, arrangement and layout design are broadly similar to other windfarm developments in the views, as they are more likely to appear as relatively simple and logical components of the landscape;
- The uniformity of appearance of the Development in different views. If the 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 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 windfarms, 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 windfarm would tend to result in a lower magnitude of change than a separate, new windfarm; and
- The scale and form comparison between developments. If the 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.

#### 1.7.2.2 Geographical Extent

64. The geographical extent 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 Development and is principally assessed through analysis of the extent of visibility of the Development from visual receptors, in order 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 Development; and
- The extent to which the change affects views, whether this is unique to the viewpoint or if similar changes occur over wide areas represented by the viewpoint.

#### 1.7.2.3 Duration and Reversibility

65. The duration and reversibility of effects on views are based on the period over which the Development would be likely to exist and the extent to which it 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.

#### 1.7.3 Levels of Magnitude of Change

66. An assessment of the magnitude of change resulting from the Development on each visual receptor and viewpoint is made by assessing the size or scale of change. The geographical extent over which this change takes place is also assessed and, where relevant, the duration and reversibility of the effect. The basis of the assessment is made clear using evidence and professional judgement. The magnitude of change is assessed as high, medium, low, negligible or none according to the following definitions:

- High, where the Development would result in a major alteration to the baseline view, providing a prevailing influence and/or introducing elements that are substantially uncharacteristic in the view;
- Medium, where the Development would result in a moderate alteration to the baseline view, providing a readily apparent influence and/or introducing elements that may be prominent but are not uncharacteristic in the view;
- Low, where the 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 view;
- Negligible or None, where the alteration to the view is barely discernible or there is no change.

67. There may also be intermediate levels of magnitude of change –medium to high, medium to low and low to negligible - where the change falls between two of the definitions.

#### 1.7.4 Significance of Effects on Views

68. The significance of the effect on each view or visual receptor is dependent on the factors that are considered in the sensitivity of the view or receptor and the magnitude of change upon it. These factors are combined using professional judgement to arrive at an overall assessment as to whether the Development would have a significant or not significant effect on the view or visual receptor. The matrix shown in Table A6.1 above is also used to inform the threshold of significance when combining sensitivity and magnitude of change.

69. A significant effect would occur where the combination of the variables results in the Development having a defining effect on the view or visual receptor. A not significant effect would occur where the effect of the Development is not definitive and the view continues to be characterised principally by its baseline characteristics. In this instance, a not significant effect would indicate that the Development may have an influence on the view, but this influence would not be a defining one.

70. 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 Development would vary greatly depending upon a number of factors.

#### 1.8 Assessment of Cumulative Effects

71. Cumulative effects are the incremental effects that arise through the interaction of two or more developments within the landscape and visual baseline context. Cumulative effects arise where the Study Areas for two or more wind energy developments (or other relevant developments) overlap so that both are experienced at a 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. The cumulative effect assessed is that which would arise from the addition of the Development to the predicted cumulative situation, and not the overall effect of multiple windfarms.

#### 1.8.1 Types of Cumulative Effect

72. Cumulative effects on landscape character arise when the influence of two or more windfarms becomes a prevailing characteristic of a landscape or visual receptor. This can occur to varying extents, as described from **Section 1.8.2** of this Appendix.

73. Cumulative effects on views consist of combined visibility 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 windfarms 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 windfarms. Sequential effects occur when the observer has to move to another viewpoint to see different developments, and may arise assessed on roads, cycle paths, railway lines and footpaths. Such effects may be frequently sequential or occasionally sequential depending on the time lapses between instances of visibility.

74. The significance of cumulative effects is determined through a combination of the sensitivity of the landscape receptor or visual receptor and the cumulative magnitude of change arising from the addition of the Development. The sensitivity of landscape receptors and visual receptors is taken from the main assessment, while the cumulative magnitude of change is evaluated according to additional criteria, described below.

#### 1.8.2 Cumulative Magnitude of Change

75. 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 Development to or in combination with windfarm developments that are already operational/under construction, consented or at application stage. The cumulative magnitude of change is assessed based on a number of criteria, as follows:

- The location of the Development in relation to other windfarm developments. If the Development is seen in a part of the view or setting to a landscape receptor that is not affected by other windfarm development, this would generally increase the cumulative magnitude of change as it would extend windfarm influence into an area that is currently unaffected. Conversely, if the Development is seen in the context of other sites or is a repowering of an operational windfarm, the cumulative magnitude of change may be lower as windfarm influence is not being extended to otherwise undeveloped

parts of the outlook or setting. This is particularly true where the scale and layout of the Development is similar to that of the other sites as where there is a high level of integration and cohesion with an existing windfarm site the various developments may appear as a single site;

- The extent of the developed skyline. If the 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 windfarm 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 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 windfarm developments. If the Development is of a similar scale to other visible windfarms, 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 Development in relation to other windfarm developments. The cumulative magnitude of change of the Development is likely to be lower if its turbine height, arrangement and layout design are broadly similar to other windfarms in the landscape, as they are more likely to appear as relatively simple and logical components of the landscape;
- The context in which the windfarm 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 windfarm development is unplanned and un-coordinated, affecting a wide range of landscape characters and blurring the distinction between them; and
- The magnitude of change of the 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 Development itself is assessed to have a negligible or no magnitude of change on a view or receptor there would not be a cumulative effect as the contribution of the Development would equate to the 'no change' situation.

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

- High, the addition of the Development to other wind energy developments in the landscape or view would result in a major change to the cumulative windfarm situation;
- Medium, the addition of the Development to other wind energy developments in the landscape or view would result in a moderate change to the cumulative windfarm situation;
- Low, the addition of the Development to other wind energy developments in the landscape or view would result in a minor change to the cumulative situation;
- Negligible, where the alteration to the cumulative situation is barely discernible; and
- None, where there would be 'no change'.

77. There may also be intermediate levels of cumulative magnitude of change –medium to high, medium to low and low-negligible - where the change falls between two of the definitions.

### 1.8.3 Significance of Cumulative Effects

78. Significant cumulative landscape and visual effects arise where windfarms become a principal characteristic of the landscape or view as a result of the addition of the Development to other existing, under construction, consented or proposed windfarms, which results in Wind Turbines becoming so prolific that they become a prevailing landscape and visual characteristic. The creation of a landscape defined by windfarms may evolve as follows:

- A small-scale, single windfarm would often be perceived as a new or 'one-off' feature or landmark within the landscape. Except at a local site level, it would not usually change the overall existing landscape character, or become a new characteristic element of a wider landscape;
- With the addition of further windfarm development, windfarms can become a characteristic element of the landscape, as the windfarms appear as repeated landscape elements. Providing there is sufficient separation, physically, visually and perceptually, between each development, coalescence is avoided and the windfarms are likely to appear as a series of windfarms within the landscape, without becoming the dominant or defining characteristic of the landscape; and

- The next stage is to consider larger commercial windfarms or an increase in the number of windfarms that appear to physically, visually and perceptually coalesce. This may lead to a 'windfarm landscape' where multiple windfarms are one of the prevailing or defining characteristics of the landscape. A windfarm characterised landscape may already exist as part of the baseline landscape or visual context.

79. In this context, the addition of the Development may lead to the final step of one of the key characteristics of a landscape or view being the presence of windfarms, so that other patterns and components are no longer definitive and, in some cases, to transform it into a different landscape type. In this case, the cumulative effect would be assessed as significant. In some cases, significant cumulative effects may arise where the Development lies in close proximity to other developments, but with notable differences between them in terms of scale and setting, thus increasing the cumulative magnitude of change. However, provided that the Development is designed to achieve a high level of visual integration with adjacent or nearby windfarms, these effects may not be assessed as significant.

80. Significant cumulative effects may also result from the creation of a situation where windfarms have some geographical separation but remain highly inter-visible, potentially resulting in a proliferation of windfarm development on the skyline, the creation of multiple discrete windfarm landscapes or where there are distinct inconsistencies in image or differences in appearance between windfarms.

81. In the LVIA, the main assessment undertaken for the Development covers the effect of the addition of the Development with the predicted baseline context that contains operational and under construction windfarms (including Gruig Windfarm) and its interaction with them. The cumulative assessment relates principally to the addition of the Development in respect of other operational windfarms and therefore is included in the main assessment.

### 1.9 The Nature of Effects

82. The 'nature of effects' relates to whether the effects of the Development are positive, neutral or negative. Guidance provided in GLVIA3 states that "*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 does not provide an indication as to how that may be established in practice. The nature of effect is therefore one that requires interpretation and reasoned professional opinion.

83. In relation to many forms of development, the EIA will identify positive and negative effects under the term 'nature of effect'. The landscape and visual effects of windfarms are difficult to categorise as either positive or negative as, unlike other disciplines, there are no definitive criteria by which these effects can be measured as being categorically positive or negative. For example, in disciplines such as noise or ecology it is possible to identify the nature of the effect of a windfarm by objectively quantifying its effect and assessing the nature of that effect in prescriptive terms. However, this is not the case with landscape and visual effects, where the approach combines quantitative and qualitative assessment.

84. In this assessment, positive, neutral and negative effects are defined as follows:

- Positive effects contribute to the landscape and visual resource through the enhancement of desirable characteristics or the introduction of new, beneficial attributes. 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 Development neither contributes to nor detracts from the landscape and visual resource and is accommodated with neither beneficial nor 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
- Negative effects are those that detract from or weaken the landscape and visual resource 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.

85. A precautionary approach has been adopted which assumes that significant landscape and visual effects will be weighed on the negative side of the planning balance, although positive or neutral effects may arise in certain situations. Unless it is stated otherwise, the effects on the landscape and visual amenity of the Development are therefore considered to be negative.



### 1.10 Duration and Reversibility of Effects

86. GLVIA3 advises that duration and reversibility should be a consideration in the assessment of magnitude of change. The majority of the changes to landscape and visual receptors that occur in relation to windfarm development are reversible, however, following the construction stage they are also generally long-term, remaining for the duration of the Development. OPEN's methodology does not include duration and reversibility as part of magnitude of change, as there is the potential that the reversibility aspect could alter or reduce potentially significant effects even though they are long-term. The duration and reversibility of the effects is instead determined separately and recorded alongside significance rather than being a factor of it.
87. The effects of the Development are of variable duration and are assessed as either short-term or long-term and permanent or reversible. The turbines, meteorological mast, site access tracks, substation and energy storage would be present for the operational life, and the effects associated with these components are considered to be permanent, but reversible upon decommissioning.
88. Other infrastructure and operations such as the decommissioning and construction processes and plant, including tall cranes for turbine erection and construction compounds, will be apparent only during the initial decommissioning and construction period of the Development and are considered to be short-term effects.
89. The reversibility of effects is variable. The most apparent effects on the landscape and visual resource, which arise from the presence of the turbines, are reversible as the turbines can be removed, as can the substation and meteorological mast. The effects of the tall cranes and heavy machinery used during the decommissioning and construction period are also reversible.
90. The access tracks for Operational Rigged Hill Windfarm would be reused as far as possible or would otherwise be regraded and reinstated with local vegetation. Turbine foundations and underground cabling would be left in-situ below ground with no residual landscape and visual effects. If the Development is decommissioned in the future the same would apply.
91. OPEN's methodology does not include duration and reversibility as part of magnitude of change, as there is the potential that the reversibility aspect could alter or reduce potentially significant effects even though they are long-term. The duration and reversibility of the effects is instead determined separately and recorded alongside significance rather than being a factor of it.
92. In order to avoid repetition, the duration and reversibility of effects are not reiterated throughout the assessment.

### 1.11 Technical productions and their limitations

#### 1.11.1 Zone of Theoretical Visibility (ZTV)

93. The ZTVs have been generated using GIS software (ESRI ArcGIS Version 10.5) to demonstrate the number of Wind Turbines that may theoretically be seen from any point in the Study Area. The hub height ZTV shows the number of Wind Turbine hubs of the Development theoretically visible in the Study Area. 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.
94. 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 2 m above ground level;
  - All ZTVs are based on Ordnance Survey (OS) 10 m Digital Terrain Model (DTM).;
  - The Blade Tip ZTV does not indicate the decrease in visibility that occurs with increased distance from the 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 7 turbines may gain views of the smallest extremity of blade tips, or of 7 full turbines. This can make a considerable difference in the effects of the 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.
95. These limitations mean that while the ZTVs are used as a starting point in the assessment, providing an indication of where the Development would theoretically be visible, the information drawn from the ZTV is checked with wirelines and in the field, to ensure that the assessment conclusions represent the visibility of the Development reasonably accurately.

### 1.12 Visualisations

96. The viewpoint assessment is illustrated by a range of visualisations, including photographs and photomontages, which accord with SNH's Visual Representation of Windfarms Version 2.2 (SNH, 2017). Visualisations of windfarms have a number of limitations when using them to form a judgement on a windfarm proposal. These include:
- A visualisation can never show exactly what the windfarm 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 Wind Turbines and the distance to them, but can never be 100% accurate;
  - A static image cannot convey Wind Turbine movement, or lighting from the sun on the Wind Turbines 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 effects of the windfarm proposal these images are best viewed at the viewpoint location shown; and
  - The visualisations must be printed at the right size to be viewed properly (A1 width or as otherwise specified) and viewed at a comfortable viewing distance.
97. 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) sensor. The photographs are taken on a tripod with a pano-head at a height of approximately 1.5 m above ground.
98. To create the baseline panorama, the frames are individually cylindrically projected and then digitally joined to create a fully cylindrically projected panorama using 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. Sections of these panoramas are then cropped and planar projected using PTGui software. These are used in the creation of the 53.5 degree field of view photomontages.
99. Wireline representations that illustrate the Wind Turbines set within a computer-generated image of the landform are used in the assessment to predict theoretical appearance of the Wind Turbines. These are produced with Resoft WindFarm software and are based on the 10 m DTM. There are limitations in the accuracy of DTM data so that landform may not be picked up precisely and may result in Wind Turbines being more or less visible than is shown, however, the use of OS 10 m DTM minimises these limitations. Where descriptions within the assessment identify the numbers of Wind Turbines visible this refers to the illustrations generated and therefore the reality may differ to a degree from these impressions.
100. Photomontages have been produced for a number of agreed viewpoints, again using Resoft WindFarm software, to provide a more realistic image of the appearance of the Development. Photomontages show the Wind Turbines and where stated, other permanent infrastructure.
101. 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.
102. The 53.5 degree field of view wirelines and photomontages are prepared using a planar projected image and should also be viewed flat at a comfortable arm's length. These images are each printed on paper 841 x 297 mm (half A1), which provides for a relatively large scale image.
103. In the wirelines, the turbines are shown with the central Wind Turbines facing the viewer directly, with the full rotor diameter visible at its tallest extent. In the photomontages, the Wind Turbine rotors are shown with a random appearance with the central Wind Turbines facing the viewer directly.
104. 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 will 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.