

Hornsea Project Three
Offshore Wind Farm



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Preliminary Environmental Information Report:
Annex 4.1 - Landscape and Visual Impact Assessment Methodology

Date: July 2017

Environmental Impact Assessment

Preliminary Environmental Information Report

Volume 6

Annex 4.1 - Landscape and Visual Impact Assessment Methodology

Liability

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Summary

This annex provides details of the methodological approaches used in volume 3, chapter 4: Landscape and Visual Resources. The annex sets out the guidance followed and the methods used in the assessment of any effects of Hornsea Three on landscape and visual resources, the criteria used for the assessment and how the significance of any effects are decided. The annex also includes appendices providing further information on the methods of photography and visualisation, and the Zone of Theoretical Visibility (ZTV) used in the assessment.

Glossary

Term	Definition
Characteristics	Elements, or combinations of elements, which make a contribution to landscape character.
Designated landscape	Areas of landscape identified as being of importance at international, national or local levels, either defined by statute or identified in development plans or other documents.
Development	Any proposal that results in a change to the landscape and/or visual environment.
Elements	Individual parts which make up the landscape, such as, for example, trees, hedges and buildings.
Feature	Prominent elements in the landscape, such as tree clumps, church towers or wooded skylines.
Green Infrastructure	Networks of green spaces and watercourses and water bodies that connect rural areas, villages, towns and cities.
Heritage	The historic environment and especially valued assets and qualities, such as historic buildings and cultural traditions.
Indirect effects	Effects that result indirectly from the proposed project as a consequence of the direct effects, often occurring away from the site, or as a result of a sequence of interrelationships or a complex pathway. They may be separated by distance or in time from the source of the effects.
Key characteristics	Elements which are particularly important to the current character of the landscape and help to give an area its particularly distinctive sense of place.
Landform	The shape and form of the land surface which has resulted from combinations of geology, geomorphology, slope, elevation and physical processes.
Landscape	An area, as perceived by people, the character of which is a result of the action and interaction of natural and/or human factors.
Landscape character	A distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse.
Landscape Character Areas (LCAs)	These are single unique areas which are the discrete geographical areas of a particular landscape type.
Landscape Character Assessment	The process of identifying and describing variation in the character of the landscape, and using this information to assist in managing change in the landscape. It seeks to identify and explain the unique combination of elements and features that make landscape distinctive. The process results in the production of a Landscape Character Assessment.
Landscape effects	Effects on the landscape as a resource in its own right.
Landscape quality (condition)	A measure of physical state of the landscape. It may include the extent to which typical character is represented in individual areas, the intactness of the landscape and the condition of individual elements.
Landscape receptors	Defined aspects of the landscape resource that have the potential to be affected by the proposal.
Landscape Value	The relative value that is attached to different landscapes by society. A landscape may be valued by different stakeholders for a whole variety of reasons
Magnitude (of effect)	A term that combines judgements about the size and scale of the effect, the extent of the area over which it occurs, whether it is reversible or irreversible and whether it is short or long term in duration.

Term	Definition
Photomontage	A visualisation which superimposes an image of a proposed development upon a photograph or series of photographs [of the existing landscape].
Seascape	The visual and physical conjunction of land and sea which combines maritime, coast and hinterland character.
Susceptibility	The ability of a defined landscape or visual receptor to accommodate the specific proposed development without undue negative consequences.
Townscape	The character and composition of the built environment including the buildings and the relationships between them, the different types of urban open space, including green spaces, and the relationship between buildings and open spaces.
Tranquillity	A state of calm and quietude associated with peace, considered to be a significant feature in the landscape.
Visual amenity	The overall pleasantness of the views people enjoy of their surroundings, which provides an attractive visual setting or backdrop for the enjoyment of activities of the people living, working, recreating, visiting or travelling through an area.
Visual effects	Effects on specific views and on general visual amenity experienced by people.
Visual Receptors	Individuals and/or defined groups of people who have the potential to be affected by a proposal.
Visualisation	A computer simulation, photomontage or other technique illustrating the predicted appearance of a proposed development.
Zone of Theoretical Visibility (ZTV)	A map, usually digitally produced, showing areas of land within which a development is theoretically visible.

Units

Unit	Description
cm	Centimetre
m	Metre
km	Kilometre

Acronyms

Unit	Description
AONB	Area of Outstanding Natural Beauty
DSM	Digital Surface Model
DTM	Digital Terrain Model
EIA	Environmental Impact Assessment
GLVIA3	Guidelines for Landscape and Visual Impact Assessment
GPS	Geographical Positioning System
LVIA	Landscape and Visual Impact Assessment
RPaG	Registered Park and Garden
ZTV	Zone of Theoretical Visibility

1. Landscape and Visual Impact Assessment Methodology

1.1 Introduction

1.1.1.1 This methodology note has been drafted to provide a clear and transparent basis for the Hornsea Three landscape and visual resources assessment of the potential effects of the proposed landfall, cable route, booster station(s) and onshore HVDC converter/HVAC substation.

1.1.2 Guidance

1.1.2.1 As well as relevant planning policy and guidance detailed in volume 3, chapter 4: Landscape and Visual Resources, the methodology used for the landscape, visual and cumulative assessment had regard to relevant guidance and requirements contained in published documents, including that in the following:

- Council of Europe, The European Landscape Convention (2000, ratified 2006) ETS No. 176;
- Landscape Character Assessment, Guidance for England and Scotland (Countryside Agency and Scottish Natural Heritage, 2002);
- Topic Paper 6: Techniques and Criteria for judging Capacity and Sensitivity (Countryside Agency and Scottish Natural Heritage, 2004);
- Design Manual for Roads and Bridges: Volume 11 (Highways Agency, 2008);;
- UK Offshore Energy Strategic Environmental Assessment: Future Leasing for Offshore Wind Farms and Licensing for Offshore Oil and Gas and Gas Storage: Environmental Report and appendices (Department of Energy and Climate Change, 2009);
- and
- Guidelines of Landscape and Visual Impact Assessment, 3rd Edition (Landscape Institute and the Institute of Environmental Management and Assessment, 2013) (GLVIA3).

1.1.3 Approach Taken in Hornsea Three Landscape and Visual Impact Assessment (LVIA)

1.1.3.1 GLVIA3 notes that “This edition concentrates on principles and process. It does not provide a detailed or formulaic ‘recipe’ that can be followed in every situation - it remains the responsibility of the professional to ensure that the approach and methodology adopted are appropriate to the task in hand” (Preface).

1.1.4 Key messages within GLVIA3

Key Messages

1.1.4.1 The GLVIA3 is a guidance document that has been produced by the Landscape Institute and Institute of Environmental Management and Assessment in order to provide an authoritative statement on the principles of assessment and is considered to be the industry standard for landscape practitioners, developers, legal advisors and decision-makers. GLVIA3 contains detailed guidance on a number of areas: the European Landscape Convention; seascape assessment; townscape assessment; historic landscape assessment; quality of life capital, and green infrastructure.

1.1.4.2 There is also emphasis on the iterative design-focused nature of LVIA and its application to different environments, whether the proposed development is situated in a rural landscape, an urban environment, or a marine or coastal landscape. GLVIA3 also emphasises the need for a genuine consultation process.

1.1.4.3 GLVIA3 sets out the need to assess landscape and visual aspects separately. These are separate but related topics, and so it is recommended that these are treated separately throughout the assessment.

1.1.4.4 The guidance emphasises the need for all assessments to be clear and transparent. It encourages the use of a simplified matrix of significance and warns against the use of other topics’ significance criteria. The guidance also warns against reliance on significance tables alone, the emphasis should be on well-argued narrative text, for clarity and transparency.

1.1.4.5 When judging the overall significance of the effects, GLVIA3 reiterates the need to clearly distinguish between effects which are significant and those which are not. It explains that there are no hard or fast rules about what effects should be deemed to be significant. However, the guidance warns against using the term ‘not significant in Environmental Impact Assessment (EIA) terms’, as this phrase has no specific meaning in relation to the EIA Regulations (paragraph 3.32).

1.1.4.6 GLVIA3 explains that valency has no place in impact assessment. Whether an impact is positive or negative should be informed by professional judgement alone.

Assessment of landscape effects

1.1.4.7 The guidance explains that the sensitivity of a landscape resource is a combination of its susceptibility to the type of change or development proposed and the value attached to the landscape. The European Landscape Convention explains that all landscapes have a value. Susceptibility is an additional criterion in the assessment of sensitivity of landscape resources. It is defined as the ability of the landscape receptor to accommodate the proposed development without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies (paragraph 5.40). Landscape value is referred to in GLVIA3 at paragraph 5.44 as *“the value of any Landscape Character Type or Areas that may be affected, based on review of any designations at both national and local levels, and, where there are no designations, judgements based on criteria that can be used to establish landscape value”* and *“the value of individual contributors to landscape character, especially the key characteristics, which may include elements of the landscape, particularly landscape features, notable aesthetic, perceptual or experiential qualities, and combinations of these contributions.”* This is not new guidance, but it includes the assessment of the value of undesignated landscapes through examination of aesthetic, perceptual and experiential qualities (from the Countryside Agency’s ‘Landscape Character Assessment: Guidance for England and Scotland’ (2002) paragraph 7.22) and adds a new criterion ‘recreation value’.

1.1.4.8 The magnitude of impact on the landscape resource includes the size or scale of change in the landscape resource, the geographical extent and the duration of the change. However, it now includes reversibility, which it suggests is combined with duration.

1.1.4.9 GLVIA3 explains that the level of significance can only be defined in relation to each development and specific location. It is for each assessment to determine how the judgements about the landscape receptors and landscape effects should be combined (sequentially or as an overall profile) to arrive at significance and to explain how the conclusions have been derived (paragraph 5.54). This is as the previous guidance, but there is now emphasis on the individuality (and proportionality) of each assessment. The guidance stresses again that there are no set rules on what is and what isn’t a significant effect. The guidance expressly states that the assessment of significance should take into account any designed in mitigation/mitigation as part of the proposals.

Assessment of visual effects

1.1.4.10 The scope of the visual assessment should be consulted upon and agreed with the relevant authorities. GLVIA3 emphasises that requirement for proportionality.

1.1.4.11 In determining the sensitivity of the visual receptor, the assessment should be focussed on the person experiencing the view, rather than the viewpoint itself, with the exception of key or promoted viewpoints. GLVIA3 emphasises that this is not black and white, and that there will in reality be a gradation in susceptibility.

1.1.4.12 The assessment of the magnitude of impact upon visual receptors includes the size and scale of change due to proximity, the geographical extent and the duration of the change. It also includes ‘reversibility’, which should also be combined with the other measurements of change, to assess magnitude.

1.1.4.13 As with the assessment of the significance of landscape effects, the significance of visual effects is described in GLVIA3 as not absolute and can only be defined in relation to each development and its specific location (paragraph 6.42).

Mitigation measures

1.1.4.14 GLVIA3 explains that there are different types of mitigation measures. Mitigation generally falls into three categories:

- Primary measures, developed through the iterative design process, which have become integrated or embedded into the project design;
- Standard construction and operational management practices for avoiding and reducing environmental effects; and
- Secondary measures, designed to address any residual adverse effects remaining after primary measures and standard construction practices have been incorporated into the scheme.

1.1.4.15 Enhancement is also described within the guidance (paragraphs 4.35 to 4.37). It notes that enhancement is not required by the EIA Regulations, but that enhancement can make a very real contribution to sustainable development and the overall quality of the environment. Ideally any enhancement should be an integral part of the project development. The aim of enhancement is to improve the landscape character and visual amenity of the area. Enhancement can be part of an Environmental Management Plan. Hornsea Three will also develop a Landscape Scheme and Management Plan which will include details of any landscape mitigation that may be included as part of the project.

Cumulative effects

1.1.4.16 The chapter on cumulative effects within GLVIA3 includes many references to the Scottish Natural Heritage (2012) guidance ‘Assessing the cumulative impact of onshore wind energy development’. While GLVIA3 sets out the requirement for cumulative assessment to include all development types and not just development of the same type, it emphasises the need for a proportional assessment. The cumulative effects assessment should consider:

- Other types of development, not only wind farms;
- The distance between developments; and
- The different types of cumulative effect (extension, fill, incremental, consequential, combined, successive, sequential (frequent/infrequent)).

1.1.4.17 Paragraph 7.3 of GLVIA3 identifies three types of cumulative effects:

- “Cumulative effects as ‘the additional changes caused by a proposed development in conjunction with other similar developments or as the combined effect of a set of developments, taken together’ (SNH, 2012:4);
- “Cumulative landscape effects as effects that ‘can impact on either the physical fabric or character of the landscape, or any special values attached to it’ (SNH, 2012:10);” and
- “Cumulative visual effects as effects that can be caused by combined visibility, which ‘occurs where the observer is able to see two or more developments from one viewpoint and/or sequential effects which occur when the observer has to move to another viewpoint to see different developments’ (SNH, 2012:11).”

1.1.4.18 GLVIA3 notes at paragraph 7.28 that “the most significant cumulative landscape effects are likely to be those that would give rise to changes in the landscape character of the study area of such an extent as to have major effects on its key characteristics and even, in some cases, to transform it into a different landscape type” and that “this may be the case where the project being considered itself tips the balance through its additional effects”.

1.1.4.19 The approach taken in the Hornsea Three assessment is set out below.

1.1.5 Staged Process

1.1.5.1 In order to undertake the full landscape, visual and cumulative assessment a number of clear stages are identified below. These have been addressed in accordance with the prescribed methodology.

1.1.6 Study Area

1.1.6.1 The study area for the onshore cable corridor has been determined by the width of the onshore cable corridor search area plus 1 km. This study area was established in order to focus the assessment upon the likely significant effects of the onshore cable corridor construction and three main construction compounds, taking into account the likely heights of the construction plant that will be used during the construction phase of the, the receiving landscape character, existing development types, value and the likely visibility of the construction activities.

1.1.6.2 In deriving the study areas for the onshore HVAC booster station and the onshore HVDC converter/HVAC substation, receptors have been considered against four buffers, according to the guidance set out in Guidelines on the Environmental Impacts of Windfarms and Small Scale Hydroelectric Schemes (SNH, 2000). The buffers are described below:

- Up to 2 km (very close views) – May be seen as a dominant focus although the entire development or activity may not be completely visible due to obscuring by landform and because visibility may also be screened or deflected by foreground features such as trees and buildings.

- Between 2-5 km (close views) - Likely to be seen as one of the key elements of the landscape rather than the dominant feature and a larger section of the development or activity is likely to be visible at this distance.
- Between 5-15 km (mid distant views) – Unlikely to be prominent even in clear visibility conditions and is seen as part of the wider landscape composition.
- Between 15-25 km (distant views) - Only likely to be seen in very clear visibility conditions and where a viewer deliberately searches for the feature, the weather conditions are such that the development or activity is highlighted against its surroundings, or views are orientated to face the turbine as a focus. Development or activity from this distance is usually seen as a minor element of a wide landscape composition and is generally unclear.

1.1.6.3 In an effort to focus the assessment on the likely significant effects that may arise as a result of the proposed development, and prevent these from being diluted by a high number of effects that are not determined to be significant, the wider buffers have not been included within the study areas for the onshore HVAC booster station and the onshore HVDC converter/HVAC substation. Additionally, as the booster station and substation buildings are much smaller than the wind turbines dealt with in this guidance and having considered the receiving landscape character, existing development types, landscape value and the likely visibility for the proposed development, the 2 km inner buffer has been reduced to 1 km for the purpose of this assessment which leaves a 1 km inner buffer and a 1-5 km outer buffer.

1.1.6.4 This method for establishing the study areas aligns with the guidance set out in Assessing the impact of small-scale wind energy proposals on the natural heritage (SNH, 2016), which refers specifically to wind turbines and not other development but suggests that an appropriate study area should be identified on a case-by-case basis, based on a clear rationale derived from a Zone of Theoretical Visibility (ZTV) map.

1.1.6.5 As a result of this approach and consultation at the scoping stage with PINS, offshore elements of Hornsea Three have been scoped out of this onshore assessment.

1.1.7 Zone of Theoretical Visibility

1.1.7.1 A preliminary Zone of Theoretical Visibility (ZTV, based on a mix of digital surface model (DSM) and topographical height data) has been run for the onshore HVDC converter/HVAC substation heights (indicated on Figures 5.2 and 5.3 in volume 3, chapter 4 Landscape and Visual Resources). This has enabled the identification of those parts of the study area that may experience landscape and visual effects due to the development of the project.

1.1.7.2 Through consultation with North Norfolk District Council, and South Norfolk District Council, the number and location of representative and sensitive viewpoints within the study area has been agreed.

1.1.8 Desk Study

1.1.8.1 A desk study for those areas that the ZTV of the onshore HVDC converter/HVAC substation extends over, as well as the character areas that the study area of the landfall and cable route extends over, has been undertaken. The study has included collecting information on: relevant current landscape policy context for the site and surrounding areas; and existing landscape and seascape character assessments for the site and surrounding areas, at national, regional and local levels (annexes 4.2 to 4.4).

1.1.9 Field Study

1.1.9.1 Site visits to undertake viewpoint photography and verify the findings of the desk based character study were undertaken by RPS on December 6th and 7th 2016 and March 8th to the 10th and March 15th to the 17th 2017.

1.1.9.2 The baseline landscape character and the visual baseline has been described in the annexes and summarised in volume 3, chapter 4: Landscape and Visual Resources.

1.1.10 Project description

1.1.10.1 The LVIA contains a brief description of those aspects of the proposed development relevant in this context. The project is described in detail in volume 1, chapter 3: Project Description.

1.1.11 Visualisation

1.1.11.1 To aid the assessment, computer generated wireframes showing the proposed development from the agreed representative viewpoints have been undertaken. Viewpoints for the HVAC booster station site have been agreed with North Norfolk District Council and viewpoints for the HVDC converter/HVAC substation have been agreed with South Norfolk Council. Representative viewpoints for the onshore cable route will be agreed, as required, with the relevant local planning authorities through the PEIR process, and further discussed once the alignment of the final onshore cable corridor has been further refined.

1.1.12 Assessment

1.1.12.1 An assessment of the magnitude and extent of impact and the significance of any effects arising from the development upon the landscape character, and the existing visual environment has been undertaken and reported in [Chapter ()]. This follows the method set out in this annex. The significance of the effects during the construction, operational and decommissioning stages for the development has been assessed.

1.1.12.2 The potential effects of the development, in combination with other developments on landscape resources, have been considered. These will include:

- Direct and indirect effects on designated and undesignated landscapes.

1.1.12.3 The effects of the project on visual receptors will include consideration of potential effects on the following:

- Views from residential properties;
- Views from public rights of way and publicly accessible land;
- Views from tourist and recreational receptors;
- Views from community receptors;
- Views from commercial and industrial receptors; and
- Views from dynamic receptors road/rail/marine.

1.1.12.4 Data required to inform the study has included the following:

- Landscape character areas and descriptions;
- Photomontage or wireframe representations;
- Assessment of meteorological data for visibility for the past 10 years;
- Assessment of visual receptors; and
- Field work to confirm desk-based study and for descriptions of chosen viewpoints.

1.1.12.5 Where no published data is available, characterisation has been undertaken using a combination of desk gathered data, e.g., from other specialists working on the project, and field surveys.

1.1.13 Mitigation

1.1.13.1 An assessment of the outline mitigation measures, incorporated within the proposals to help reduce identified potential landscape and visual effects, has been included in the LVIA.

1.1.14 Method Statements

1.1.14.1 RPS has developed method statements which are relevant to the LVIA assessment, these are as follows:

- Method Statement for Photography and Photomontages; and
- Method Statement for Zone of Visual Influence.

1.1.14.2 These are described in detail in Appendices A and B to this methodology.

2. Assessment of Effects

2.1 Assessment criteria and significance of effect

2.1.1.1 The effects on the landscape resources or visual receptors are assessed by considering the proposed change against the type of resource or receptor. See Figure 2.1 below.

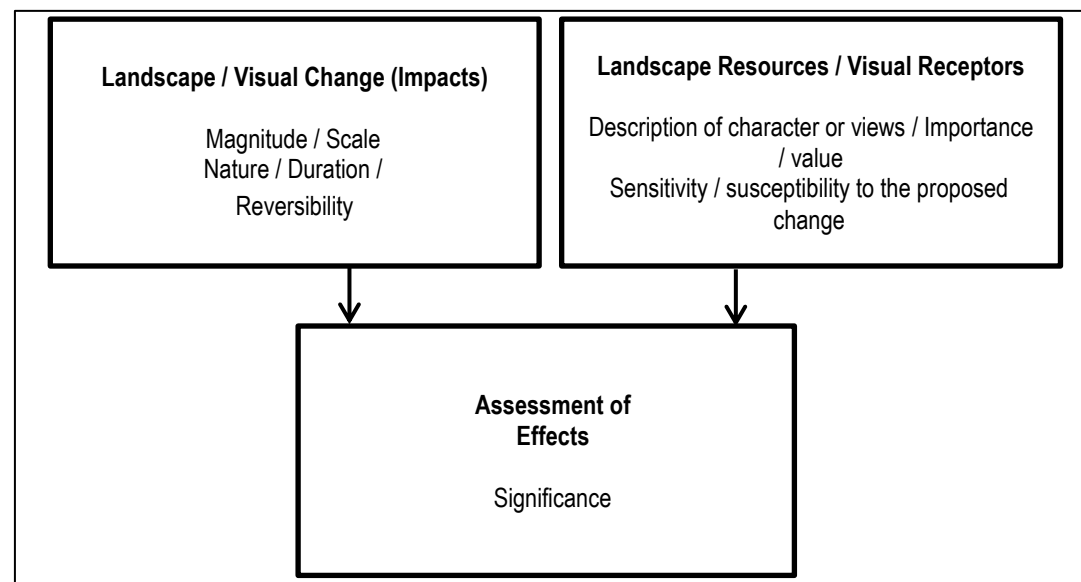


Figure 2.1: Assessment Methodology Summary.

2.1.1.2 These factors are determined by a combination of quantitative and qualitative assessment using professional judgement. The magnitude of change is expressed on a scale of no change to major (see Table 2.1). The resource or receptor sensitivity is expressed on a scale of negligible to very high (see Table 2.2 and Table 2.3). Resource value is expressed on a scale of negligible to very high (see Table 2.2).

2.1.2 Duration of Impact

2.1.2.1 The duration of impacts falls into two criteria, temporary and permanent. Where impacts are identified they can be either:

- Temporary short term (0-2 years);
- Temporary medium term (2-5 years);
- Temporary long term (5-15 years); or

- Permanent (15 years or greater).

2.1.3 Magnitude of change

2.1.3.1 The magnitude of change of a particular proposal depends on:

- Nature of proposed development and change to existing baseline;
- Scale of proposed change;
- Duration of change; and
- Reversibility.

2.1.3.2 Definitions of magnitude of impact are set out in Table 2.1 below.

Table 2.1: Definition of terms relating to the magnitude of an impact.

Magnitude	Definition	
	Landscape resource	Visual resource
Major	Total loss or addition or/very substantial loss or addition of key elements/features/patterns of the baseline, i.e. pre-development landscape and/or introduction of dominant, uncharacteristic elements with the attributes of the receiving landscape.	Complete or very substantial change in view involving complete or very substantial obstruction of existing view or complete change in character and composition of baseline, e.g. through removal of key elements.
Medium	Partial loss or addition of or moderate alteration to one or more key elements/features/patterns of the baseline, i.e. pre-development landscape and/or introduction of elements that may be prominent, but may not necessarily be substantially uncharacteristic with the attributes of the receiving landscape.	Moderate change in view: which may involve partial obstruction of existing view or partial change in character and composition of baseline, i.e., pre-development view through the introduction of new elements or removal of existing elements. Change may be prominent, but would not substantially alter scale and character of the surroundings and the wider setting. Composition of the views would alter. View character may be partially changed through the introduction of features which, although uncharacteristic, may not necessarily be visually discordant.
Low	Minor loss or addition of or alteration to one or more key elements/features/patterns of the baseline, i.e., pre-development landscape and/or introduction of elements that may not be uncharacteristic with the surrounding landscape.	Minor change in baseline, i.e., pre-development view – change would be distinguishable from the surroundings whilst composition and character would be similar to the pre-change circumstances.

Magnitude	Definition	
	Landscape resource	Visual resource
Negligible	Very minor loss or addition of or alteration to one or more key elements/features/patterns of the baseline, i.e., pre-development landscape and/or introduction of elements that are not uncharacteristic with the surrounding landscape approximating to a 'no-change' situation.	Very slight change in baseline, i.e., pre- development view – change barely distinguishable from the surroundings. Composition and character of view substantially unaltered.
No change	No loss, alteration or addition to the receiving landscape resource.	No alteration to the existing view.

2.1.3.3 To assist in more detailed analysis of magnitude, intermediate definitions have been included in the significance matrix. Intermediate definitions would include a variety of change – types from both definitions listed. See Table 2.2 below.

2.1.4 Sensitivity

2.1.4.1 Landscape sensitivity is referred to in GLVIA3 at paragraph 5.39 “Landscape receptors need to be assessed firstly in terms of their sensitivity, combining judgements of their susceptibility to the type of change or development proposed and the value attached to the landscape.”

2.1.4.2 The sensitivity of landscape resources and visual receptors to a development is dependent on a range of factors and is classified on a five point scale (negligible, low, medium, high and very high) as set out in Table 2.2 and Table 2.3 below. However, these tables can only illustrate general categories, as sensitivity is project specific, that is, how sensitive the resource or receptor is to the particular development proposed.

2.1.5 Value of Landscape Resources

2.1.5.1 Landscape value is defined in the glossary of GLVIA3 as the “relative value that is attached to different landscapes by society. A landscape may be valued by different stakeholders for a whole variety of reasons.”

2.1.5.2 The value of certain landscapes has been recognised, e.g., the national designation of Area of Outstanding Natural Beauty (AONB) and Registered Parks and Gardens (RPaG). The aspects of the landscape that led to the designations will be noted, as will the degree to which that aspect is present in the particular area under consideration.

2.1.5.3 Other landscapes are undesignated, but valued locally for specific reasons or specific elements/features. The value of an area of landscape is expressed both through designation and also other criteria, such as tranquillity, remoteness, wildness, scenic beauty, cultural associations and conservations interests.

2.1.5.4 How the value of landscape resources might be affected by a development is, like sensitivity of landscape resources, classified on a five point scale (negligible, low, medium, high and very high) as set out in Table 2.2 below. The table can only illustrate general categories, as the effects on an area or element of landscape are peculiar to the development proposed and that particular aspect affected.

Table 2.2: Definition of terms relating to the sensitivity and value of landscape resources.

Sensitivity	Definition	
	Landscape resource sensitivity	Landscape resource value
Very High	Exceptional landscape quality, no or limited potential for substitution. Key elements features well known to the wider public. Little or no tolerance to change.	Nationally/internationally designated/valued landscape, or key elements or features of nationally/internationally designated landscapes. Little or no tolerance to change.
High	Strong/distinctive landscape character; absence of landscape detractors. Low tolerance to change.	Regionally/nationally designated/valued countryside and landscape features. Low tolerance to change.
Medium	Some distinctive landscape characteristics; few landscape detractors. Medium tolerance to change.	Locally/regionally designated/valued countryside and landscape features. Medium tolerance to change.
Low	Absence of distinctive landscape characteristics; presence of landscape detractors. High tolerance to change.	Undesignated countryside and landscape features. High tolerance to change.
Negligible	Absence of positive landscape characteristics. Significant presence of landscape detractors. High tolerance to change.	Undesignated countryside and landscape features. High tolerance to change.

Table 2.3: Definition of terms relating to the sensitivity and value of visual resources.

Sensitivity	Definition	
	Visual resource sensitivity	Visual resource rationale
Very High	Views of remarkable scenic quality, of and within internationally designated landscapes or key features or elements of nationally designated landscapes that are well known to the wider public. Little or no tolerance to change.	Observers, drawn to a particular view, including those who have travelled from around Britain and overseas to experience the views. Little or no tolerance to change.
High	Views from residential property, public rights of way and nationally designated countryside/landscape features with public access and National Trails. Low tolerance to change.	Observers enjoying the countryside from their homes or pursuing quiet outdoor recreation are more sensitive to visual change. Low tolerance to change.
Medium	Views from local roads and routes crossing designated countryside/landscape features and 'access land', as well as promoted paths. Medium tolerance to change.	Observers enjoying the countryside from vehicles on quiet/promoted routes are moderately sensitive to visual change. Medium tolerance to change.
Low	Views from work places, main roads and undesignated countryside/landscape features. High tolerance to change.	Observers in vehicles or people involved in frequent or frequently repeated activities are less sensitive to visual change. High tolerance to change.
Negligible	Views from within and of undesignated landscapes with significant presence of landscape detractors. High tolerance to change.	Observers in vehicles or people involved in frequent or frequently repeated activities are less sensitive to visual change. High tolerance to change.

2.1.5.5 The assessment of the sensitivity of visual receptors draws on GLVIA3 paragraphs 6.33 to 6.44 for the categories in Table 2.3. These refer to residents at home; people who are engaged in outdoor recreation (including those whose attention are likely to be focused on the landscape and on particular views). This also includes visitors to heritage assets or to other attractions where views of the surrounds are an important contributor of the experience and communities where views contribute to the landscape setting enjoyed by residents in the area. However, it should be noted that paragraph 6.32 of the GLVIA refers to the susceptibility of different visual receptors to changes in views and states that *"the occupation or activity of different people experiencing the view at particular locations"* should be recorded and *"the extent to which their attention or interest may therefore be focused on the views and the visual amenity they experience at particular locations."*

2.1.5.6 The purpose of an EIA is to determine, the likely significant environmental effects of a project. It is accepted that, due to the nature and scale of development, a proposed onshore booster station and HVDC converter/HVAC substation could potentially give rise to some significant visual and landscape effects. However, it should be stressed that, not all landscape and visual effects arising would be significant. Furthermore, a significant effect does not necessarily mean that the effect is unacceptable in planning terms. What is important is that the likely effects are transparently assessed and understood in order that the determining authority can bring a balanced, well-informed judgement to bear when making the planning decision. This judgement should be based on weighing up the benefits of a renewable energy project against the anticipated effects, both positive and negative.

2.1.5.7 The significance of effects on landscape, views and visual amenity will be evaluated according to a six-point scale: substantial, major, moderate, minor, negligible or none. A description of the significance criteria is provided in Table 2.4.

Table 2.4: Definition of terms relating to the significance of criteria for landscape and visual effects.

Significance of effects	Landscape resource	Visual resource/amenity
None	Where proposals would not alter the landscape character of the area.	Where proposals would retain existing views.
Negligible	Where proposed changes would have an indiscernible effect on the character of an area.	Where proposed changes would have a barely noticeable effect on views/visual amenity.
Minor	Where proposed changes would be at slight variance with the character of an area.	Where proposed changes to views, although discernible, would only be at slight variance with the existing view.
Moderate	Where proposed changes would be noticeably out of scale or at odds with the character of an area.	Where proposed changes to views would be noticeably out of scale or at odds with the existing view.

Significance of effects	Landscape resource	Visual resource/amenity
Major	Where the proposed changes would be uncharacteristic and/or would significantly alter a valued aspect of (or a high quality) landscape.	Where the proposed changes would be uncharacteristic and/or would significantly alter a valued view or a view of high scenic quality.
Substantial	Where proposed changes would be uncharacteristic and/or would significantly alter a landscape of exceptional landscape quality e.g., internationally designated landscapes, or key elements known to the wider public of nationally designated landscapes - where there is no or limited potential for substitution.	Where proposed changes would be uncharacteristic and/or would significantly alter a view of remarkable scenic quality, within internationally designated landscapes or key features or elements of nationally designated landscapes that are well known to the wider public.

2.1.5.8 For the purposes of this assessment those effects indicated as being of substantial, or major significance, as shaded in Table 2.5 below, are regarded as significant. Effects of moderate and lesser significance have been identified in the assessment, but are not considered significant. Temporary changes, i.e., those during construction and decommissioning, may have higher ratings than the 'significance of effects' assessment would suggest. This is due to their temporary nature. The definitions set out within these tables provide the basis for professional judgement that allows the determination of the significance levels.

Table 2.5: Matrix used for assessment of significance showing the combinations of receptor sensitivity and the magnitude of impact.

	Magnitude of impact					
	No change	Negligible	Minor	Moderate	Major	
Sensitivity of receptor	Negligible	Negligible	Negligible	Negligible or minor	Negligible or minor	Minor
	Low	Negligible	Negligible or minor	Negligible or minor	Minor	Minor or moderate
	Medium	Negligible	Negligible or minor	Minor	Moderate	Moderate or major
	High	Negligible	Minor	Minor or moderate	Moderate or major	Major or substantial
	Very high	Negligible	Minor	Moderate or major	Major or substantial	Substantial

2.1.5.9 GLVIA3 states at paragraph 5.55 that a sequential approach can be adopted when assessing landscape significance "susceptibility to change and value can be combined into an assessment of sensitivity for each receptor, and size/scale, geographical extent and duration and reversibility can be combined into an assessment of magnitude for each effect. Magnitude and sensitivity can then be combined to assess overall significance."

2.1.5.10 Significance can vary depending on individual circumstances and the baseline situation, for example the presence of landscape designations and/or visual detractors. This is particularly true of the effects on landscape resources for instance in assessing whether (or not) a proposed development would:

- Give rise to a new landscape character type in its own right where the proposed development would be the defining landscape characteristic; and/or
- Give rise to a new landscape sub-type in which the proposed development would be a major contributory element in defining character.

2.1.5.11 In the first case the resulting effect would normally be significant. In the second case the assessor must use professional judgement to determine if the effect is significant or not.

2.2 Cumulative Landscape and Visual Assessment

2.2.1 Introduction

2.2.1.1 The cumulative assessment will consider existing and consented development, and may include other major planning proposals within an agreed distance of the boundaries of the proposed site or Zone of Influence and as set out in current PINS' guidance (Cumulative Effects Assessment, 2015) will include those projects that are:

- Built and operational;
- Under construction;
- Permitted application(s), but not yet implemented;
- Submitted application(s) not yet determined which, if permitted, would affect the proposed development in the scoping report; and
- Identified in the Development Plan (and emerging Development Plans - with appropriate weight being given as they move closer to adoption) recognising that much information on any relevant proposals will be limited.

2.2.1.2 The final list of projects will be agreed with North Norfolk District Council, Broadland District Council, South Norfolk Council, Norfolk County Council and the Planning Inspectorate.

2.2.1.3 The search area for cumulative schemes will be the same as the study areas.

2.2.1.4 Potential cumulative effects of the development will be assessed by considering the degree of overlap between the ZTV of the proposal and those of other developments. The significance of cumulative effects will be established by cross-referencing the sensitivity of viewpoints where more than one site would be visible and the cumulative magnitude of effect on each particular view.

2.2.1.5 GLVIA3 identifies the following main types of potential cumulative visual effect:

- The extension to an existing development of the positioning of a new development;
- The 'filling' of an area with either the same or different types of development over time;
- The interactions between different types of development, each of which may have different landscape and/or visual effects and where the total effect is greater than the sum of the parts;
- Incremental change as a result of successive individual developments such that the combined visual effect is significant even though the individual effects may be;
- Temporal effects, referring to the cumulative impacts of simultaneous and/or successive projects that may affect communities and localities over an extended period of time;
- Effects of development which have indirect effects on other development, either by enabling it or disabling it; and
- Visual effects resulting from a future action that removes something from the existing landscape which may have consequences for other existing or proposed development.

2.2.1.6 The potential cumulative effects of the development, in combination with other developments, on landscape character should be considered. These will include those aspects described in section 2 of this methodology.

2.2.1.7 The cumulative effects of the development on visual resources will include consideration of potential effects on those types of visual receptors detailed in section 2 of this annex.

3. References

Countryside Agency and Scottish Natural Heritage (2002) Landscape Character Assessment

Countryside Agency and Scottish Natural Heritage (2004) Topic Paper 6: Techniques and Criteria for Judging Capacity and Sensitivity. Cheltenham, The Countryside Agency.

Department of Energy and Climate Change (2009) UK Offshore Energy Strategic Environmental Assessment: Future Leasing for Offshore Wind Farms and Licensing for Offshore Oil and Gas and Gas Storage: Environmental Report. London, Department of Energy and Climate Change.

Guidance for England and Scotland. Cheltenham, The Countryside Agency.

Highways England (2008) Design Manual for Roads and Bridges: Volume 11. London, The Stationery Office.

Landscape Institute and the Institute of Environmental Management and Assessment (2013) Guidelines for Landscape and Visual Impact Assessment. 3rd ed. London, Routledge.

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2009. 2009. SI 2009/2263. London, The Stationery Office.

Appendix A Photography and Visualisation Methodology

A.1.1.1 In order to produce photographs of suitable quality to be used in the photomontages, the following points are adhered to as much as possible following the guidance set out within the Landscape Institute guidance of Photography and photomontage in landscape and visual impact assessment, 2011 as well as within the SNH guidance set out in Visual Representation of Windfarms, 2006:

- Photographs are taken in weather conditions of clear visibility;
- The same exposure is used for all the frames i.e. manual exposure is used to avoid the photographs having different exposures. Alternatively a camera with an exposure lock with a carefully set exposure is used, especially where wider panoramas are taken, and/or where a proportion of the panorama may be taken partially looking towards the sun (which can be a particular problem in early morning/late afternoon/wintertime);
- A 50mm lens is used in a 35 mm format);
- A 50% overlap is taken between photos to allow the sides of each photo to be removed when splicing the photos together to minimise distortion;
- Panoramas are produced by splicing standard photographs with recognised software (e.g., Adobe Photoshop) and not by the use of specialist cameras in order to minimise distortion;
- A levelled tripod is used. In addition, the camera is also levelled using a spirit level that sits in the flash socket of an SLR camera. This ensures that the sea horizon is in the centre of the frame;
- A very high quality camera lens is used, the Canon 5D full frame sensor camera;
- When taking the photograph, the precise location is recorded using a hand held Geographical Positioning System (GPS). The orientation to the proposed development, approximate altitude (ground level), date, time of day and weather conditions are recorded for each viewpoint;
- The height from ground to centre of camera lens is recorded;
- If, when on site, the proposed viewpoint location is screened by trees or minor variations in topography, the viewpoint is relocated and the new location details recorded and submitted to the relevant parties with reasons for relocation. Winter views, if feasible, will ensure maximum visibility through vegetation cover;
- Where possible, the onshore HVDC converter/HVAC substation site is positioned in the middle of the view with frames taken either side to give context;
- Where possible, reference points are recorded with Geographical Positioning System (GPS) locations or compass bearings;
- To ensure all photos align, all shots are taken from the same location/grid co-ordinate by turning the tripod on the same spot; and
- Curvature of the earth - Along the horizon view you may be looking at objects over 10 km away. The panoramic photograph may start to show a fish eye effect i.e., vertical objects on the edge of

the photograph appear to lean over. In addition proposals may start to disappear off the horizon, i.e., out of view.

A.2 Methodology for the production of computer models (visualisations)

A.2.1.1 The proposed development is modelled to be superimposed on the photograph to generate the photomontage. Based on the use of AutoCAD® and SketchUp to generate the photomontages, the following procedure is used (and are in line with guidance set out in Visual Representation of Windfarms, 2006 from SNH):

- Base mapping and height data of the relevant area are set up to real-world OS co-ordinates;
- The proposed development is located according to the scheme design using the correct onshore HVDC converter/HVAC substation specification. A wireline is produced in AutoCAD® and where full photomontages are produced, the development is rendered using SketchUp;
- The arrangement and size of the development are modelled in accordance with the application;
- Viewpoint locations are inputted using GPS data collected on site;
- The panoramic photography is then aligned for the relevant viewpoint using GPS data collected on site;
- The direction and viewing angle of the perspective is then matched with each photographic frame in the panoramic views;
- Photographs are corrected for colour, brightness and contrast to ensure that image quality is optimised. Model lighting is corrected to match photographic conditions; and
- The rendered photomontages are generated.

A.3 Presentation

A.3.1.1 Photomontages are used as a series of figures in this Environmental Statement. The general format of this document is A3 landscape.

- Each viewpoint is presented on an A3 sheet showing the existing view and the proposed view with specific camera information and distances to the onshore HVDC converter/HVAC substation. The A3 format allows for a 75° field of view, which should be viewed at approximately 300 mm from the image. If the print is curved around the viewer to give a constant 300 mm distance it produces an accurate reproduction of how the viewer would perceive things on site; and,
- Views are annotated to aid interpretation.

Appendix B Zone of Theoretical Visibility Methodology

B.1 Method for calculating a Zone of Theoretical Visibility (ZTV)

- B.1.1.1 ZTV calculation is performed in ArcGIS 10.1 using the Viewshed Analysis tool (part of the 3d Analyst extension). A ZTV is a line of site indication between an object (e.g., a wind turbine) and an observer location over a digital terrain model (DTM) or DSM. If the object is visible, a value of one is returned, otherwise the value is zero. If there is more than one object, the results are added together to give an indication of how many objects are visible from that single observer location.
- B.1.1.2 The ZTV is based on a combination of topographical data throughout the study area and more detailed data within 1 km of the onshore HVDC converter/HVAC substation. It provides a more accurate (although not definitive) reflection of screening effect of buildings, structures and vegetation. A combination of Infoterra 2 m Digital Surface model and 10 m Ordnance Survey Digital Terrain Model was used.
- B.1.1.3 The combined terrain and surface model has a resolution of 2 m, meaning that the landform is split into individual cells (pixels/squares) of 2 by 2 m. Each cell has a single height value representing the average height for the whole cell.
- B.1.1.4 A 2 m DTM was interpolated from the lower resolution 10 m DTM to allow the analysis to use a single resolution.
- B.1.1.5 When making the calculation the following variables are used:
- Offset A = the height of the object; and
 - Offset B = the height of the observer. Assumed to be the eye level of a standing adult and set at 1.5 m.
- B.1.1.6 The curvature of the earth is also incorporated.
- B.1.1.7 The accuracy of the resulting ZTV is dependent on the accuracy and resolution of the underlying DTM and DSM. The Infoterra 2 m DSM has a reported vertical accuracy of +/- 15 cm. The Ordnance Survey 10m DTM has a reported vertical accuracy of +/- 2.5 m in lowland areas. The vertical accuracy of the interpolated 2 m DTM may be lower than the 10m data as supplied.
- B.1.1.8 The 2 m resolution DSM may not pick up the heights of structures smaller than 2 m in all dimensions.

- B.1.1.9 A further caveat is the nature of a DTM which considers a mix of topographic and DSM data. Those landscape features such as buildings, and vegetation further afield, are not included. Therefore the ZTV will tend to provide a worst-case scenario outside the area of the DSM data, as if there were no built features or other obstructions within the landscape to act as visual barriers above the existing relief, see figure 2, below.

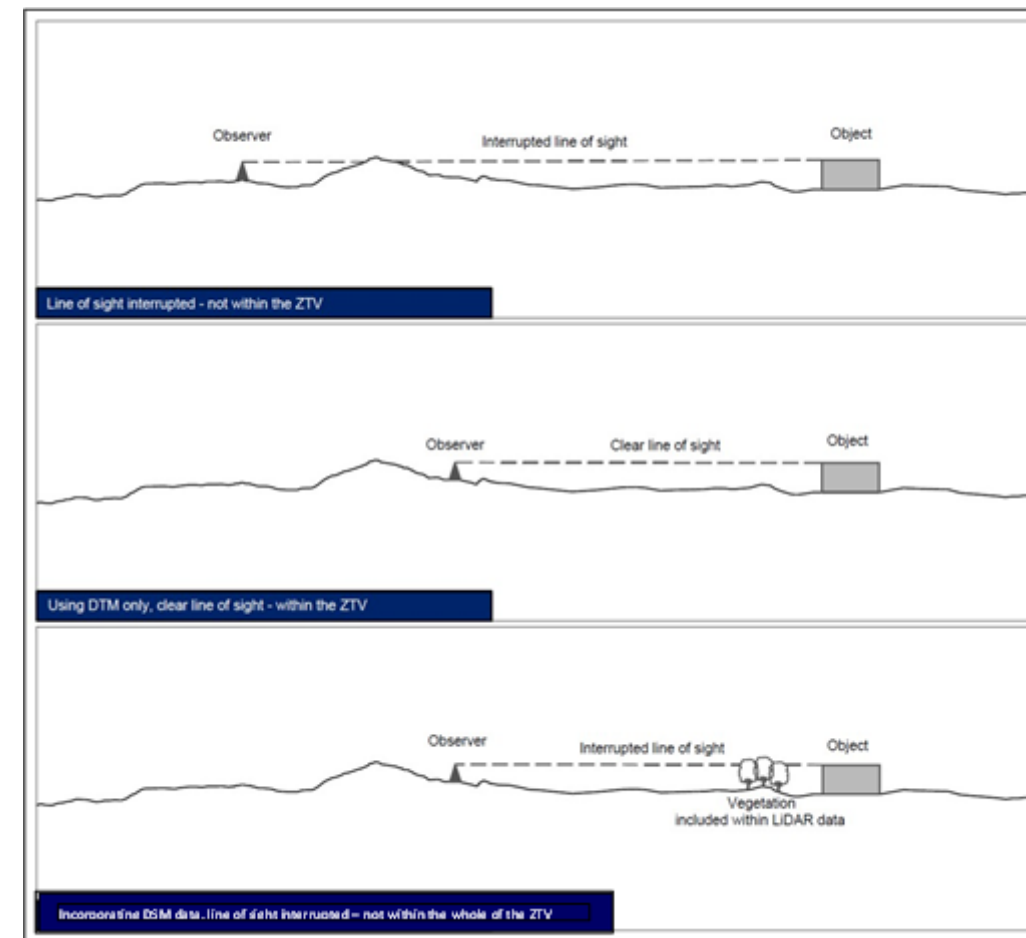


Figure B.1: (Appendix B) Zone of Theoretical Visibility.