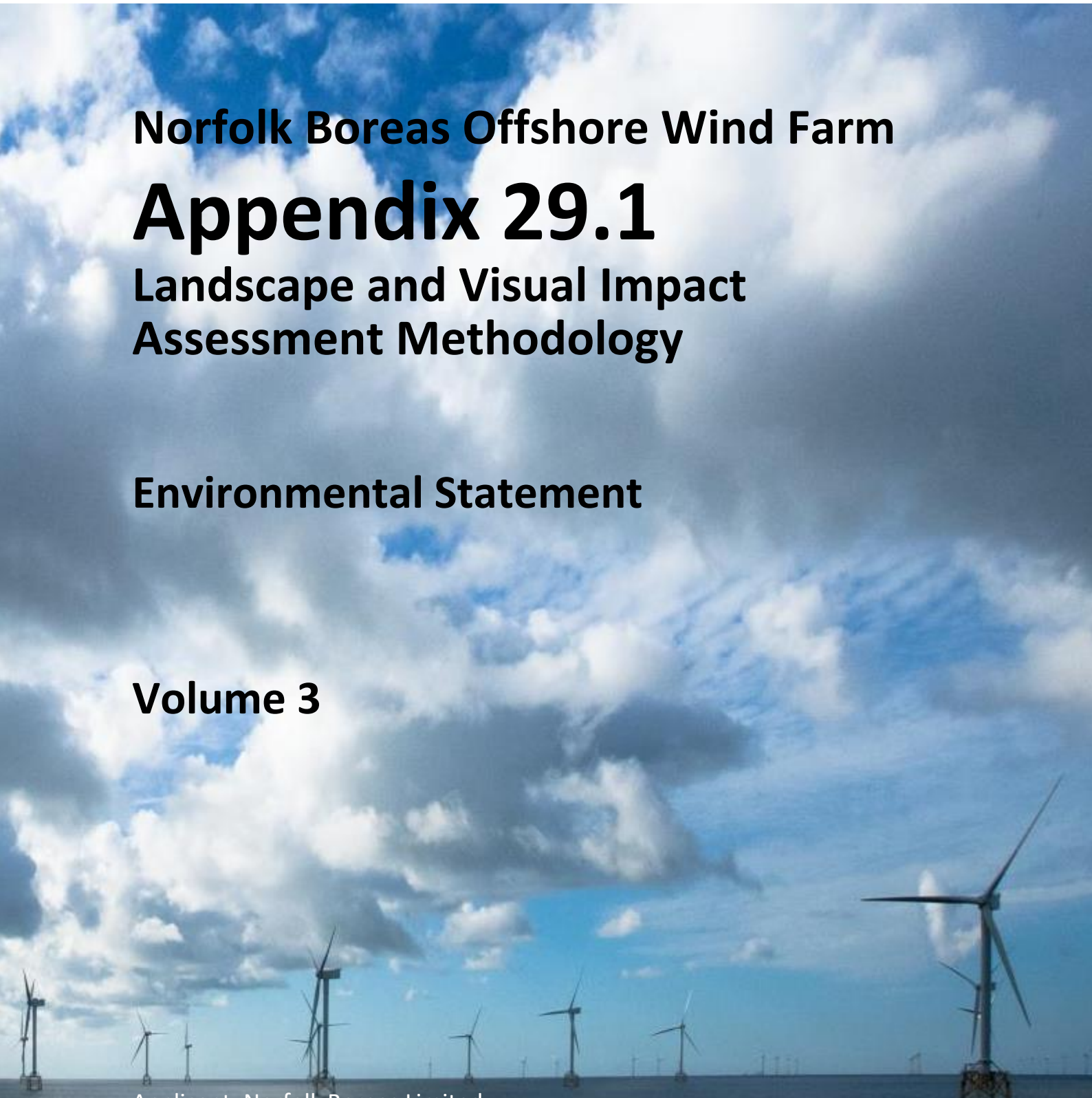
Norfolk Boreas Offshore Wind Farm

Appendix 29.1

Landscape and Visual Impact Assessment Methodology

Environmental Statement

Volume 3



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Glossary of Acronyms

AONB	Area of Outstanding Natural Beauty
CIA	Cumulative Impact Assessment
CLVIA	Cumulative Landscape and Visual Impact Assessment
DCO	Development Consent order
EIA	Environmental Impact Assessment
GIS	Geographical Information System
GLVIA	Guidelines for the Assessment of Landscape and Visual Impacts
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
LCA	Landscape Character Assessment
LCT	Landscape Character Types
LCU	Landscape Character Units
LI	Landscape Institute
LVIA	Landscape and Visual Impact Assessment
NPS	National Policy Statement
OPEN	Optimised Environments Ltd
SNH	Scottish Natural Heritage
ZTV	Zone of Theoretical Visibility

Glossary of Terminology

Indicative mitigation planting	Areas identified for mitigation planting at the onshore project substation and Necton National Grid substation.
Landfall	Where the offshore cables come ashore at Happisburgh South
Mobilisation area	Areas approx. 100 x 100m used as access points to the running track for duct installation. Required to store equipment and provide welfare facilities. Located adjacent to the onshore cable route, accessible from local highways network suitable for the delivery of heavy and oversized materials and equipment.
National Grid overhead line modifications	The works to be undertaken to complete the necessary modification to the existing 400kV overhead lines
National Grid substation extension	The permanent footprint of the National Grid substation extension
Necton National Grid substation	The existing 400kV substation at Necton, which will be the grid connection location for Norfolk Boreas
Onshore cable route	The 35m working width within a 45m wide route which will contain the buried export cables as well as the temporary running track, topsoil storage and excavated material during construction.
Onshore project substation	A compound containing electrical equipment to enable connection to the National Grid. The substation will convert the exported power from HVDC to HVAC, to 400kV (grid voltage). This also contains equipment to help maintain stable grid voltage.
The project	Norfolk Boreas Offshore Wind Farm, including the onshore and offshore infrastructure.

1 Introduction

1. 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 assessment in Chapter 29 Landscape and Visual Impact Assessment (LVIA) of the Environmental Statement (ES). The LVIA identifies and assesses the significance of changes resulting from the project, on both, the landscape as an environmental resource, and on people's views and visual amenity. The LVIA methodology is structured as follows:

- Types of impact;
- Significance of impacts;
- Assessment of landscape impacts;
- Assessment of visual impacts;
- Assessment of cumulative landscape and visual impacts;
- Nature of impacts; and
- Duration and reversibility.

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

- Guidelines for Landscape and Visual Impact Assessment (GLVIA): Third Edition (Landscape Institute (LI) and IEMA, 2013);
- Natural England (2014). An Approach to Landscape Character Assessment (LCA);
- Assessing the Cumulative Impact of Onshore Wind Energy Developments (Scottish Natural Heritage (SNH), 2012);
- Visual Representation of wind farms, Version 2.2 (SNH, 2017);
- LI Advice Note 01/11 Photography and Photomontage in Landscape and Visual Impact Assessment (LI, 2011);
- LI (March 2017). LI Technical Guidance Note 02/17, Visual Representation of development proposals; and
- Siting and Designing Wind Farms in the Landscape, Version 2 (SNH, 2014).

3. OPEN's LVIA methodology accords with the guidance set out in Guidelines for Landscape and Visual Impact Assessment Third Edition (GLVIA3). Where it diverges from specific aspects of the guidance, in a small number of areas, reasoned professional justification for this is as follows.

4. 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 with reference made in paragraphs 5.48, 5.50-5.52, 6.38 and 6.40-6.41.

5. OPEN considers that the process of combining all three considerations in one rating can distort the aim of identifying significant impacts of large scale 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 impacts are diluted down due to their limited geographical extent, limited duration or reversibility. Conversely, a low magnitude of change, based on size or scale, may be increased to a higher rating if it occurred across a wider area or for a longer duration, giving rise to a significant impact despite the inherently low magnitude of change.

6. 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 extent of these impacts and their duration and reversibility separately.

7. The LVIA study area is defined as a 3km radius area from the outer edge of the onshore project substation and a 500m strip either side of the 45m onshore cable route and associated access routes and mobilisation areas (Figure 29.1 and 29.12). This includes all those areas within which potentially significant landscape and visual impacts of the project may occur. Similar extents were applied in the Norfolk Vanguard LVIA.

2 Development Scenarios

8. Vattenfall Wind Power Limited (VWPL) (the parent company of Norfolk Boreas Limited) is also developing Norfolk Vanguard, a 'sister project' to Norfolk Boreas. In order to minimise impacts associated with onshore construction works for the two projects, Norfolk Vanguard are seeking to obtain consent to undertake enabling works for both projects at the same time. However, Norfolk Boreas needs to consider the possibility that Norfolk Vanguard may not proceed to construction.

9. The Environmental Impact Assessment (EIA) will therefore be undertaken using the following two alternative scenarios (further details are presented in Chapter 5 Project Description) and an assessment of potential impacts has been undertaken for each scenario:

    - **Scenario 1** – Norfolk Vanguard proceeds to construction and installs ducts and other shared enabling works for Norfolk Boreas.
    - **Scenario 2** – Norfolk Vanguard does not proceed to construction and Norfolk Boreas proceeds alone. Norfolk Boreas undertakes all works required as an independent project

10. The same LVIA methodology is applied in the assessment of both these scenarios.

3 Types of Impact

11. The LVIA is intended to determine the impacts that the project would have on the landscape and visual resource.

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

3.1 Landscape Impacts

13. The LVIA considers the impacts of the project on the landscape as a resource. Landscape impacts occur as either impacts on the landscape elements of the site or impacts on the landscape character of the site and surroundings. The assessment of landscape impacts is carried out as follows:

- Assessment of impacts on landscape elements, which are the direct impacts on the landscape elements of the site as a result of the project, such as the removal of trees or alteration to ground cover.
- Assessment of impacts on landscape character, which arise either through the introduction of new elements that alter the landscape character in the immediate locale, or through visibility of the project, which may alter the landscape character as perceived from surrounding parts. Landscape character is defined as the distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape and relates to the way in which this pattern is perceived. Landscape character receptors fall into two groups; landscape character areas and landscape designations.

3.2 Visual impacts

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

- An assessment of the impacts of the project on views from principal visual receptors, including residents of settlements; motorists using roads; people using recreational routes, features and attractions throughout the study area; and
- An assessment of the impacts of the project on representative viewpoints that have been selected to assess the impact on locations relevant to these visual receptors and from specific viewpoints, chosen because they are key or promoted viewpoints in the landscape.

3.3 Cumulative landscape and visual impacts

15. Chapter 6 Environmental Impact Assessment Methodology presents the general method and summarises the different steps of the CIA for this chapter. This appendix 29.1 sets out a more detailed methodology specific to the requirements of the LVIA process.

16. The objective of the CIA for the LVIA is to describe, visually represent and assess the ways in which the project would have additional impacts when considered together with other existing, consented or proposed energy developments or other relevant projects, and to identify related significant cumulative impacts arising as a result of the addition of the project. The guiding principle in preparing the CIA is to '*focus on the likely significant impacts and in particular those which are likely to influence the outcome of the consenting process'*, in accordance with Scottish Natural Heritage (SNH) guidance.

17. Projects with the potential to contribute to a significant cumulative impact are presented in Table 29.14 of Chapter 29, along with an initial assessment of their relevance to the cumulative assessment. Under Scenario 1, potential 'in combination' cumulative impacts are most likely to relate to the Norfolk Vanguard onshore project substation, and National Grid substation extension works, owing to their close proximity and scale. While all these developments are considered in the main assessment, the 'in combination' effect is assessed in detail in the CIA.

18. Under Scenario 2, there is the potential for a significant cumulative effect to arise between the construction of Norfolk Boreas onshore cable route in conjunction with the construction of Hornsea Project Three onshore cable route, in the localised area where the cable routes cross and where construction compounds are located, to the north-east of Reepham.

4 Significance of Impacts

19. The objective in assessing the impacts of the project is to predict the significant impacts on the landscape and visual resource. In accordance with the 2017 Environmental Impact Assessment (EIA) Regulations the LVIA impacts are assessed to be either significant or not significant. The LVIA does not define levels of significance as the Regulations do not provide for these.

20. The significance of impacts is assessed through a combination of two considerations - the sensitivity of the landscape receptor or visual receptor, and the magnitude of change that would result from the project.

21. OPEN's methodology requires the application of professional judgement in accordance with the Landscape Institute's (LI's) GLVIA3. Although it is not reliant on

the use of a matrix, the following matrix has been included to illustrate how combinations of the ratings for sensitivity and magnitude of change can give rise to significant and not significant impacts, as well as to give an understanding of the threshold at which significant impacts may arise. Table 29.1 below provides this illustration.

Table 29.1 Impact Significance Matrix

Sensitivity	Magnitude of change					
	High	Medium/ High	Medium	Medium/ Low	Low	Negligible
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*

22. Impacts that are assessed within the red boxes in the matrix are assessed to be significant in terms of the requirements of the EIA Regulations. Those impacts that are assessed within the orange boxes may be significant, or not significant, depending on the specific factors and impact that is assessed in respect of a particular landscape or visual receptor. Those impacts that are assessed within the green boxes are assessed to be not significant. In accordance with the GLVIA3, experienced professional judgement is applied to the assessment of all impacts and reasoned justification is presented in respect of the findings.

23. A significant impact occurs where the project would provide a defining influence on a landscape element, landscape character receptor or visual receptor. Not significant impacts occur where the impact of the project is not material and the baseline characteristics of the landscape element, landscape character receptor or visual receptor continue to provide the definitive influence. In this instance, the project may have an influence, but this influence would not be definitive. Significant cumulative landscape and visual impacts arise where the addition of the project to

the baseline under consideration leads to this type of development becoming a prevailing landscape and visual characteristic.

24. Where the assessment identifies significant effects on landscape and visual receptors, these will be mitigated during the construction, operation or decommissioning of the project. Embedded mitigation has been developed as part of the overall project design through site selection and detailed design where possible. The iterative design process has involved the consideration of the sensitivity of the landscape and visual receptors with the aim of mitigating the effects on those more sensitive receptors, especially where visual amenity of residents is a concern. For more information on embedded mitigation, see section 29.7.1 of Chapter 29.

5 Assessment of Landscape Impacts

25. Impacts on landscape character arise either through the introduction of new elements that physically alter this pattern of elements, or through visibility of the project, which may alter the way in which the pattern of elements is perceived. This category of impacts is made up of physical impacts and landscape impacts. The latter fall into two groups; landscape character areas and designated areas.

5.1 Assessment of Impacts on Landscape Elements

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

5.1.1 Sensitivity of landscape elements

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

28. 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.

29. 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 replant peripheral hedgerows following the excavation required for the building of the onshore project substation, and this would reduce the susceptibility of this element. The evaluation of sensitivity is described for each receptor in the assessment. The following levels of sensitivity are applied; high, medium-high, medium, medium-low and low. The sensitivity of each receptor is a product of the specific combination of value and susceptibility, including the potential for mitigation, as evaluated by professional judgement.

5.1.2 Magnitude of change on landscape elements

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

- High, where the project would result in the complete removal or alteration of a key landscape element;
- Medium, where the project would result in the removal of a notable part of a landscape element or a notable alteration to a key landscape element; and
- Low, where the project would result in the removal of a minor part of a landscape element or a minor alteration to a key landscape element; and
- Negligible, where the project would result in the removal of a negligible amount of a landscape element or is barely discernible.
- None, where the project would result in no change to the landscape element.

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

5.1.3 The significance of impacts on landscape elements

32. The significance of the impact on landscape elements is dependent on all the factors considered in the sensitivity of the receptor and the magnitude of change upon it. This requires professional judgement to assess whether the project would have an impact that is significant or not significant.

33. A significant impact would occur where the degree of removal or alteration of the landscape element is such that the characteristic of the element would be redefined. If the landscape element is of a high sensitivity, a significant impact can occur with a moderate degree of removal or alteration. A not significant impact would occur where the form of the landscape element is not redefined as a result of the project. If the landscape element is of lower sensitivity, it may undergo a higher level of removal or alteration yet remain as a not significant impact.

5.2 Assessment of Impacts on Landscape Character

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

5.2.1 Baseline study and scope of the assessment

35. 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 covers the following issues:

- The description of the landscape character receptor drawn from the relevant documentation such as the LCA 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 project is located; and
- How change in this landscape character receptor, either through natural or human processes, is presently affecting character and how these changes are predicted to affect character in the future.

5.2.2 Sensitivity of landscape character

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

5.2.3 Value of the landscape receptor

37. 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 would 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 and the reasons for its designation which may be set out in a citation. 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.

5.2.4 Susceptibility to change

38. 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 project. 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 project: The susceptibility of landscape receptors is assessed in relation to change arising from the project, including its specific components and features, its size, scale, location, context and its specific characteristics.
- Landscape character: The key characteristics of the landscape character receptor are considered in the evaluation of susceptibility, as they determine the degree to which the receptor may accommodate the influence of the project. For example, a landscape that is of a particularly wild and remote character may have a high susceptibility to the influence of the project 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 project.

- Landscape association: The extent to which the project would influence the character of landscape receptors across the study area, relates to the associations that exist between the landscape receptor where the project is located and the landscape receptor from which the project 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 project is set along the skyline, and in other situations weak where the landscapes are not directly related, for example the influence on a coastal landscape which is strongly associated with the seaward aspect and not the landward aspect where the project is situated.

5.2.5 Sensitivity rating

39. An overall sensitivity rating for each landscape character receptor is made by combining the assessment of the value and its susceptibility to change. The following levels of sensitivity are applied; high, medium-high, medium, medium-low and low. The basis for the assessment of sensitivity for each receptor is made clear using evidence and professional judgement.

5.2.6 Magnitude of change on landscape character receptors

40. The magnitude of change on landscape character is an expression of the size or scale of the change that would result from the project. 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. Duration and reversibility are discussed further in section 8.1 of this Appendix. The basis for this assessment is made clear using evidence and professional judgement, based on the following criteria.

- The degree to which the pattern of elements that makes up the landscape character would be altered by the project, by removal or addition of elements in the landscape. The magnitude of change would generally be higher if the features that make up the landscape character are extensively removed or altered, and/or if many new or large scale components are added to the landscape;
- The extent to which the project would change the key characteristics of the landscape, which may be critical to 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, the juxtaposition of the project with these key characteristics.

- The distance between the landscape character receptor and the project. Generally, the greater the distance, the lower the scale of change as the project would constitute a less apparent influence on the landscape character; and
- The extent of the project that would be seen from the landscape receptor. Generally, the greater the extent of the project that can be seen, the higher the scale of change.

5.2.7 Geographical extent

41. The geographical extent over which the landscape impacts would be experienced is also assessed, which is distinct from the size or scale of impact. This evaluation is not combined in the assessment of the level of magnitude but instead expresses the extent of the receptors which would experience a particular magnitude of change and can therefore affect the geographical extent of the significant and not significant impacts.

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

43. The geographical area over which the impacts of the project would be experienced is also evaluated. The extent of the impact would vary depending on the specific nature of the project and is principally a reflection of the extent of the landscape receptor that would be affected by visibility of the project.

5.2.8 Duration and reversibility

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

45. In terms of the project, short-term relates to a period of 0 to 2 years and applies mostly to the initial construction and decommissioning works. Medium-term relates to a period of 2 to 5 years covering the entire construction and decommissioning phases and the period for reinstatement. Long-term relates to a period of 5 years or more and relates mostly to the time required for the majority of the vegetation to re-establish and grow to a reasonable size. Long term relates to the majority of the 30 year operational lifetime of the project.

46. Reversibility is a judgement about the prospects and practicality of a particular impact being reversed. The majority of the impacts relating to the project would be reversible.

5.2.9 Levels of magnitude of change

47. The basis for the assessment of the magnitude of change for each receptor is made clear using evidence and professional judgement.

48. The levels of magnitude of change that can occur are defined as follows:

- High, the project would result in a major alteration to the baseline characteristics of the landscape, providing the prevailing influence and/or introducing elements that are substantially uncharacteristic in the receiving landscape;
- Medium, the project would result in a moderate alteration to the baseline characteristics 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, the project 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; and
- Negligible, the project 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.

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

5.2.10 The significance of impacts on landscape character

50. The significance of the impact 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 project. These judgements on sensitivity and magnitude are combined to arrive at an overall assessment as to whether the project would have an impact that is significant or not significant on the landscape character receptor. The matrix shown in Table 29.1 helps to inform the threshold of significance when combining sensitivity and magnitude to assess significance.

51. A significant impact would occur where the combination of the variables results in the project having a defining impact on the receptor. A not significant impact would occur where the impact of the project is not definitive, and the landscape character of the receptor continues to be characterised principally by its baseline characteristics. In this instance, the project may have an influence on the receptor and may alter the landscape character, but this influence would not be a defining one.

6 Assessment of Visual Impacts

52. The assessment of visual impacts is an assessment of how the introduction of the project would affect the views available to people and their visual amenity. The assessment of visual impacts is carried out in two parts:

- An assessment of the impacts that the project 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 impacts that the project 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.

53. The objective of the assessment of impacts on visual receptors is to determine what the likely impacts of the project would be on the people experiencing views across the study area, and whether these impacts would be significant or not significant. The methodology for the assessment of visual impacts involves the undertaking of a baseline study, evaluation of sensitivity and magnitude of change, and an assessment of significance.

6.1 Baseline Study

54. The baseline study establishes the visual baseline, including the different groups of visual receptors (people) within the study area. The descriptions of the baseline views gained at specific representative viewpoints are included alongside the assessments of these viewpoints. The scope of the assessment includes a description of the area from which the project may be visible and how viewpoints would be affected by this visibility. The baseline study establishes the visual baseline in relation to the following issues:

- The location, type and number of visual receptors experiencing visibility of the project, the likely views experienced and the activity / occupation they are engaged in;
- 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 project as well as the wider available view, referring to the principal orientation, focal features, and visible extent 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

other operational projects where they are a feature of the baseline landscape and visual context.

6.1.1 Sensitivity of visual receptors

55. 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 project would have on the view.

6.1.2 Value of the view

56. 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-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 maps as formal viewpoints, are sign-posted 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 would 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, which implies a greater value to the visible landscape.
- Informal recognition: Views that are well-known at a local level or have 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. 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.
- 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 would increase the scenic quality and others would reduce the scenic quality. The value of the view would also be increased if the condition of the landscape is near to the optimum for its type.

6.1.3 Susceptibility to change

57. Susceptibility relates to the nature of the viewer and their experience from that particular viewpoint or series of viewpoints, as well as the principal characteristics of the view.

- 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 which are subject to constant views of the project. 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 work place which they occupy.
- Principal characteristics of the view: The principal visual characteristics are those features which define the view. The presence and relationship of certain elements, features or patterns in the baseline view influence the degree to which the landscape in the view may accommodate the influence of the project. For example, a developed, industrial landscape where built elements and structures are already part of the view may have a lower susceptibility to change, whereas a view of an undeveloped landscape which has little or no built development may have a higher susceptibility to change.
- Experience of the viewer: The experience of the visual receptor relates to the extent to which their focus is directed on the view, the duration and clarity of the view and whether it is a static or transitory view. For example, if the principal outlook from a residential property is aligned directly towards the project, 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.

6.1.4 Sensitivity to change

58. An overall level of sensitivity is applied for each visual receptor or view by combining individual assessments of the value of the receptor and its susceptibility to change; high, medium-high, medium, medium-low, low. The basis for the assessments is made clear using evidence and professional judgement in the evaluation of each receptor.

6.1.5 Magnitude of change on views

59. The magnitude of change that the project would have on visual receptors is assessed in terms of the size or scale of the change as follows. 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. Duration and reversibility are discussed further in section 8.1 of this Appendix. The basis for this assessment is made clear using evidence and professional judgement, based on the following criteria:

6.1.6 Size or scale

60. This criterion relates to the size or scale of change to the visual resource that would arise as a result of the project, based on the following factors.

- 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 distance between the visual receptor and the project. Generally, the greater the distance, the lower the magnitude of change, as the project would constitute a smaller scale component of the view.
- The proportion of the project that would be seen. Generally, the larger the development appears in the view, and the more of the project that can be seen, the higher the magnitude of change.
- The field of view available and the proportion of the view that is affected by the project. Generally, the more of a view that is affected, the higher the magnitude of change would be. If the project 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 project covers just a part of an open, expansive and wide view, the magnitude of change is likely to be reduced as the project would not affect the whole open part of the outlook.
- The scale and character of the context within which the project 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 texture. The scale of the landform and the patterns of the landscape, the existing land use and vegetation cover, and the degree and type of development and settlement seen in the view would be relevant. For example, a large-scale simple landform can provide a more appropriate receiving environment than a more intimate, small-scale setting where the project may result in uncomfortable scale comparisons that attracts the eye of the viewer and increases the magnitude of change.
- The consistency of the appearance of the project. If the project appears in a similar setting and form and from the same angle each time it is apparent it would be characterised as a single, familiar site and this tends to reduce the magnitude of change. If, on the other hand, it appears from a different angle, and this is seen in a different form and setting, the magnitude of change is likely to be higher as it would be a less familiar component of the landscape.

6.1.7 Geographical extent

61. The geographic extent over which the visual impacts 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 is used in determining the extent which would experience a particular magnitude of change and therefore the extent of the significant and non-significant impacts. The extent of

the impacts would vary depending on the specific nature of the project and is principally assessed through analysis of the geographical extent of visibility of the project across the visual receptor.

62. The extent of impacts on views is based on the following factors:

- The extent of a receptor (a road, footpath or settlement, for example) from which the project may be seen; 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.

6.1.8 Duration and reversibility

63. The duration and reversibility of impacts on views are based on the period over which the project is likely to exist and the extent to which the project would be removed and its impacts reversed at the end of that period. Duration and reversibility are not incorporated into the overall magnitude of change and may be stated separately in relation to the assessed impacts.

6.1.9 Levels of magnitude of change

64. 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 project 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 landscape;
- Medium, the project 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 receiving landscape;
- Low, the project 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 landscape; and
- Negligible, the project 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 landscape.

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

6.1.10 The significance of impacts on views

66. The significance of the impact 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 project. These judgements on sensitivity and magnitude are combined to arrive

at an overall assessment as to whether the project would have an impact that is significant or not significant on the visual receptor. The matrix shown in Table 29.1 helps to inform the threshold of significance when combining sensitivity and magnitude to assess the impacts.

67. A significant impact would occur where the combination of the variables results in the project having a defining impact on the view. A not significant impact would occur where the appearance of the project is not definitive, and the view continues to be defined principally by its baseline characteristics. In this instance, the project may affect the appearance of the view, but this impact would not be a defining one.

68. The assessment of visual impacts assumes clear weather and optimum viewing conditions. This means that impacts 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 impacts resulting from the project would vary greatly dependent on the prevailing viewing conditions.

7 Assessment of Cumulative Landscape and Visual Impacts

7.1 Introduction

69. Cumulative impacts arise where the study areas for two or more developments overlap so that both of the developments are experienced at a proximity where they may have a greater incremental impact, or where developments may combine to have a sequential impact, irrespective of any overlap in study areas. The cumulative impact assessed is the difference between the impact of a given development in its own right and the combined impact of this development and the project. It is this incremental impact of the addition of the project to the cumulative situation that is assessed in the LVIA, not the overall impact of multiple developments.

70. The objective of the Cumulative Landscape and Visual Impact Assessment (CLVIA) is to describe, visually represent and assess the ways in which the project would have additional impacts when considered together with other existing or proposed projects and to identify related significant cumulative impacts arising as a result of the project. The guiding principle in preparing the CLVIA is to '*focus on the likely significant impacts and in particular those which are likely to influence the outcome of the consenting process'*, in accordance with SNH guidance.

71. The degree to which cumulative impacts occur, or may occur, as a result of more than one development being constructed are a result of:

- The distance between individual developments;
- The interrelationship between their Zones of Theoretical Visibility (ZTV);
- The overall character of the landscape and its sensitivity to developments;

- The siting and design of the developments themselves; and
- The way in which the landscape is experienced.

7.2 Types of Cumulative Impact

72. The CLVIA is not required to examine the total impact arising from a number of developments, but to look at the additional impacts, for example, due to the relationship between developments being discordant, and potentially reduced impacts, for example due to the relationship between developments being complementary. Two or more adjacent developments may complement one another, or may be discordant with one another, and it is the increased or reduced level of significance of impacts which arises as a result of this change that is assessed in the cumulative assessment.

73. Cumulative impacts on landscape character arise when two or more developments, through the introduction of new landscape features, change the key characteristics of a landscape or change it to such an extent that they create a different 'development' landscape type. Developments may also have a cumulative impact on the character of landscapes that are designated for their landscape value. Development proposals in nationally designated landscapes tends to be rare, therefore cumulative impacts on the character of designated landscapes tend to be indirect.

74. Cumulative impacts on visual amenity consist of combined and sequential impacts. 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 developments 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 developments. Sequential visibility occurs when the observer has to move to another viewpoint to see different developments. Sequential impacts are assessed along regularly used routes such as major roads, railway lines and footpaths. The occurrence of sequential impacts ranges 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).

7.3 Assessing the Significance of Cumulative Landscape and Visual Impacts

75. The significance of cumulative impacts is determined through a combination of the sensitivity of the landscape receptor or visual receptor and the cumulative magnitude of change resulting from the project. The sensitivity of landscape receptors and visual receptors is taken from the main assessment carried out in the

LVIA, as this does not change. The cumulative magnitude of change is assessed with additional criteria, as described below.

7.3.1 Cumulative magnitude of change

76. The cumulative magnitude of change is an expression of the degree to which landscape character receptors and visual receptors would be changed by the addition of the project to developments that are already operational or proposed. The cumulative magnitude of change is assessed based on a number of criteria, set out as follows:

- The location of the project in relation to other developments. If the project is seen in a part of the view that is not affected by another development, this would generally increase the cumulative magnitude of change as it would extend the influence of development into an area that is currently unaffected. Conversely, if the project is seen in the context of other developments, the cumulative magnitude of change may be lower as it is not extending development to undeveloped parts of the outlook. This is particularly true where the scale and layout of the project 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 project would add notably to the developed skyline in a view, the cumulative magnitude of change would tend to be higher, as the appearance of the skyline has 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 project to a view where a greater number of smaller developments are apparent would usually have a higher cumulative magnitude of change than a view of 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 project 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 project in relation to other developments. The cumulative magnitude of change of the project 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 consistent 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 development is unplanned and uncoordinated, affecting a wide range of landscape characters.
- The distance of the project from the viewpoint or receptor. As in the assessment of the project itself, the greater the distance, the lower the cumulative magnitude of change would tend to be.
- The magnitude of change of the project 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 project itself is assessed to have a negligible magnitude of change on a view or receptor there would not be a cumulative impact as the contribution of the project would equate to the 'no change' situation.

77. 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 project to other developments in the landscape or view, would result in a major incremental cumulative change, loss or addition to the cumulative situation;
- Medium, the addition of the project to other developments in the landscape or view would result in a moderate incremental cumulative change, loss or addition to the cumulative situation;
- Low, the addition of the project to other developments in the landscape or view would result in a minor incremental cumulative change, loss or addition to the cumulative situation;
- Negligible, where the addition of the project to other 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 project to other developments in the landscape or view would have no incremental change, loss or addition to the cumulative situation and its addition equates to a 'no change' situation.

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

7.4 Significance of Cumulative Impact

79. The objective of the cumulative assessment is to determine whether any impacts that the project would have on landscape receptors and visual receptors, when seen or perceived in combination with other existing and proposed projects, would be

significant or not significant. Significant landscape and visual impacts arise where a landscape characterised by a type of development is created as a result of the addition of the project to other existing or proposed projects. This results in a type of development becoming the prevailing landscape and visual characteristic. The creation of a landscape characterised by a type of development may evolve as follows:

- A small scale, single development 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 development, it can become a characteristic element of the landscape, as the developments appear as landscape elements or components that are repeated. Providing there was sufficient 'space' or undeveloped landscape/skyline between each development, or the overlapping of several developments was not too dense; the projects 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 impacts; and
- The next stage would be to consider larger commercial developments and or an increase in the number of developments within an area that either overlap or coalesce and/or 'join-up' along the skyline. The impact is to create a 'developed landscape' where the development is the prevailing or defining characteristic of the landscape. The result would be to change the existing landscape character of a landscape type, or the landscape in a view and resulting in a significant cumulative impact. A developed landscape may already exist as part of the baseline landscape context.

80. Less extensive, but nevertheless significant cumulative landscape and visual impacts may also arise as a result of the addition of the project, where it results in a landscape or view becoming defined by the presence of more than one development, so that other patterns and components are no longer definitive, or where the project contrasts with the scale or design of an existing or proposed project. Higher levels of significance may arise from cumulative landscape and visual impacts related to the project being in close proximity to other developments when they are clearly visible together in views, however provided that the project is designed to achieve a high level of visual integration, with few notable visual differences between developments, these impacts may not necessarily be significant.

81. In particular, the impacts of the extension to a development are often less likely to be significant, where the impact is concentrated, providing that the design of the

developments 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 development, or if the project extends across Landscape Character Types (LCT) or clear visual/topographic thresholds in a view. Higher levels of significance may result from developments that have some geographical separation, but remain highly inter-visible, potentially resulting in extending impacts into new areas, such as an increased proliferation of development on a skyline, or the creation of multiple, separate development defined landscapes.

82. In the cumulative assessment, a scenario is considered in which the project is added to a situation which comprises the operational Norfolk Vanguard project.

8 Nature of Impacts

83. The nature of impacts refers to whether the landscape and/or visual impact of the project is positive or negative (herein referred to as 'beneficial' and 'adverse').

84. Guidance provided by the LI on the nature of impact in GLVIA3 states that "*in the LVIA, thought must be given to whether the likely significant landscape and visual impacts 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 impact is therefore one that requires interpretation and, where applied, this involves reasoned professional opinion.

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

86. The attribution of 'beneficial' and 'adverse' nature of impacts is used inconsistently by landscape professionals when preparing LVIAs for developments and there is not a consensus of opinion that supports its use for development assessments. Generally, a precautionary approach is adopted by OPEN, which assumes that significant landscape and visual impacts would be weighed on the adverse side of the planning balance. Beneficial impacts may, however, arise in certain situations.

Judgements on the nature of impact are based on professional experience and reasoned opinion informed by best practice guidance.

87. Adverse, neutral or beneficial, impacts are based on the following definitions:

- **Beneficial impacts** 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 impacts** occur where the project neither contributes to nor detracts from the landscape and visual resource and can be accommodated with neither beneficial / adverse impacts or, where the impacts 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;
- **Adverse impacts** 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.

88. Unless it is stated otherwise, the impacts considered in this assessment are considered to be adverse in order that a worst case assessment is represented.

8.1 Duration and reversibility

89. The impacts of the project are of variable duration and are assessed as short-term, medium term or long-term, and permanent or temporary/reversible. It is proposed that the indicative design life of the development would be up to 30 years. During this time, the onshore project substation and National Grid substation extension would be the most apparent features, with smaller scale features such as kiosks, marker posts and some sections of jointing pits evident along the onshore cable route. These impacts are considered to be long-term.

90. Short-term covers a period of 0 to 2 years and would mostly apply to construction works at the outset of the project and decommissioning works at the end of the operational life of the development. The construction of the landfall would take up to 20 weeks and the construction of the onshore cable route would take up to 2 years, thus making the associated effects short-term. The infrastructure and operations such as the construction processes and plant, the mobilisation areas and Trenchless Zone compounds would be apparent only during the initial period of the project and are considered to be short-term impacts. The construction of the landfall and onshore cable route and pulling through of cables for the landfall and onshore cable route would also be short-term.

91. In respect of the construction phase of the onshore project substation and National Grid substation extension, the impact would be considered medium term. Medium term covers a period of 2 to 5 years and as the construction of the onshore project substation and National Grid substation extension would take up to a 30 month period, the associated effects are considered medium term.

92. Medium term is also used to describe the period that it would take for hedgerows to re-establish and would typically be 3 to 5 years for short hedgerows and 5 to 10 years for tall hedgerows, timed from planting. As planting in the different locations would occur at different times, the measure of medium term would vary between locations.

93. Long term effects are used to describe those effects which would last between 5 and 30 years and relate to the residual effects of the presence and operational processes of visible components of the project and the time taken for trees and taller hedgerows to fully establish.

94. Reversibility is a judgement about the prospects and practicality of a particular impact being reversed. Many of the impacts relating to the project would be reversible. The major impacts on the landscape and visual resource, which result from the presence of onshore project substation and National Grid substation extension, are temporary and reversible, as the building would be removed on decommissioning. The impacts that would occur during the construction period and decommissioning of the site, from the use of tall cranes and heavy machinery, stockpiling of topsoil and presence of mobilisation areas and Trenchless Zone compounds are also temporary and reversible.

95. Permanent impacts include physical removal of landscape elements required for the development of the site, and any residual impacts that remain following decommissioning. Underground ducts would remain but would have no permanent landscape and visual impacts. The access tracks may be retained at the request of the landowner or otherwise they would be re-graded and local vegetation reinstated from the seed bank material.

8.2 Graphic Production

96. The written LVIA is accompanied by a set of graphics contained in Volume 2. Reference is made throughout the written text to these graphics, as they are an integral part of the overall assessment and of importance in illustrating specific issues. They should be viewed in accompaniment to the written text.

97. The graphics can be divided into two categories; maps and visualisations. The maps are based on the study area around the landfall, onshore cable route, onshore project substation and National Grid substation extension, and present data of

relevance to the assessment, such as the location and extent of LCT and units, landscape designations and principal visual receptors. A Zone of Theoretical Visibility ('ZTV') map is also included in relation to the onshore project substation and National Grid substation extension.

8.2.1 Zone of theoretical visibility

98. ZTVs have been generated using GIS software (ESRI ArcGIS Version 10.5) to demonstrate the extent to which the onshore project substation and National Grid substation extension may theoretically be seen from any point in the study area. These ZTVs are shown in Figures 29.5 and 29.6 for Scenario 1 and Figures 29.16 and 29.17 for Scenario 2.

99. The zones of visibility are calculated based on the height of the landform relative to the height of the proposed project. They also factor in the potential screening effect of areas of woodland in the study area, to which an average height of 10m has been attributed, which is considered a conservative average. The ZTVs do not take into account the screening effect of smaller groups of trees, hedgerows, hedgetrees, buildings or other local features. As a result the ZTV presents a conservative worst case assumption in respect of theoretical visibility and this is highlighted in the limitations set out below.

100. There are limitations in the theoretical production of the zones of visibility, and these should be considered in the interpretation and use of the ZTV:

- The ZTV illustrates the 'bare ground' situation with major woodland blocks, but does not take into account the screening effects of other vegetation, buildings, or other local features that may prevent or reduce visibility;
- The ZTVs are based on theoretical visibility from 2m above ground level; and
- The ZTVs are based on 5m data grid (OS Terrain 5).

101. These limitations mean that while the ZTV is a useful starting point in the assessment, by providing an indication of locations where the proposed project would theoretically be visible from, the information drawn from the ZTV is checked in the field, to ensure that the assessment conclusions represent the actual visibility of the project reasonably accurately.

8.2.2 Visualisations

102. 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). In the absence of detailed guidance on the production of photomontages for non-wind farm developments, the LI in its Advice Note 01/11 makes the following comment:

- *"Scottish Natural Heritage's Visual representation of windfarms: good practice guidance states that the guidance may also be applicable to other forms of development or within other locations. The LI endorses this guidance and strongly advises members to follow this where applicable in preference to any other guidance or methodology."*

103. Although the onshore elements of the project do not constitute a wind farm, the SNH guidance has been applied in the production of the photomontages because it is commonly held to be the most appropriate for this purpose.

104. Chapter 6 Environmental Impact Assessment Methodology, at Section 6.4 The Project Design Envelope, explains how the project will be based on the 'Rochdale Envelope' approach, as supported by The Planning Inspectorate Advice Note Nine (The Planning Inspectorate, 2012). The Rochdale Envelope presents the parameters of the project which represent the worst case assumption. This ensures the assessment covers the maximum extent of the proposed project. Visualisations in Figures 29.23 to 29.46 show a Rochdale Envelope marked by a blue dashed 3D box around the computer-generated model, indicating the maximum possible extent of the project. This ensures that the LVIA considers the worst case assumption in respect of both the onshore project substation and National Grid substation extension.

105. The design of the National Grid substation extension is represented by a computer-generated model, indicating the worst case assumption. It is set within the parameters of the Rochdale Envelope marked by a 3D box in the visualisation. This ensures that if any modifications to the design are made, these will occur within the parameters of the worst case assumption assessed.

106. The design of the onshore project substation will be further developed within the parameters set by the Rochdale Envelope The computer-generated model included in the visualisations provides an indicative representation of the worst case assumption within the Rochdale Envelope and this has formed the basis of the LVIA. Those aspects of the design that would not change include the footprint of the development (250m x 300m), the maximum height of the buildings (19m), the maximum height of the lightning protection masts (25m) and the general infrastructure of indoor converter halls and outdoor electrical infrastructure. The computer-generated model has been included in the photomontages to give an impression of the general appearance and character of the onshore project substation, set within the parameters of the Rochdale envelope.

107. Visualisations of energy developments have a number of limitations when using them to form a judgement on the effects of this type of development. These include:

- A visualisation can never show exactly what the energy development will look like in reality due to factors such as: different lighting, weather and seasonal conditions which vary through time and the resolution of the image;
- The images give a reasonable impression of the scale of the energy developments and the distance from the viewpoint and, whilst they have been produced to accord with best practice guidance, can never be 100% accurate;
- 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 development these images are best viewed in the field at the viewpoint location shown; and
- The visualisations must be printed at the right size to be viewed properly (A1 width) and viewed at a comfortable viewing distance.

108. 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 (35mm negative size) CMOS sensor. The photographs are taken on a tripod with a pano-head at a height of approximately 1.5m above ground.

109. 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. These should be viewed flat at a comfortable arm's length.

110. 53.5-degree field of view frames have been used to assist interpretation of the likely effects of the project. They show an enlarged image of the development, which is considered authentic in conveying the likely actual scale that would be experienced on site. For some viewpoints two or three 53.5 degree frames have been included to illustrate the full extent of the project. A 90-degree baseline photograph frame has also been included to illustrate the wider context of the views experienced from each viewpoint.

111. These images are each printed on paper 841 x 297 mm (half A1), which provides for a relatively large-scale image. Tonal alterations are made using Adobe software to create an even range of tones across the photographs once joined.

112. 3D model views that illustrate the onshore project substation and National Grid substation extension within a computer-generated image of the landform are used in the assessment to present an indicative appearance of the project. These are produced with Visual Nature Studio software and are based on the OS Terrain 5 digital terrain model with a 5m data grid (OS Terrain 5). There are limitations in the

accuracy of DTM data so that finer elements of landform may not be picked up precisely and may result in parts of the onshore project substation or National Grid substation extension, 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 extent of onshore infrastructure visible this refers to the illustrations generated and therefore the reality may differ to a degree from these impressions. The modifications to the overhead line, which include an additional two towers and an incremental change in the location and height of another tower, are included in the ES photomontages.

113. Photomontages have been produced for all the representative viewpoints, using Adobe Photoshop software, to provide a realistic image of the appearance of the project. For most views, these include the introduction of the onshore project substation, National Grid substation extension and overhead line modifications, as these are the elements that create the greatest change in views and are likely to be most visible from the surrounding area. The location and scale of the computer-generated model has been verified using markers such as the existing transmission towers, the existing substations, church towers and other fixed built features in the landscape.

114. The photographs 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.

115. GPS readings and accurate aerial photography have been used to verify viewpoint locations and markers within the OS terrain model, which is referenced to the OS British National Grid co-ordinate system.

116. In respect of the onshore project substation and National Grid substation extension, there are twelve representative viewpoints shown in Figures 29.23 to 29.46. Viewpoints 1 to 8 were agreed with Statutory Consultees involved in the LVIA ETG Meetings for Norfolk Vanguard, while Viewpoints 9 to 12 were added in response to comments raised at these meetings and since agreed through the Norfolk Boreas ETG consultation. For the Norfolk Boreas LVIA, Viewpoint 3 has been micro-sited to allow slightly fuller visibility of the project. Visualisations have been prepared to represent Scenario 1 and Scenario 2.

117. The Scenario 1 figures for each viewpoint show the following;

- Location map of the viewpoint, baseline photograph and computer-generated model;

- Photomontage of Norfolk Boreas and Norfolk Vanguard onshore project substations, National Grid substation extensions and overhead line modifications; and
- Photomontage of Norfolk Boreas and Norfolk Vanguard onshore project substations, National Grid substation extensions, overhead line modifications and mitigation planting relating to Norfolk Vanguard and Scenario 1 Norfolk Boreas.

118. The Scenario 2 figures for each viewpoint show the following;

- Location map of the viewpoint, baseline photograph and computer-generated model;
- Photomontage of Norfolk Boreas onshore project substation, National Grid substation extension and overhead line modification; and
- Photomontage of Norfolk Boreas onshore project substation, National Grid substation extension, overhead line modification and mitigation planting relating to Scenario 2 Norfolk Boreas.

8.2.3 Public access

119. The assessment has been carried out from publicly accessible areas. In instances where parts of these areas have been inaccessible, other sources of information have been used and professional judgement has been applied in the interpretation of these sources. For example, where sections of the busy A47 have been inaccessible owing to the health and safety risks, then safe stopping places nearby have been used in order to gain a similar experience and the assessment has been supplemented through the use of Google Earth to better understand the experience from the road.

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