

Hornsea Project Three  
Offshore Wind Farm



## Hornsea Project Three Offshore Wind Farm

Environmental Statement:  
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Hornsea 3  
Offshore Wind Farm

Orsted

**Environmental Impact Assessment**

**Environmental Statement**

**Volume 6**

**Annex 4.1 - Landscape and Visual Impact Assessment Methodology**

**Liability**

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## 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.
Environmental Impact Assessment	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Directive and EIA Regulations, including the publication of an Environmental Statement.
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 Hornsea Three 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	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 character type	These are distinct types of landscape that are relatively homogeneous in character. They are generic in nature in that they may occur in different areas in different parts of the country, but wherever they occur they share broadly similar combinations of geology, topography, drainage patterns, vegetation, historical land use, and settlement pattern.
Landscape effects	Effects on the landscape as a resource in its own right.

Term	Definition
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.
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.
Sensitivity	A term applied to specific receptors, combining judgements of the susceptibility of the receptor to the specific type of change or development proposed and the value related to that receptor.
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	A map, usually digitally produced, showing areas of land within which a development is theoretically visible.

## Acronyms

Unit	Description
AONB	Area of Outstanding Natural Beauty
BDC	Broadland District Council
DSM	Digital Surface Model
DTM	Digital Terrain Model
EIA	Environmental Impact Assessment
GLVIA3	Guidelines for Landscape and Visual Impact Assessment
GPS	Geographical Positioning System
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
LCA	Landscape Character Area
LCT	Landscape character type
LVIA	Landscape and Visual Impact Assessment
NCC	Norfolk County Council
NCP	Norfolk Coast Partnership
NNDC	North Norfolk District Council
RPaG	Registered Park and Garden
SNDC	South Norfolk District Council
ZTV	Zone of Theoretical Visibility

## Units

Unit	Description
cm	Centimetre
m	Metre
km	Kilometre

## 1. Landscape and Visual Impact Assessment Methodology

### 1.1 Introduction

1.1.1.1 This annex sets out the method for the Hornsea Three landscape and visual resources assessment of the potential effects of the onshore elements of Hornsea Three, comprising the landfall, onshore cable corridor, onshore HVAC booster station, onshore HVDC converter/HVAC substation, and the interconnection with the Norwich Main National Grid substation, as well as compounds and storage areas.

1.1.1.2 The generic method for the Environmental Statement for Hornsea Three is set out in volume 1, chapter 5: Environmental Impact Assessment Methodology. The Landscape and Visual Impact Assessment (LVIA) methodology presented in this annex departs from the generic methodology in some instances to ensure compliance with the Guidelines of Landscape and Visual Impact Assessment (GLVIA3).

1.1.1.3 The LVIA also assesses landscape and visual effects of the proposed offshore HVAC booster station(s) which would be located within the offshore HVAC booster station search area which is located, at its closest point, approximately 35 km from the Norfolk coast. The method for this particular aspect of the LVIA assessment has been developed in consultation with Norfolk County Council (NCC), the Norfolk Coast Partnership (NCP) and North Norfolk District Council (NNDC) and is included in Appendix D.

### 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 and visual assessment has regard to relevant guidance and requirements contained in published documents, including in the following:

- Council of Europe, The European Landscape Convention (2000, ratified 2006) ETS No. 176;
- Topic Paper 6: Techniques and Criteria for judging Capacity and Sensitivity (Countryside Agency and Scottish Natural Heritage, 2004);
- An Approach to Landscape Character Assessment, Natural England, 2014; and
- GLVIA3.

### 1.1.3 Key messages within GLVIA3

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). 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 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.

1.1.3.2 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.

1.1.3.3 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.

1.1.3.4 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.

1.1.3.5 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).

### **Assessment of landscape effects**

- 1.1.3.6 GLVIA3 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, inter alia, aesthetic, perceptual and experiential qualities.
- 1.1.3.7 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. The magnitude of impact is also influenced by reversibility, which it suggests is combined with duration.
- 1.1.3.8 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). The guidance expressly states that the assessment of significance should take into account any designed in mitigation as part of the proposals.

### **Assessment of visual effects**

- 1.1.3.9 The scope of the visual assessment should be consulted upon and agreed with the relevant authorities.
- 1.1.3.10 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.
- 1.1.3.11 The assessment of the magnitude of impact upon visual receptors includes the size and scale of change, 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.
- 1.1.3.12 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**

- 1.1.3.13 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.
- 1.1.3.14 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.

### **Cumulative effects**

- 1.1.3.15 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)).
- 1.1.3.16 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).”*

1.1.3.17 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”.

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

#### 1.1.4 Staged Process

1.1.4.1 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.

#### 1.1.5 Study Area

1.1.5.1 The Hornsea Three landscape and visual resources study area for the Hornsea Three onshore cable corridor has been determined by the footprint of the corridor, construction compounds and storage areas plus 1 km. The construction area includes temporary compounds and storage areas. The Hornsea Three landscape and visual resources study area for the main construction compound (which will be located away from the Hornsea Three onshore cable corridor) is also 1 km. The 1 km study area was established in order to focus the assessment upon the likely significant effects, taking into account the construction plant, temporary buildings and other elements that will be used during the construction phase, the receiving landscape character, existing development types, and the likely visibility of the construction activities by visual receptors.

1.1.5.2 The Hornsea Three landscape and visual resources study areas for the onshore HVAC booster station and the onshore HVDC converter/HVAC substation are 5 km from the footprint of the permanent land take (excluding the landscape areas). These have been informed by analysis of the Zone of Theoretical Visibility (ZTV) studies (see below) and initial site assessment work. The 5km study areas were established in order to focus the assessment upon the likely significant effects, taking into account the likely heights of the construction and operational equipment and development, the receiving landscape character, existing development types, and the likely visibility of the onshore HVAC booster station and the onshore HVDC converter/HVAC substation by visual receptors.

1.1.5.3 These Hornsea Three landscape and visual resources study areas were set out volume 3, chapter 4: Landscape and Visual Resources in the Preliminary Environmental Information Report (PEIR) and no comments were raised during consultation.

1.1.5.4 As noted in section 1.1 paragraph 1.1.1.3, any proposed offshore HVAC booster station(s) would be located, at its closest point, approximately 35 km from the Norfolk coast; this would be the closest part of Hornsea Three offshore infrastructure visible to land-based receptors during the operation phase. This lies outside the Hornsea Three landscape and visual resources study areas described above and is subject to a separate assessment method which is included in Appendix D. Other elements of Hornsea Three offshore infrastructure would lie further from the coast and are scoped out of the LVIA on the grounds that they are too far offshore to have any significant impacts on onshore receptors.

#### 1.1.6 Zone of Theoretical Visibility

1.1.6.1 Zone of Theoretical Visibility (ZTV) studies were produced for the proposed onshore HVAC booster station and HVDC converter/HVAC substation and based on their maximum potential heights. These are shown on Figures 4.5 and 4.7 in volume 3, chapter 4: Landscape and Visual Resources. The analysis was carried out using a topographic model and including settlements and woodlands (with heights derived from NEXTMAP 25 surface mapping data) as visual barriers in order to provide a more realistic indication of potential visibility.

1.1.6.2 The ZTV study was used to aid the identification of those receptors that are likely to be most affected by Hornsea Three and those that may be scoped out. However, areas shown as having potential visibility may in practice have limited or no visibility of Hornsea Three on account of it being screened by local features such as trees, hedgerows, embankments or buildings.

1.1.6.3 Through consultation with NNDC, SNDC, NCC and the NCP, the number and location of representative viewpoints within the Hornsea Three landscape and visual resources study areas have been agreed.

#### 1.1.7 Desk Study

1.1.7.1 A desk study was undertaken for the Hornsea Three landscape and visual resources study area. The study has included collecting information on: relevant current landscape policy context and existing landscape and seascape character assessments, at national, regional and local levels, and qualities of natural beauty of the Norfolk Coast Area of Outstanding Natural Beauty (AONB) (annexes 4.2 to 4.4).

#### 1.1.8 Field Study

1.1.8.1 Site visits to undertake baseline and impact assessments were undertaken by RPS in December 2016 and March 2017, and by LDA Design in November and December 2017, and January 2018.

#### 1.1.9 Project description

1.1.9.1 The LVIA contains a brief description of those aspects of Hornsea Three relevant in this context, further detail is provided in volume 1, chapter 3: Project Description.

1.1.9.2 The maximum design scenarios which have the potential to result in the greatest effect on an identified resource, receptor or receptor group are used to assess landscape and visual impacts. These scenarios have been selected from the details provided in the project description (volume 1, chapter 3: Project Description).

### 1.1.10 Visualisations

1.1.10.1 To aid the assessment, computer generated wireframes showing the maximum potential design scenarios of the proposed HVAC booster station and the HVDC converter/HVAC substation from the agreed representative viewpoints have been prepared. In addition, photomontages showing indicative designs for the HVAC booster station and the HVDC converter/HVAC substation have been prepared from a selection of these viewpoints, after completion of construction (Year 1) before mitigation planting has matured, and at Year 15 after mitigation planting has matured. The method for preparing wireframes and photomontages is included in Appendix A. The viewpoints from which these wireframes and photomontages have been prepared have been determined in consultation with NCC, NNDC and SNDC as noted in Table 4.4 of volume 3, chapter 4: Landscape and Visual Resources.

### 1.1.11 Assessment

1.1.11.1 An assessment of the magnitude and extent of impact and the significance of any effects arising from Hornsea Three upon the landscape character, and the existing visual environment has been undertaken and reported in volume 3, chapter 4: Landscape and Visual Resources. This follows the method set out in this annex. The significance of the effects during the construction, operational and decommissioning stages for Hornsea Three has been assessed.

1.1.11.2 The potential effects of Hornsea Three, in combination with other developments on landscape resources, have been considered. These include:

- Direct and indirect effects on designated and undesignated landscapes; and
- Direct and indirect effects on visual receptors.

1.1.11.3 Visual receptors are “the different groups of people who may experience views of the development” (GLVIA3, para 6.3). In order to identify those groups who may be significantly affected the ZTV study, baseline desk study and site visits have been used.

1.1.11.4 The different types of groups assessed encompass residents within settlements; people using key routes such as roads; cycle ways or long distance paths; people within accessible or recreational landscapes; people using Public Rights of Way; or people visiting key viewpoints. In dealing with Public Rights of Way and local roads, receptors are grouped into areas where effects might be expected to be broadly similar, or areas which share particular factors in common.

1.1.11.5 Effects on private residential amenity are a separate matter, and only require assessment when a development is has potential to be ‘overwhelming and oppressive’ (as set out within Appendix B). Initial assessment has identified that this is unlikely to occur at any residential properties. However, following a precautionary approach, effects on a small number of residential properties that have the greatest potential to be affected by Hornsea Three near the proposed HVDC converter/HVAC substation will be assessed to test this initial assessment.

### 1.1.12 Mitigation

1.1.12.1 Mitigation measures, incorporated within the proposals to help reduce identified potential landscape and visual effects, have been included in the LVIA. All mitigation measures and enhancements are designed-in to the proposals that are assessed.

## 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.

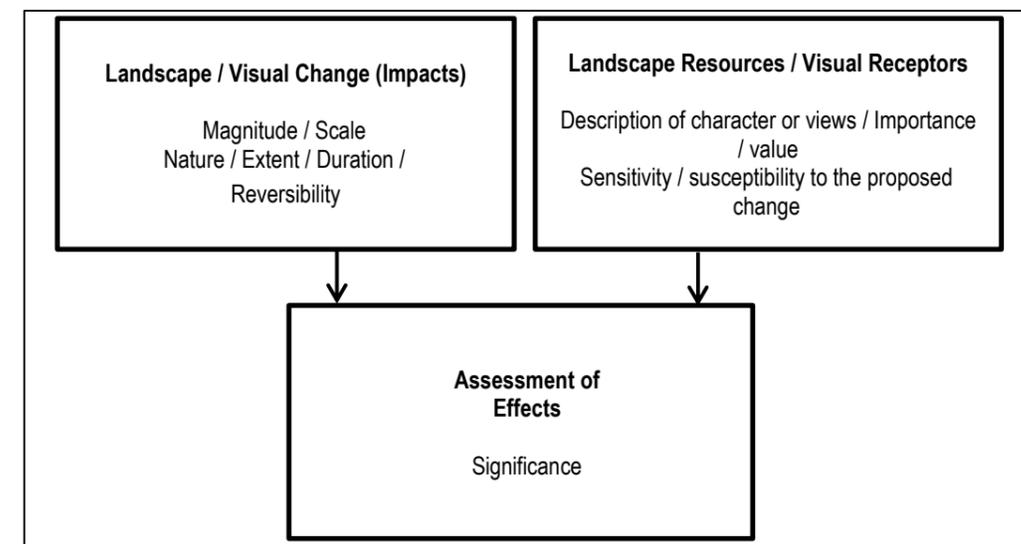


Figure 2.1: Assessment Methodology Summary.

2.1.1.2 These factors are determined by a combination of quantitative and qualitative assessment using professional judgement.

## 2.1.2 Magnitude of change

2.1.2.1 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;
- Extent of change; and
- Reversibility.

2.1.2.2 The magnitude of impact is rated within the range of Major, Moderate, Minor, Negligible and No Change, and is informed by combining the scale, duration and extent of an impact.

2.1.2.3 The scale of impacts is assessed as summarised in Table 2.1.

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

Scale	Definition	
	Landscape resource	Visual resource
Large	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.
Small	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.

Scale	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.

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

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

2.1.2.5 The extent of impacts indicates the geographic area over which effects are felt. Where impacts are identified they can be:

- Limited – site, or part of site, or small part of a receptor area (< approx. 10%);
- Localised – site and surroundings up to 2 km, or part of receptor area (up to approx. 25%);
- Intermediate – up to approx. 2-4 km, or around half of receptor area; or
- Wide – beyond 4km, or more than half of receptor.

## 2.1.3 Sensitivity

2.1.3.1 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), informed by assessments of susceptibility and value as set out in Table 2.2 and Table 2.3 below. However, these tables can only illustrate general categories, as susceptibility is project specific, that is, how susceptible the resource or receptor is to the particular development proposed.

**Sensitivity of Landscape Resources**

- 2.1.3.2 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.” The judgement of sensitivity of landscape resources is arrived at by combining assessments of susceptibility and value on a scale of negligible to very high (see Table 2.2).
- 2.1.3.3 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.”
- 2.1.3.4 The value of certain landscapes has been recognised, e.g., the national designation of 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.
- 2.1.3.5 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.
- 2.1.3.6 The value of landscape resources is, like susceptibility of landscape resources, classified on a five point scale (negligible, low, medium, high and very high) as set out in Table 2.2 below. In addition to the factors of landscape resource value given in Table 2.2, an assessment of landscape value is informed by the following factors outlined in Box 5.1 of GLVIA3: Landscape quality (condition); scenic quality; rarity; representativeness; conservation interest; recreational value; perceptual aspects; and associations (see Appendix C for further detail).
- 2.1.3.7 Assessments of susceptibility and value of a particular resource may be different and professional judgement will always be used to conclude on the judgement of sensitivity. For example, value may be high and susceptibility may be low, and a professional judgement will be made to determine whether sensitivity is high, low or in between, supported by narrative explanation.

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

	Definition	
	Landscape resource susceptibility	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.
High	Strong/distinctive landscape character; absence of landscape detractors.  Low tolerance to change.	Regionally/nationally designated/valued countryside and landscape features.
Medium	Some distinctive landscape characteristics; few landscape detractors.  Medium tolerance to change.	Locally/regionally designated/valued countryside and landscape features.
Low	Absence of distinctive landscape characteristics; presence of landscape detractors.  High tolerance to change.	Undesignated countryside and landscape features.
Negligible	Absence of positive landscape characteristics. Significant presence of landscape detractors.  High tolerance to change.	Undesignated countryside and landscape features.

\* Also informed by assessment of factors outlined in Box 5.1 of GLVIA3 (see Appendix C).

**Sensitivity of Visual Receptors**

- 2.1.3.8 For visual receptors; judgements of susceptibility and value are closely interlinked considerations; for example the most valued views are likely to be those which people go and visit because of the available view – and it is at those viewpoints that their expectations will be highest. The value attributed to visual receptors also relates to the value of the view – for example a National Trail is nationally valued for its access, not necessarily for its views. Views will be treated as valued where there is documentary evidence of that value – such as recommendations to visitors; or reference within special qualities of designated areas.

2.1.3.9 Paragraph 6.32 of the GLVIA refers to the susceptibility of different visual receptors to changes in views and states that susceptibility is mainly a function of “the occupation or activity of different people experiencing the view at particular locations” 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.”

2.1.3.10 The sensitivity of visual receptors is generally rated as set out in Table 2.3.

Table 2.3: Definition of terms relating to the sensitivity of visual receptors.

Sensitivity	Definition
Very High	Visitors to valued viewpoints or routes which people might visit purely to experience the view, e.g. promoted or well-known viewpoints, routes from which views that form part of the special qualities of a designated landscape can be well appreciated; key designed views; panoramic viewpoints marked on maps.
High	People in locations where they are likely to pause to appreciate the view, such as from local waypoints such as benches; or at key views to/from local landmarks. Visitors to local attractions, heritage assets or public parks where views are an important contributor to the experience, or key views into/out of Conservation Areas would also fall into this category. People in the streets around their home, or using public rights of way, navigable waterways or accessible open space (public parks, open access land). Users of promoted scenic rail and road routes.
Medium	Users of cycle routes, local roads and railways. Users of A-roads which are promoted scenic routes.
Low	Outdoor workers. Users of sports facilities such as cricket grounds and golf courses.
Negligible	Users of Motorways and A-roads; shoppers at retail parks, people at their (indoor) places of work.

## 2.1.4 Significance of Effects

2.1.4.1 The significance of effects on landscape and visual receptors is evaluated according to a six-point scale: substantial, major, moderate, minor or negligible. This feeds into the matrix set out in Table 2.4.

Table 2.4: Matrix used for assessment of significance showing the combinations of receptor sensitivity and the magnitude of impact

Sensitivity of receptor	Magnitude of impact				
	No change	Negligible	Minor	Moderate	Major
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

2.1.4.2 For the purposes of this assessment those effects indicated as being of substantial, or major significance are regarded as significant. Effects of moderate and lesser significance have been identified in the assessment, but are not considered significant.

2.1.4.3 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 Hornsea Three would be the defining landscape characteristic; and/or
- Give rise to a new landscape sub-type in which Hornsea Three would be a major contributory element in defining character.

2.1.4.4 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.

### Positive/Adverse/Neutral

2.1.4.5 Effects are defined as adverse, neutral or positive. Neutral effects are those which overall are neither adverse nor positive, but may incorporate a combination of both.

2.1.4.6 The decision regarding the significance of effect and the decision regarding whether an effect is beneficial or adverse are entirely separate. For example, a rating of major and positive would indicate an effect that was of great significance and on balance positive, but not necessarily that the proposals would be extremely beneficial. Whether an effect is positive, neutral or adverse is identified based on professional judgement.

## 2.2 Cumulative Landscape and Visual Assessment

### 2.2.1 Introduction

2.2.1.1 The cumulative assessment considers existing and consented development, and may include other major planning proposals within an agreed distance of Hornsea Three. It will include projects allocated into the following 'Tiers', reflecting their current stage within the planning and development process.

- Tier 1: Hornsea Three considered alongside:
  - Other project/plans currently under construction; and/or
  - Those with consent, and, where applicable (i.e. for low carbon electricity generation projects), that have been awarded a Contract for Difference (CFD) but have not yet been implemented; and/or
  - Those currently operational that were not operational when baseline data was collected, and/or those that are operational but have an on-going impact.
- Tier 2: All projects/plans considered in Tier 1, as well as:
  - Those project/plans that have consent but, where relevant (i.e. for low carbon electricity generation projects) have no CFD; and/or
  - Submitted but not yet determined.
- Tier 3: All projects/plans considered in Tier 2, as well as those on relevant plans and programmes likely to come forward but have not yet submitted an application for consent (the PINS programme of projects and the adopted development plan including supplementary planning documents are the most relevant sources of information, along with information from the relevant planning authorities regarding planned major works being consulted upon, but not yet the subject of a consent application). Specifically, this Tier includes all projects where the developer has advised PINS in writing that they intend to submit an application in the future, those projects where a Scoping Report is available and/or those projects which have published a PEIR.

2.2.1.2 Built and operational developments form part of the existing baseline and are not included in the cumulative assessment.

2.2.1.3 The search area for cumulative schemes is the same as the Hornsea Three landscape and visual resources study areas as defined at section 1.1.5.

2.2.1.4 Potential cumulative effects of Hornsea Three are assessed by considering the degree of overlap between the visibility of the proposal and those of other developments. The significance of cumulative effects is established by cross-referencing the sensitivity of receptors where more than one development would be visible and the cumulative magnitude of effect. The projects which have been screened into the cumulative assessment are listed in volume 4, annex 5.2 Cumulative Effects Screening Matrix and 5.3 Location of Cumulative Schemes.

2.2.1.5 GLVIA3 identifies the following main types of potential cumulative visual effect (Paragraph 7.17):

- The extension to an existing development of the positioning or 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 not 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 Hornsea Three, in combination with other developments, on landscape character are considered. These include those aspects described in section 2 of this methodology.

2.2.1.7 The cumulative effects of Hornsea Three on visual resources include consideration of potential effects on those types of visual receptors detailed in section 2 of this methodology.

### 3. References

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

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Landscape Institute Advice Note 01/11 - Photography and photomontage in landscape and visual impact assessment.

Landscape Institute Technical Note 02/17 – Visual Representation.

Natural England (2014) An Approach to Landscape Character Assessment.

Scottish Natural Heritage (2016) Assessing the impact of small-scale wind energy proposals on the natural heritage.

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

The Planning Inspectorate (2015) Cumulative Effect Assessment Version 1.

## Appendix A ZTV and Photomontage Methodology

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

- A.1.1.1 ZTV studies are prepared using the ESRI ArcGIS Viewshed routine. This creates a raster image that indicates the visibility (or not) of the points modelled. LDA Design undertake a ZTV study that is designed to include visual barriers from settlements and woodlands (with heights derived from NEXTMAP 25 surface mapping data). If significant deviations from these assumed heights are noted during site visits, for example young or felled areas of woodland, the features concerned will be adjusted within the model or the adoption of a digital surface model will be used to obtain actual heights for these barriers. In this instance this has not been required.
- A.1.1.2 The model is also designed to take into account both the curvature of the earth and light refraction, informed by the SNH guidance. LDA Design undertake all ZTV studies with observer heights of 2m.
- A.1.1.3 The ZTV analysis begins at 1m from the observation feature and will work outwards in a grid of the set resolution (on a standard LDA Design assessment this will be at 12.4 sq. m) until it reaches the end of the terrain map for the project.
- A.1.1.4 For all plan production LDA Design will produce a ZTV that has a base and overlay of Ordnance Survey mapping. The ZTV will be reproduced at a suitable scale on an A3 template to encompass the Hornsea Three landscape and visual resources study area.

#### A.1.2 Ground model accuracy

- A.1.2.1 Depending on the project and level of detail required, different height datasets may be used.
- A.1.2.2 Below is listed the different data products and their specifications:

Product	Distance Between Points	Vertical RMSE Error
LiDAR	50cm – 2m	up to +/- 5cm
Photogrammetrically Derived Heights	2m – 5m	up to +/- 1.5m
Ordnance Survey OS terrain 5	5 m	up to +/- 2.5m
NextMap25 DTM	25 m	+/- 2.06m
Ordnance Survey OS terrain 50	50 m	+/- 4m

- A.1.2.3 Site-specific topographical survey data may also be used where available. For most purposes, the NextMap25 data will be used, but on certain more detailed analysis of areas close to the site may be required, in which case, more detailed ZTVs using more detailed surface mapping products such as Photogrammetrically Derived Heights (from Getmapping or Bluesky), or LiDAR may be used. This has not been done for this assessment.

### A.2 Photomontages

- A.2.1.1 Photomontages are produced in seven stages:

- Photography is undertaken using a digital SLR camera and 50mm equivalent lens. A tripod is used to take overlapping photographs which are joined together using an industry standard application to create a single panoramic image for each viewpoint. These are then saved at a fixed height and resolution to enable correct sizing when reproduced in the final images. The photographer also notes the GPS location of the viewpoint and takes bearings to visible landmarks whilst at the viewpoint.
- Creation of a ground model and 3D mesh to illustrate that model. This is created using NextMap25 DTM point data (or occasionally other terrain datasets where required, such as site-specific topographical data or Photogrammetrically Derived Heights) and ground modelling software.
- The addition of the proposed development to the 3D model. The main components of the proposed development are accurately modelled in CAD and are then inserted into the 3D model at the proposed locations and elevations.
- Wireline generation – The viewpoints are added within the 3D CAD model with each observer point being inserted at 1.5m above the modelled ground plane. The location of the landmarks identified by the photographer may also be included in the model. The view from the viewpoint is then replicated using virtual cameras to create a series of single frame images, which also include bearing markers. As with the photographs, these single frame images are joined together using an industry standard application to create a single panoramic image for each viewpoint. These are then saved at a fixed height and resolution to ensure that they are the same size as the photographs.
- Wireline matching – The photographs are matched to the wirelines using a combination of the visible topography, bearing markers and the landmarks that have been included in the 3D model.
- For the photomontage, an industry standard 3D rendering application is used to produce a rendered 3D view of the proposed development from the viewpoint. The rendering uses materials to match the intended surface finishes of the development and lighting conditions according to the date and time of the viewpoint photograph.
- The rendered development is then added to the photograph in the position identified by the wireline (using an image processing application) to ensure accuracy. The images are then layered to ensure that the development appears in front of and behind the correct elements visible within the photograph. Where vegetation is proposed as part of the development, this is then added to the final photomontage.

## Appendix B Residential Amenity

B.1.1.1 Paragraph 6.17 of GLVIA3 notes that:

*“In some instances it may also be appropriate to consider private viewpoints, mainly from residential properties.... Effects of development in private property are frequently dealt with mainly through ‘residential amenity assessments’. These are separate from LVIA although visual effects assessment may sometimes be carried out as part of a residential amenity assessment, in which case this will supplement and form part of the LVIA for a project. Some of the principles set out here for dealing with visual effects may help in such assessments but there are specific requirements in residential amenity assessment”*

B.1.1.2 As noted in the extract above, dwellings may sometimes also be used as ‘representative viewpoints’, and effects assessed to supplement the LVIA. However, for the sake of clarity, this is not done in this assessment, in order to preserve the distinction between the assessment of effects on public amenity (LVIA), and private amenity (residential amenity assessment).

B.1.1.3 When dealing with effects on residential properties, the outlook from a private property is essentially a private matter. The difference between that private interest and what should be protected in the public interest has been the subject of particular focus at Public Inquiries in relation to wind farm cases and the lessons learnt from Inspector’s decisions have informed how effects on views from residential properties influence a planning decision. This is fully described and set out in paragraphs 209-211 of the decision regarding Spring Farm Ridge wind farm (APP/Z2830/A/11/2165035 – December 2014), which sets out the approach that in considering effects on private residential amenity – whether effects are visually significant is not determinative – effects which fall below the threshold of being “so unpleasant, overwhelming and oppressive that this would become an unattractive place to live” (known as the Lavender Test) “would not feature in the planning balance, irrespective of how many dwellings were so affected”. The Inspector’s report also makes clear that this is a separate exercise to “weighing in the balance, as a component of the character and appearance issue, the effects on the locality generally that would derive from visual effects on resident receptors”, which is covered within the assessment of effects on settlements.

B.1.1.4 For this reason, the effects on the closest residential properties are assessed separately to the viewpoints, specifically in order to identify whether the effects would result in unacceptable harm to residential amenity.

B.1.1.5 The Spring Farm Ridge Inspector’s decision is for a wind farm but makes it clear that “the level of impact or threshold at which the public interest would be so engaged should be no different for wind turbines than would be the threshold applicable to other types of development.” (Paragraph 210.) Wind farms are much taller developments than the proposed landfall, cable route, onshore HVAC booster station(s) and onshore HVDC converter/HVAC substation with a greater chance that they could have such an effect. For a substation, booster station or cable corridor development to cause effects of such a high magnitude to render a property an unattractive place in which to live they would have to be very close to the property and occupy a large proportion of views.

B.1.1.6 Residential properties closest to Hornsea Three have been viewed on site and from aerial photography to assess whether Hornsea Three would be “so unpleasant, overwhelming and oppressive that this would become an unattractive place to live”. Factors taken into account in this assessment include the nature and duration of any changes to views from dwellings and gardens, whether there are intervening elements such as vegetation or features that filter or screen views, whether views occur from ground floor and / or other floors, and whether views from windows are direct or oblique.

B.1.1.7 The full residential amenity assessment is presented in volume 3, chapter 4: Landscape and Visual Resources, annex 4.8: Residential Visual Amenity including how properties were scoped out of or into the assessment.

## Appendix C Landscape Value

C.1.1.1 Landscape value is “the relative value that is attached to different landscapes by society” (GLVIA3, page 157). GLVIA3 describes at Box 5.1 a range of factors that may help to identify valued landscapes, these include:

- **Landscape quality (condition)** – a measure of the 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;
- **Scenic Quality** – the term used to describe landscapes that appeal primarily to the senses (primarily but not wholly the visual senses);
- **Rarity** – the presence of rare elements or features in the landscape or the presence of a rare Landscape Character Type;
- **Representativeness** – whether the landscape contains particular character and/or features or elements which are considered particularly important examples;
- **Conservation interests** – the presence of features of wildlife, earth science or archaeological or historical and cultural interest can add to the value of the landscape as well as having value in their own right;
- **Recreation value** – evidence that the landscape is valued for recreational activity where experience of the landscape is important;
- **Perceptual aspects** – a landscape may be valued for its perceptual qualities, notably wildness and/or tranquillity; and
- **Associations** – some landscapes are associated with particular people, such as artists or writers, or events in history that contribute to perceptions of the natural beauty of the area.

## Appendix D Assessment of the Offshore HVAC Booster Station

D.1.1.1 Given the distance of the proposed offshore HVAC booster station(s) search area from shore, approximately 35 km, the resulting effects will be limited. In order to demonstrate this, a photograph and wireframe visualisation of a proposed offshore HVAC booster station located at the most southerly location within the search area were prepared from two onshore locations and supported by narrative text in the LVIA. The two viewpoint locations comprise:

- Royal Cromer Golf Club – located on the public footpath running along the top of the cliffs; and
- Incleborough Hill – an area of open access land located between East Runton and West Runton.

D.1.1.2 These locations were selected to illustrate the maximum potential visibility and effects for land based receptors. In particular, they were chosen due to them being:

- publicly accessible;
- within the Norfolk Coast AONB;
- elevated (approximately 60 – 80 m AOD); and
- within an area which allows panoramic views offshore and where the coast lies closest to the offshore HVAC booster station search area.

D.1.1.3 The wireframes have been prepared in conformity with Landscape Institute Advice Note 01/11 Photography and Photomontage in Landscape and Visual Impact Assessment (March 2011), Landscape Institute Guidance Note 02/17 Visual Representation of Development Proposals (March 2017), and Scottish Natural Heritage Visual Representation of Wind Farms Guidance (2017). The wireframe shows the outline of the maximum potential development envelope of a proposed offshore HVAC booster station at the mostly southerly location within the search area.

D.1.1.4 This approach was consulted on and agreed with NCC and the NCP as noted in Table 4.4 of volume 3, chapter 4: Landscape and Visual Resources. NNDC was also consulted but at the time of finalisation of this report had not responded.