FIVE ESTUARIES
OFFSHORE WIND FARM

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PRELIMINARY ENVIRONMENTAL INFORMATION REPORT

VOLUME 6, ANNEX 10.1: SEASCAPE, LANDSCAPE AND VISUAL METHODOLOGY

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DEFINITION OF ACRONYMS

Term	Definition
AONB	Area of Outstanding Natural Beauty
CEA	Cumulative Effect Assessment
CPRE	Campaign to Protect Rural England
CRoW	Countryside and Rights of Way (Act)
DCO	Development Consent Order
EIA	Environmental Impact Assessment
ES	Environmental Statement
GLVIA3	Guidelines for Landscape and Visual Impact Assessment, 3rd Edition
HAT	Highest Astronomical Tide
ICAO	International Civil Aviation Organisation
IEMA	Institute of Environmental Management and Assessment
LAT	Lowest Astronomical Tide
LCA	Landscape Character Area
LDWA	Long Distance Walkers Association
MCA	Marine Character Areas
MHW	Mean High Water
MLW	Mean Low Water
MMO	Marine Management Organisation
NSIP	Nationally Significant Infrastructure Project
OWF	Offshore Wind Farm
PEIR	Preliminary Environmental Information Report
PINS	Planning Inspectorate
SCHAONB	Suffolk Coast and Heaths Area of Outstanding Natural Beauty
SLVIA	Seascape, Landscape and Visual Impact Assessment
UK	United Kingdom
VE	Five Estuaries
ZTV	Zone of Theoretical Visibility

GLOSSARY OF TERMS

Term	Definition
Baseline	Refers to existing conditions as represented by latest available survey and other data that is used as a benchmark for making comparisons to assess the impact of development.
Baseline conditions	The environment as it appears (or would appear) immediately prior to the implementation of a proposed development together with any known or foreseeable future changes that will take place before completion of a proposed development.
Construction effects	Used to describe both temporary effects that arise during the construction phases as well as permanent existence effects that arise from the physical existence of development (for example new buildings).
Cumulative effects	Additional changes caused by a proposed development in conjunction with other similar developments or as a combined effect of a set of proposed developments.
Cumulative Effects Assessment (CEA)	Assessment of impacts as a result of the incremental changes caused by other past, present and reasonably foreseeable human activities and natural processes together with a proposed development.
DCO Application	An application for consent to undertake a Nationally Significant Infrastructure Project made to the Planning Inspectorate who will consider the application and make a recommendation to the Secretary of State, who will decide on whether development consent should be granted for a proposed development.
Decommissioning	The period during which a development and its associated processes are removed from active operation.
Embedded environmental measures	Equate to 'primary environmental measures' as defined by Institute of Environmental Management and Assessment (2016). They are measures to avoid or reduce environmental effects that are directly incorporated into the proposed development.
Environmental Impact Assessment (EIA)	The written output presenting the full findings of the Environmental Impact Assessment.
Evidence Plan Process (EPP)	A voluntary consultation process with specialist stakeholders to agree the approach and the information required to support the EIA and HRA for certain aspects.
Formal consultation	Formal consultation refers to statutory consultation that is required under Section 42 and Section 47 of the Planning Act 2008 with the relevant consultation bodies and the public on the preliminary environmental information.
Impact	The changes resulting from an action.
Indirect effects	Effects that result indirectly from a proposed development 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. Often used to describe effects on landscape character that are not directly impacted by a proposed development such as effects on perceptual characteristics and qualities of the landscape.
Likely significant effects	It is a requirement of Environmental Impact Assessment Regulations to determine the likely significant effects of a proposed development on the environment which should relate to the level of an effect and the type of effect.
Magnitude (of change)	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 term or long term in duration'. Also known as the 'degree' or 'nature' of change.
Nationally Significant Infrastructure Project (NSIP)	Nationally Significant Infrastructure Projects are major infrastructure developments in England and Wales which are consented by DCO. These include proposals for renewable energy projects with an installed capacity greater than 100MW.
Preliminary Environmental Information Report (PEIR)	The written output of the Environmental Impact Assessment undertaken for a proposed development. It is developed to support formal consultation and presents the preliminary findings of the assessment to allow an informed view to be developed of a proposed development, the assessment approach that has been undertaken, and the preliminary conclusions on the likely significant effects of a proposed development and environmental measures proposed.
Receptor	These are as defined in Regulation 5(2) of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 and include population and human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage and landscape that may be at risk from changes as a result of a proposed development.
Scoping Opinion	A Scoping Opinion is adopted by the Secretary of State for a proposed development.
Scoping Report	A report that presents the findings of an initial stage in the Environmental Impact Assessment process.
Secretary of State	The authority who makes the decision to grant development consent.
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 associated to that receptor.
Significance	A measure of the importance of the environmental effect, defined by criteria specific to the environmental aspect.
Significant effects	It is a requirement of the EIA Regulations to determine the likely significant effects of the development on the environment which should relate to the level of an effect and the type of effect. Where possible significant effects should be mitigated.
Temporal Scope	The temporal scope covers the time period over which changes to the environment and the resultant effects are predicted to occur and are typically defined as either being temporary or permanent.

Temporary or permanent effects	Effects may be considered as temporary or permanent. In the case of wind energy development the application is for a defined period after which the assessment assumes that decommissioning will occur and that the site will be restored. For these reasons the effect of the VE array areas are referred to as long term and reversible.

1 SEASCAPE, LANDSCAPE AND VISUAL

1.1 INTRODUCTION

1.1.1 The project-wide approach to the assessment methodology is set out in Volume 2, Chapter 3: EIA Methodology. This appendix describes the methodology used within the seascape, landscape and visual impact assessment (SLVIA) of the EIA for the proposed Five Estuaries Offshore Wind Farm (VE). The SLVIA in Volume 2, Chapter 10: Seascape, Landscape and Visual of the Environmental Statement (ES) assesses the VE array areas (Wind Turbine Generators (WTGs), inter-array cables, offshore substation platform(s) and possible platform link cables to connect offshore substations) (Figure 10.1).

1.1.2 This SLVIA methodology appendix has been structured as follows:

- overview of SLVIA methodology;
- iterative assessment and design;
- guidance, data sources and site surveys;
- assessing seascape/ landscape effects;
- assessing visual effects;
- assessing night-time effects of lighting;
- assessing cumulative seascape, landscape and visual effects;
- evaluation of significance;
- nature of effects; and
- visual representations.

1.2 OVERVIEW OF THE SLVIA METHODOLOGY

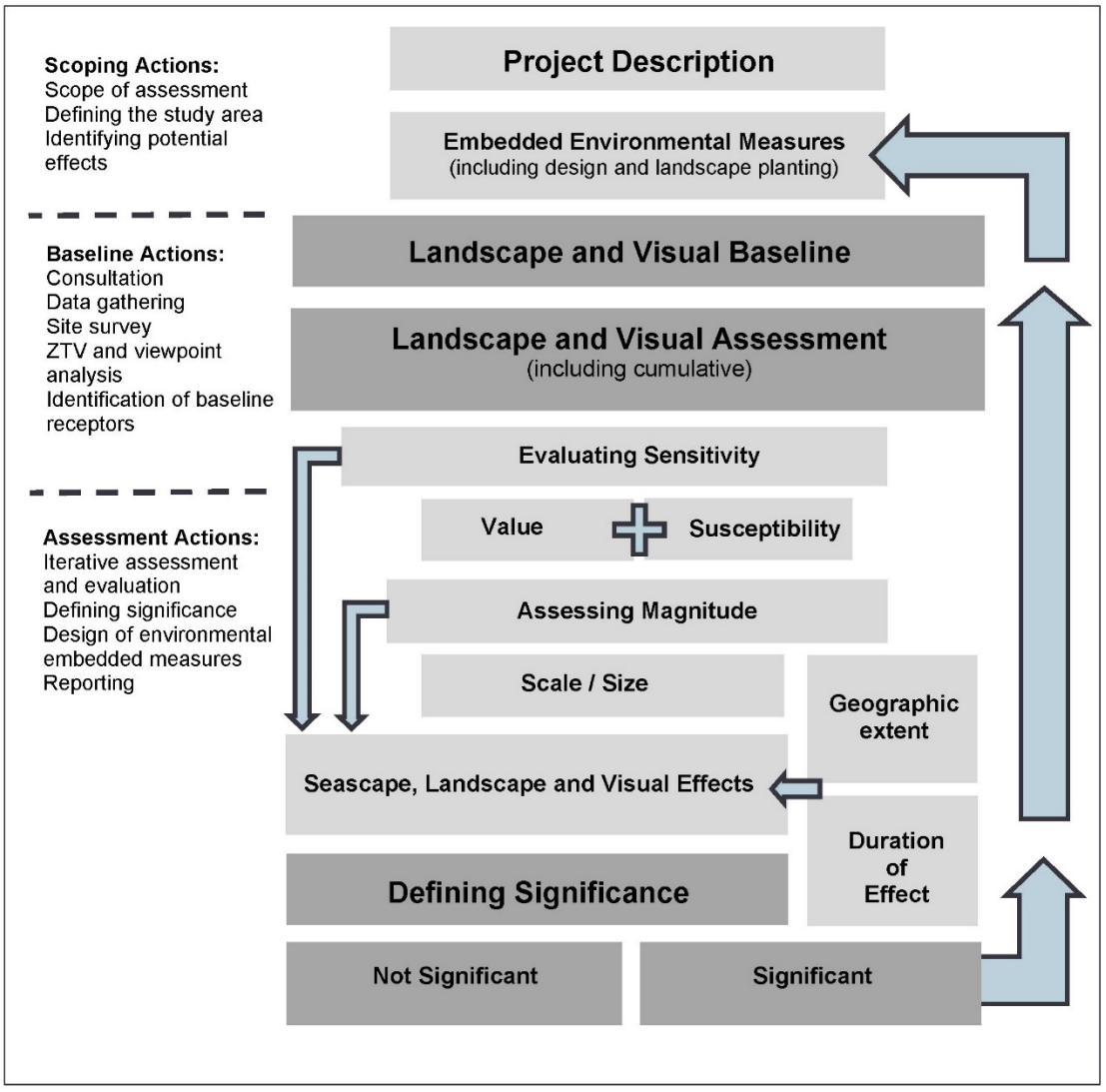
1.2.1 The assessment has been undertaken in accordance with the Landscape Institute and Institute of Environmental Management and Assessment (IEMA) (2013) Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3), and other best practice guidance. An overview or summary of the SLVIA process is provided here and illustrated, diagrammatically in Figure 1.1.

1.2.2 The SLVIA assesses the likely effects that the construction, operation and maintenance, and decommissioning of the VE array areas on the seascape, landscape and visual resource, encompassing effects on seascape/ landscape character, designated landscapes, visual effects and cumulative effects.

1.2.3 The SLVIA is based on the Rochdale Envelope described in Chapter 10 (Section 11.8). In compliance with EIA regulations, the likely significant effects of a realistic 'worst case' scenario are assessed and illustrated in the SLVIA. This worst-case scenario is described in Volume 2, Chapter 10: Seascape, Landscape and Visual.

1.2.4 The evaluation of sensitivity takes account of the value and susceptibility of the receptor to the VE array areas. This is combined with an assessment of the magnitude of change which takes account of the size and scale of the proposed change. By combining assessments of sensitivity and magnitude of change, a level of seascape, landscape or visual effect can be evaluated and determined. The resulting level of effect is described in terms of whether it is significant or not significant, and the geographical extent, duration and the type of effect is described as either direct or indirect; temporary or permanent (reversible); cumulative; and beneficial, neutral or adverse.

Figure 1.1: Overview of approach to Seascape, Landscape and Visual Impact Assessment



1.2.5 The assessment has also considered the whole project or combined effects of the VE array areas, as well as the cumulative effects likely to result from the VE array areas and other similar array areas.

1.2.6 In each case an appropriate and proportionate level of assessment has been undertaken and agreed through consultation at the scoping stage. The level of assessment may be 'preliminary' (requiring desk-based data analysis) or 'detailed' (requiring site surveys and investigations in addition to desk-based analysis).

1.2.7 The seascape, landscape and visual assessment unavoidably, involves a combination of quantitative and qualitative assessment and wherever possible a consensus of professional opinion has been sought through consultation, internal peer review, and the adoption of a systematic, impartial, and professional approach.

INTERFACE BETWEEN SEASCAPE AND LANDSCAPE ASSESSMENT

1.2.8 Together, the SLVIA and the onshore Landscape and Visual Impact Assessment (LVIA) provide a whole project assessment of the effects of VE. The VE array areas, including WTGs, inter-array cables, offshore substation platform(s) and possible platform link cables to connect offshore substations (Figure 10.1), are assessed in the SLVIA. The onshore infrastructure of VE (the onshore substation, onshore export cables, and landfall location) are assessed in the onshore LVIA.

1.2.9 The SLVIA also refers to potential interrelated effects likely to result from any areas where the construction, operation and decommissioning of the offshore and offshore elements combine, or inter-relate to affect receptors within the SLVIA study area. An example could include effects on views where both offshore and offshore elements are visible, potentially resulting in whole project landscape and visual effects as a result of the construction, operation and decommissioning of the onshore and offshore elements. In those instances, the SLVIA provides whole project assessment focusing on the offshore development that has been referenced for consistency in the LVIA.

ASSESSMENT OF THE FORESHORE

1.2.10 The SLVIA seeks to take account of the definition of 'seascape', as set out in the United Kingdom (UK) Marine Policy Statement (UK Government, 2011) which states that *"…references to seascape should be taken as meaning landscapes with views of the coast or seas, and coasts and the adjacent marine environment with cultural, historical and archaeological links with each other"*.

1.2.11 The majority of the SLVIA study area consists of sea. In England, seascape character *"principally applies to coastal and marine areas seaward of the low-water mark"* and landscape character *"principally applies to terrestrial areas lying to the landward side of the high-water mark"* (Natural England, 2012, p7, Box 1). Although these definitions are clear in the guidance, the importance of the interaction of sea, coastline and land as perceived by people is also highlighted in subsequent definitions of seascape in the guidance (Natural England, 2012), indicating a subtler transition between seascape and landscape than defined in the guidance.

1.2.12 In order to address this and avoid under-valuing the inter-tidal area between the mean low and high-water mark, the SLVIA assesses 'offshore' seascape effects on Marine Character Areas (MCAs) where they are seaward of the mean high water mark; and the effect on terrestrial landscape character has been assessed on landscape character areas (LCAs) lying to the landward side of the mean low-water mark.

1.2.13 This approach means that the 'foreshore', which includes beaches, inter-tidal areas and coastlines between Mean High Water (MHW) and Mean Low Water (MLW), has been considered in both the landscape and seascape character assessments. This ensures adequate consideration has been given to assessing the relationship between terrestrial and marine areas and interactions across the land/ sea interface. This is consistent with the published Marine Management Organisation (MMO) Seascape Assessment (MMO, 2018) which extends to the mean high water mark; and published landscape character assessments.

DEFINING THE SLVIA STUDY AREA

1.2.14 The study area for the SLVIA is defined as the Development Consent Order (DCO) Order Limits together with the Zone of Theoretical Visibility (ZTV) of the VE array areas.

1.2.15 The SLVIA study area covers a radius of 60 km from the windfarm site, as illustrated in Figure 10.3. Broadly, the SLVIA study area is defined by the southern North Sea and the offshore waters, coastline and hinterland of South-East England, within the counties of Suffolk, Essex, and part of Kent. The SLVIA study area is defined to extend far enough to include all areas within which significant effects could occur, using professional judgement. It is an outer limit to where significant effects could occur.

1.2.16 IEMA Guidance (IEMA, 2015 and 2017) recommends a proportionate ES focused on the significant effects and a proportionate ES topic chapter. An overly large SLVIA study area may be considered disproportionate if it makes the understanding the key impacts of the VE array areas more difficult.

1.2.17 This is supported by LVIA Guidance produced by the Landscape Institute (GLVIA3) (Landscape Institute, 2013) (para 3.16). This guidance recommends that *"The level of detail provided should be that which is reasonably required to assess the likely significant effects"*.

1.2.18 Para 5.2 and p70 also states that *"The study area should include the site itself and the full extent of the wider landscape around it which the proposed development may influence in a significant manner"*.

1.2.19 Other wind farm specific guidance, such as NatureScot's Visual Representation of Wind Farms Guidance (NatureScot, 2017) recommends that ZTV distances are used for defining study area based on WTG height. This guidance recommends a 45 km radius for WTGs greater than 150 m to blade tip (para 48, p12), however it does not go beyond turbines above 150 m in height. The height of current offshore WTG models has now exceeded the heights covered in this guidance. The NatureScot guidance recognises that greater distances may need to be considered for larger WTGs used offshore, as is the case for the SLVIA study area for the VE array areas.

1.2.20 Beyond the DCO Order Limits, the SLVIA generally focuses on locations from where it may be possible to see the VE array areas, as defined by the Blade Tip ZTV (Figure 10.8).

1.2.21 The ZTV shown in Figure 10.8 (and Figure 10.9 at A1 scale) are based on turbines of 424 m to blade tip (above Highest Astronomical Tide (HAT)) located around the perimeter of the windfarm site and represents the Maximum Development Scenario (MDS) considered in the assessment. The ZTV illustrates where there will be no visibility of these WTGs, as well as areas where there will be lower or higher numbers of WTGs visible.

1.2.22 Consideration of the blade tip ZTV (Figure 10.9) indicates that theoretical visibility of the VE array areas mainly occurs within 60 km and that beyond 60 km, the geographic extent of visibility becomes very restricted. At distances over 60 km, the lateral (or horizontal) spread of the VE array areas also occupies a small portion of available views and the apparent height (or 'vertical angle') of the WTGs will also appear very small, therefore significant visual effects are unlikely to arise at greater than this distance, even if the WTGs are visible.

1.2.23 The influence of earth curvature begins to limit the apparent height and visual influence of the WTGs visible at long distance (such as over 60 km), as the lower parts of the turbines may be partially hidden behind the apparent horizon, leaving only the upper parts visible above the skyline.

1.2.24 The variation of weather conditions influencing visibility off the English coast has also informed the SLVIA study area. Visibility analysis in the Offshore Energy SEA (White Consultants, March 2020), which considered Met Office visibility data for eight coastal stations, recorded a visual range just under 24 km around 50% of the time, just under 30 km 33% of the time, around 34 km for 20% of the time, and 40 km 10% of the time.

1.2.25 In considering the SLVIA study area, the sensitivity of the receiving seascape, landscape and visual receptors has also been reviewed, taking particular account of the landscape designations shown in Figure 10.6 and other principal visual receptors.

1.2.26 Potential cumulative effect interactions with other offshore wind farms have also influenced the definition of the SLVIA study area. Other offshore wind farms within the SLVIA study area are shown in Figure 10.22.

1.2.27 The SLVIA study area has been reviewed and amended in response to such matters as refinement of the offshore project components, the identification of additional impact pathways and in response, where appropriate, to feedback from consultation and has been agreed with the Planning Inspectorate through the Scoping Opinion as a 60 km radius study area from the windfarm site.

1.3 ITERATIVE ASSESSMENT AND DESIGN

1.3.1 The SLVIA is part of an iterative EIA process which aims to 'design out' significant effects via a range of environmental measures including avoidance and designs that aim to reduce or eliminate significant effects. Design is an integrated part of the SLVIA process and environmental measures related to landscape design and management can be an important tool to mitigate significant effects. The EIA process can also call on a range of environmental and technical specialists that contribute other forms of mitigation that may also bring a range of benefits. Potentially significant seascape, landscape and visual effects and the constraints and opportunities connected with their resolution are identified through the SLVIA process. Where possible embedded environmental measures (Commitments) are incorporated into the VE array areas in order to mitigate seascape, landscape and visual effects.

1.3.2 Embedded environmental measures are recorded in the Commitments Register, which details how the measures has been secured as well as documenting the design evolution of the VE array areas.

POTENTIAL EFFECTS DURING CONSTRUCTION AND DECOMMISSIONING

1.3.3 Potential effects on the seascape, landscape and visual resource are likely during the construction and decommissioning of the VE array areas during the construction and decommissioning periods, including:

1.3.4 Potential effects on the seascape, landscape and visual resource are likely during the construction and decommissioning of the VE array areas during the construction and decommissioning periods, including:

- Seascape effects:
  - Effects on perceived seascape character, arising as a result of the construction and decommissioning activities (including laying new offshore export cables to shore) and structures located within the windfarm site, which may alter the seascape character of the windfarm site itself and the perceived character of the wider seascape through visibility of these changes.
- Landscape effects:
  - Effects on perceived landscape character, arising as a result of the construction and decommissioning activities and structures that will be visible from the coast and may therefore affect the perceived character of the landscape.
  - Effects on the special landscape qualities and integrity of designated landscapes as a result of the above construction and decommissioning activities.
- Visual effects:
  - Effects on views and visual amenity experienced by people from principal visual receptors and representative viewpoints, arising as a result of the construction and decommissioning activities and structures, that will be visible from the coast.
- Cumulative effects:
  - Effects of construction of the VE array areas that have the potential to contribute to cumulative seascape, landscape and visual effects including effects on seascape, landscape and visual amenity due to inter-visibility with other planned developments.

POTENTIAL EFFECTS DURING OPERATION

1.3.5 Potential effects on the seascape, landscape and visual resource are likely during the operation of the VE array areas over its operational lifetime, including:

- Seascape effects:
  - Effects on perceived seascape character (MCAs), arising as a result of the operational WTGs, substations and maintenance activities located within the

windfarm site, which may alter the seascape character of the windfarm site itself and the perceived character of the wider seascape.

- Landscape effects:
  - Effects on perceived landscape character (LCAs and Designations), arising as a result of the operational WTGs, substations and maintenance activities, which will be visible from the coast and may therefore affect the perceived character of the landscape. Effects on defined special qualities of designated landscapes.
- Visual effects:
  - Effects on views and visual amenity experienced by people as principal visual receptors and representative viewpoints, arising as a result of the operational WTGs, substations and maintenance activities, marine navigation and aviation lighting.
- Cumulative effects:
  - Effects of operation of the VE array areas that have the potential to contribute to cumulative seascape, landscape and visual effects including effects on seascape, landscape and visual amenity due to inter-visibility with other planned developments.

1.4 GUIDANCE, DATA SOURCES AND SITE SURVEYS

GUIDANCE ON METHODOLOGY

1.4.1 This methodology accords with Guidelines for Landscape and Visual Impact Assessment: Third Edition (GLVIA3). Where it diverges from specific aspects of the guidance, in a small number of areas, reasoned professional justification for this is provided as follows.

1.4.2 GLVIA3 sets out an approach to the assessment of magnitude of change in which three separate considerations are combined within the magnitude of change rating. These are the size or scale of the effect, its geographical extent and its duration and reversibility. This approach is to be applied in respect of both landscape and visual receptors. It is considered that the process of combining all three considerations in one rating can distort the aim of identifying significant effects of wind farm development. For example, a high magnitude of change, based on size or scale, may be reduced to a lower rating if it occurred in a localised geographical area and for a short duration. This might mean that a potentially significant effect could be overlooked if effects are diluted down due to their limited geographical extents and/ or duration or reversibility.

1.4.3 The consideration of the size or scale of the effect, its geographical extent and its duration and reversibility are kept separate, by basing the magnitude of change primarily on size or scale to determine where significant and non-significant effects occur, and then describing the geographical extents of these effects and their duration and reversibility separately. Duration and reversibility are stated separately in relation to the assessed effects (i.e. as short/ medium/ long-term and temporary/ permanent) and are considered as part of drawing together conclusions about significance and combining with other judgements on sensitivity and magnitude, to allow a final judgement to be made on whether each effect is significant or not significant.

1.4.4 The SLVIA assessment methodology utilises six word scales of magnitude of change – high, medium-high, medium, medium-low, low and negligible; which are preferred to the 'maximum of five categories' suggested in GLVIA3 (3.27), as a means of clearly defining and summarising magnitude of change judgements.

1.4.5 These are not new diversions and follow practice established on other Nationally Significant Infrastructure Projects (NSIP) such as East Anglia TWO, Norfolk Vanguard and Thanet Extension.

1.4.6 A full list of references, providing guidance on methodology and a glossary is provided in Section 0.

1.4.7 Whilst many of these guidance documents have been prepared by NatureScot for projects in Scotland, in the absence of alternative guidelines they have become best practice across the UK. The preparation of visual representations that accord with this NatureScot guidance has been agreed with consultees.

DATA SOURCES

1.4.8 A list of the data sources used for this assessment is provided in Table 1.1.

Table 1.1 Data sources

Source	Summary	Coverage of Study Area
Galloper Wind Farm Environmental Statement.	Characterisation for the existing operational Galloper Offshore Wind Farm (OWF) site (including seascape, landscape character and viewpoints).	Partial coverage of SLVIA study area.
Campaign to Protect Rural England (CPRE) (2016)	Interactive maps of the UK's light pollution and dark skies as part of a national mapping project (LUC/CPRE, 2016). Open Source data used to understand and illustrate baseline lighting levels. (available online: https://www.nightblight.cpre.org.uk/)	Full coverage of SLVIA study area.
English Heritage (2020)	Any specific visitor attractions / tourist destinations (available online: https://www.english-heritage.org.uk/visit/places	Full coverage of SLVIA study area.

Source	Summary	Coverage of Study Area
Essex County Council	Essex Landscape Character Assessment (2003).	Essex
Essex County Council	Landscape Character Assessment of the Essex Coast (2005).	Essex
Google Earth Pro (2020)	Aerial photography.	Full coverage of SLVIA study area.
Historic England (2020)	Registered Parks and Gardens and UNESCO World Heritage Sites (available online: https://historicengland.org.uk/listing/the-list/)	Full coverage of SLVIA study area.
Kent County Council (2004)	Landscape Character Areas (LCAs) (Kent). Landscape Assessment of Kent (available online: https://www.kent.gov.uk/about-the-council/strategies-and-policies/environment-waste-and-planning-policies/countryside-policies-and-reports/kents-landscape-assessment)	Kent
Long Distance Walkers Association (LDWA) (2020)	Overview map for Long Distance Paths and Walks (available online: https://www.ldwa.org.uk/ldp/public/ldp_overview_map.php)	Full coverage of SLVIA study area.
Met Office (2010-2020)	Visibility Data. Visibility bands every 1 km up to 30 km, then every 5 km up to 50 km, then every 10 km up to 70 km, and >70 km.	Weather stations at Weybourne and Shoeburyness.
MMO (2012)	Seascape character area assessment East Inshore and East Offshore Marine Plan Areas (2012). Available online: https://www.gov.uk/government/publications/east-marine-plan-areas-seascape-character-assessment Seascape character area assessment South East Inshore Marine Plan Area (2018). (available online: https://www.gov.uk/government/publications/seascape-assessment-for-the-south-marine-plan-areas-mmo-1037)	East Inshore, East Offshore and South-East Inshore Marine Plan Area

Source	Summary	Coverage of Study Area
National Trust (2020)	Any specific visitor attractions / tourist destinations (available online: https://www.nationaltrust.org.uk/days-out)	Full coverage of SLVIA study area.
Natural England (2014)	National Character Area profiles (available online: https://www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making/national-character-area-profiles)	Full coverage of SLVIA study area.
Natural England (2019)	GIS datasets for: National Parks (https://data.gov.uk/dataset/334e1b27-e193-4ef5-b14e-696b58bb7e95/national-parks-england). Areas of Outstanding Natural Beauty (AONB) (https://data.gov.uk/dataset/8e3ae3b9-a827-47f1-b025-f08527a4e84e/areas-of-outstanding-natural-beauty-england) County Parks (https://data.gov.uk/dataset/e729abb9-aa6c-42c5-baec-b6673e2b3a62/country-parks-england). Open Access Land (https://data.gov.uk/dataset/05fa192a-06ba-4b2b-b98c-5b6bec5ff638/crow-act-2000-access-layer). Heritage Coasts (https://data.gov.uk/dataset/79b3515f-b00e-419a-9c7e-1d3163555886/heritage-coasts)	Full coverage of SLVIA study area.
Oceanwise	Marine and coastal mapping data, ferry routes.	Full coverage of SLVIA study area.
OPEN internal dataset (2020)	Public Rights of Way.	Full coverage of SLVIA study area.
Ordnance Survey (2019)	1:50,000 scale mapping.	Full coverage of SLVIA study area.
Ordnance Survey (2019)	1:25,000 scale mapping.	Full coverage of SLVIA study area.

Source	Summary	Coverage of Study Area
Ordnance Survey Open Data (2019)	OS County Region, Local Unitary Authority, Railways, Road and Settlements.	Full coverage of SLVIA study area.
Ordnance Survey (2019)	OS Terrain 50 Digital Terrain Model (DTM).	Full coverage of SLVIA study area.
Royal Yachting Association (RYA) (2013)	Cruising routes for recreational yachting.	Full coverage of SLVIA study area.
Suffolk Coast and Heaths AONB	Touching the Tide Landscape Character Assessment (2012).	Suffolk Coast and Heaths AONB
Suffolk Coast and Heaths AONB	Suffolk Coast & Heaths AONB Management Plan 2018 – 2023	Suffolk Coast and Heaths AONB
Suffolk Coast and Heaths AONB	Suffolk Coast & Heaths AONB Natural Beauty and Special Qualities Indicators (2016).	Suffolk Coast and Heaths AONB
Suffolk Coastal District Council	Suffolk Coastal Landscape Character Assessment (2018).	East Suffolk
Suffolk Coastal District Council	Suffolk Coastal Local Plan (2020) and Waveney Local Plan (2019).	East Suffolk
Suffolk County Council	Suffolk, South Norfolk and North Essex Seascape Character Assessment (2018).	Suffolk, South Norfolk and North Essex
Suffolk County Council	Suffolk Seascape Sensitivity to Offshore Wind Farms (2020).	Suffolk

Source	Summary	Coverage of Study Area
Suffolk County Council	Suffolk Landscape Assessment (2011/updated 2018).	Suffolk
Sustrans (2020)	National Cycle Network (GIS dataset) (available online: https://www.sustrans.org.uk/)	Full coverage of SLVIA study area.

APPROPRIATE LEVEL OF ASSESSMENT

1.4.9 The assessment of whether an effect has the potential to be of likely significance has been based upon review of existing evidence base, consideration of commitments made (embedded measures), professional judgement and where relevant, recommended aspect specific methodologies and established practice. In applying this judgement, use has been made of a simple test that to be significant an effect must be of sufficient importance that it should be taken into consideration when making a development control decision.

1.4.10 The Scoping Report (Five Estuaries Offshore Wind Farm, July 2021) presented a scoping assessment of the likely seascape, landscape and visual effects scoped in and scoped out of the SLVIA (Table 17.4). The Scoping Opinion (Planning Inspectorate (PINS), November 2021) provided the opinion of the Secretary of State as to the scope, and level of detail, of the information to be provided in the Environmental Statement. The Scoping Opinion is summarised in Table 10.2 of Volume 2, Chapter 10: Seascape, Landscape and Visual. The effects of the VE array areas on certain seascape, landscape and visual receptors were agreed as scoped out of the SLVIA in agreement with PINS and are not assessed any further in the Preliminary Environmental Information Report (PEIR).

1.4.11 For those matters 'scoped in' for assessment, the approach to level of assessment is tiered. A 'preliminary' or 'detailed' assessment is undertaken as follows:

- a 'preliminary assessment' approach for an environmental aspect/ effect which may include secondary baseline data collection (for example desk-based information) and qualitative assessment methodologies. A preliminary assessment of all seascape, landscape and visual receptors is undertaken within Chapter 10 of the PEIR, using desk-based information and ZTV analysis (Figure 10.8 to Figure 10.12). The preliminary assessment identifies which seascape, landscape and visual receptors are unlikely to be significantly affected, which are subject to a preliminary assessment, and those receptors that are more likely to be significantly affected by the VE array areas, which require a 'detailed assessment'.
- a 'detailed assessment' approach is undertaken for seascape, landscape and visual receptors/ effects that are identified in the preliminary assessment in Chapter 10 of the PEIR as requiring detailed assessment. This detailed assessment may include primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies, and modelling such as ZTV analysis (Figure 10.8 to Figure 10.12) and wireline/ photomontage visualisations (Figures 11.26 - Figure 10.46).

1.4.12 To ensure the provision of a proportionate EIA and an ES that is focused on likely significant effects, the PEIR assessment takes into account the considerable levels of existing environmental information available and extensive local geographical knowledge and understanding of the study area gained from ongoing site selection analysis and environmental surveys.

DESK-BASED AND SITE SURVEY WORK

1.4.13 The SLVIA undertaken as part of the PEIR and ES has been informed by desk-based studies and field survey work undertaken within the SLVIA study area. The landscape, seascape and visual baseline has been derived from a desk-based review of landscape and seascape character assessments and the ZTV, to identify receptors that may be affected by the VE array areas and produce written descriptions of their key characteristics and value.

1.4.14 Interactions identified between the VE array areas and seascape, landscape and visual receptors have been used to predict potentially significant effects arising, with measures proposed to mitigate effects, where relevant.

1.4.15 For those receptors where a detailed assessment has required, primary data acquisition has been undertaken through a series of surveys. These surveys include field survey verification of the ZTV from terrestrial landscape character areas (LCAs), micro-siting of viewpoint locations, panoramic baseline photography and visual assessment survey from all representative viewpoints. The viewpoint photography and visual assessment surveys were undertaken in April 2022 and June to September 2022. Sea-based offshore surveys have not been undertaken as part of the SLVIA.

1.5 ASSESSING SEASCAPE/ LANDSCAPE EFFECTS

1.5.1 Landscape Effects are defined by the Landscape Institute in GLVIA 3, paragraphs 5.1 and 5.2 as follows:

"An assessment of landscape effects deals with the effects of change and development on landscape as a resource. The concern ... is with how the proposal will affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character."

1.5.2 In accordance with GLVIA 3 the term 'landscape' encompasses areas of 'townscape' and coastal areas of 'seascape'. Areas of landscape and seascape are relevant to this assessment and they are described as follows.

LANDSCAPE CHARACTER

1.5.3 GLVIA 3, paragraph 5.4, advises that Landscape Character Assessment should be regarded as the main source for baseline studies and identifies the following factors which combine to create areas of distinct landscape character:

"the elements that make up the landscape in the study area including:

physical influences – geology, soils, landform, drainage and water bodies;

landcover, including different types of vegetation and patterns and types of tree cover; and

the influence of human activity, including land-use and management, the character of settlements and buildings, and pattern and type of fields and enclosure.

The aesthetic and perceptual aspects of the landscape – such as, for example, its scale, complexity, openness, tranquillity or wildness;

The overall character of the landscape in the study area, including any distinctive Landscape Character Types or Areas that can be identified, and the particular combinations of elements and aesthetic and perceptual aspects that make each distinctive, usually by identification as key characteristics of the landscape."

SEASCAPE CHARACTER

1.5.4 GLVIA 3 paragraph 5.6, advises that where LVIA is carried out in coastal or marine locations baseline studies must take account of seascape. Seascape is defined in the UK Marine Policy Statement, (UK Government, 2011) as *"landscapes with views of the coast or seas, and coasts and the adjacent marine environment with cultural, historical and archaeological links with each other."*

1.5.5 GLVIA 3 paragraph 5.6, identifies the following different factors which together determine seascape character:

"coastal features;

views to and from the sea;

particular qualities of the open sea;

the importance of dynamic changes due to weather and tides;

changes in seascapes due to coastal processes;

cultural associations; and

contributions of coastal features to orientation and navigation at sea."

SEASCAPE/ LANDSCAPE EFFECTS

1.5.6 In respect of the VE array areas, the potential seascape/ landscape effects, occurring during the construction, operation and decommissioning periods of the VE array areas may therefore include, but are not restricted to the following:

- changes to seascape/ landscape character and qualities: seascape/ landscape character may be affected through the incremental effect on characteristic elements, landscape patterns and qualities (including perceptual characteristics) and the addition of new features, the magnitude of which is sufficient to alter the overall seascape/ landscape character within a particular area;
- changes to the perceived character of designated landscapes, including the National Parks and AONBs that will affect the special landscape qualities underpinning the designation and its integrity; and
- cumulative seascape/ landscape effects: where more than one development of a similar type may lead to a cumulative effect.

1.5.7 Development may have a direct effect on the seascape, however all landscape effects arising from the VE array areas on landscape character will be indirect effects, which will be perceived from the wider landscape, outside the DCO Order Limits and its seascape/ landscape.

EVALUATING SEASCAPE/ LANDSCAPE SENSITIVITY TO CHANGE

OVERVIEW

1.5.8 The assessment of sensitivity takes account of the seascape/ landscape value and the susceptibility of the receptor to the VE array areas.

1.5.9 Seascape/ landscape sensitivity often varies in response to both the type and phase of the development proposed and its location, such that sensitivity needs to be considered on a case by case basis. It should not be confused with 'inherent sensitivity' where areas of the landscape may be referred to as inherently of 'high' or 'low' sensitivity. For example, a National Park may be described as inherently of high sensitivity on account of its designation and value, although it may prove to be less susceptible (and therefore sensitive) to a particular development. The susceptibility of seascape/ landscape receptors has been assessed in relation to change arising from the specific development proposed, including the specific VE array areas.

1.5.10 The sensitivity of a seascape/ landscape character receptor is an expression of the combination of the judgements made about the susceptibility of the receptor to the specific type of change resulting from the VE array areas and the value related to that receptor.

SEASCAPE/ LANDSCAPE SUSCEPTIBILITY TO CHANGE

1.5.11 The susceptibility of a seascape/ landscape character receptor to change is a reflection of its ability to accommodate the changes that will occur as a result of the addition of the VE array areas (i.e. change relating to the specific development proposal) without undue consequences for the maintenance of the baseline situation and/ or the achievement of landscape planning policies and strategies. Some landscape/ seascape receptors are better able to accommodate development than others due to certain characteristics that are indicative of capacity to accommodate change. These characteristics may or not also include special landscape qualities that underpin designated landscapes.

1.5.12 The assessment of the susceptibility of the seascape/ landscape receptor to change has been classified as high, medium-high, medium, medium-low or low and the basis for this assessment has been made clear using evidence and professional judgement. Indicators of landscape/ seascape susceptibility to the type of development proposed (construction, operation and decommissioning of the VE array areas) are based on the following criteria. Indicators of higher and lower susceptibility are described further in Table 1.2.

- Natural – form/ topography/ character of hinterland (relevant landscape character type), coastal edge (cliffs, rocky coasts, upper beach, dunes, intertidal etc) and tidal range.
- Cultural/ social – use of the sea (navigation, fishing, leisure, energy etc), coast and hinterland (settlement, industry, marine related development such as harbours, ports, industry, agriculture etc) and historic features on the coast (forts, castles, lighthouses etc).
- Quality/ condition – intactness (degree of completeness or fragmentation visually, presence of detractors) and state of repair (condition of natural and built features/elements).
- Aesthetic and perceptual – scale of sea (in relation to coastal form or offshore areas); openness/enclosure (the degree and nature of enclosure of the sea by land and framing of views); exposure (degree of shelter/ exposure); aspect (relationship with the sun);

seascape pattern and foci (features and element on sea surface, coast and hinterland); tranquillity (movement, man-made structures, dark skies); wildness (sense of natural character uninfluenced by man); and remoteness (perceived distance from population and human interventions).

- Visual characteristics – key views from land to sea, sea to land and sea to sea, including nature of views and elevation, presence of iconic features; intervisibility of area with important receptors (amount, length, extent, nature of intervisibility and distance from development); and how seascape is experienced.
- Relationship between seascape area and adjacent coast – contribution of seascape to the setting of an important coast/hinterland or character area; and key relationships between hinterland, coastal edge, intertidal area and sea.

VALUE OF THE SEASCAPE/ LANDSCAPE RECEPTOR

1.5.13 The value of a seascape/ landscape character receptor is a reflection of the value that society attaches to that seascape/ landscape. The assessment of the seascape/ landscape value has been classified as high, medium-high, medium, medium-low or low and the basis for this assessment has been made clear using evidence and professional judgement, based on the following range of factors. Indicators of higher and lower value are described further in Table 1.2.

- Seascape/landscape designations - A receptor that lies within the boundary of a recognised landscape related planning designation, or within its immediate setting, will be of increased value, depending on the level of importance of the designation which may be international, national, regional or local. The absence of designations does not however preclude value, as an undesignated landscape character receptor may be valued as a resource in the local or immediate environment, however the absence of a landscape designation and location outside the immediate setting of a designation, may be an indicator of lower value.
- Seascape/ landscape quality - The quality of a seascape/ landscape character receptor is a reflection of its attributes, such as scenic quality, sense of place, rarity and representativeness and the extent to which its valued attributes have remained intact. A seascape/ landscape with high scenic quality that contributes to special qualities, with consistent, intact, well-defined and distinctive attributes is considered to be of higher quality and, in turn, higher value, than a landscape where the introduction of elements has detracted from its character, has low scenic qualities and does not contribute to special qualities.
- Seascape/ landscape experience - The experiential qualities that can be evoked by a landscape receptor can add to its value and relates to a number of factors including the perceptual responses it evokes (for example wildness, remoteness, tranquillity), the cultural associations that may exist in literature or history, or the iconic status of the seascape/ landscape in its own right, the recreational value of the seascape/ landscape, and the contribution of other values relating to the nature conservation or archaeology of the area.

SEASCAPE/ LANDSCAPE SENSITIVITY RATING

1.5.14 An overall sensitivity assessment of the seascape/ landscape receptor has been made by combining the assessment of the value of the seascape/ landscape character receptor and its susceptibility to change. The evaluation of seascape/ landscape sensitivity has been applied for each seascape/ landscape receptor - high, medium-high, medium, medium-low and low - by combining individual assessments of the value of the receptor and its susceptibility to change. The basis for the assessments has been made clear using evidence and professional judgement in the evaluation of sensitivity for each receptor, informed by criteria that tend towards higher or lower sensitivity are set out in Table 1.2 below.

Table 1.2 Seascape/ landscape sensitivity to change

Higher sensitivity	Lower sensitivity
Value	
Designation: Presence of designated seascape/ landscapes with national policy level protection or defined for their natural beauty. Perceived as lying within immediate seascape setting of a designation.	Seascape/ landscapes without formal designation. Despoiled or degraded seascape/ landscape with little or no evidence of being valued by the community. Not within seascape setting of a landscape designation.
Aesthetic/ scenic qualities: Higher quality seascape/ landscapes with consistent, intact and well-defined, distinctive attributes. A seascape/ landscape with high scenic quality that contributes to special qualities. Aesthetic/ scenic or perceptual aspects of designated wildlife, ecological or cultural heritage features that contribute to seascape/ landscape character.	Lower quality seascape/ landscapes with indistinct elements or features that detract from its inherent attributes. A seascape/ landscape with low scenic qualities that does not contribute to special qualities. Limited wildlife, ecological or cultural heritage features, or limited contribution to seascape/ landscape character.
Perceptual qualities: Seascape/ landscape with perceptual qualities with high level of perceived wildness, high level of remoteness or high tranquillity.	Seascape/ landscape with no apparent wildness, low levels of perceived remoteness or low tranquillity, often as a result of existing development influences.
Cultural associations: Seascape/ landscape with strong/ rich cultural associations that contribute to scenic quality. Presence of heritage designations overlooking or within area of potential development.	Seascape/ landscape with few/ limited cultural associations. Absence of heritage designations overlooking or within area of potential development.
Recreational and community value: Area used extensively for leisure especially related to enjoying seascape character and views. Highly valued area	Area with limited use for leisure, or where leisure relates mainly to pursuing that activity and not the enjoyment of seascape character or views, or where leisure is

Higher sensitivity	Lower sensitivity
and features/ elements by people, communities of interest and place.	dynamic/ at speed. Area or features with attributed limited value by people.
Rarity: Rare or unique seascape/ landscape character types, features or elements.	Widespread or 'common' seascape/ landscape character types, features or elements.
Susceptibility to change	
Natural:	
Hinterland: Mountainous or hilly hinterland i.e. long slopes rising from coast, high elevation.	Plateau or flat hinterland. Highly enclosed by topography or land cover.
Coastal edge: Intricate, complex, rugged forms and dramatic headlands/ ends of peninsulas.	Flat, horizontal or gently undulating or largely straight coast. Simple forms. Man-made interventions/ structures in area.
Tidal range: Where tidal range or streams add to the seascape qualities.	The tidal range or streams make a limited contribution to seascape qualities.
Cultural/ social:	
Use of the sea: Uses with limited infrastructure. Rural uses or semi-natural land. Small scale, traditional, historic settlements and harbours. Little association with other contemporary development.	Presence of energy production and large shipping vessels/ trade routes nearby (not through area). Strong or direct association with other similar contemporary developments.
Use of the coast/ hinterland: Uses with limited infrastructure. Rural uses or semi-natural land. Small scale, traditional, historic settlements and harbours. Little association with other contemporary development.	Presence of industry/ energy production/ dock infrastructure. Urban form. Strong or direct association with other similar contemporary developments.
Historic features on coast: Presence of coastal and island historic features such as forts, castles, chapels, monasteries, other buildings and structures and other heritage features which have a strong relationship with the coast and sea visually, physically or culturally.	Limited number or no heritage features
Quality/ condition:	

Higher sensitivity	Lower sensitivity
Intactness: Intact and consistent character of seascape. Few or no detractors. Fragile seascape/ landscape lacking ability to accommodate change.	Seascape character fragmented. Presence of detractors. Robust landscape capable of accommodating change.
State of repair: Well-maintained seascape or landscape character at coast.	Poorly maintained seascape or landscape character at coast.
Aesthetic and perceptual:	
Scale: Small scale, enclosed, views to horizon limited by landform. Introduction of an element of scale into previously un-scaled area.	A seascape of large scale, with simple, broad and homogenous coastal landforms. Large scale views.
Openness and enclosure: Openness may increase susceptibility if there is wide visibility, however open seascape/ landscape may also be larger scale and simple which would decrease susceptibility. Where openness is a key characteristic and introduction of built elements may compromise this.	Enclosed seascape/ landscape can offer more screening potential, limiting visibility to a smaller area, however they may also be smaller scale and more complex which would increase susceptibility. Unframed open views unimpeded by natural elements or features.
Exposure: Sheltered and calm seascapes. Where seascape is extremely exposed such that the perceived wild, elemental nature is a key characteristic	Open, exposed seascapes which does not provide a perception of elemental or wild seascape character.
Aspect: Development would interfere with notable views of sunrises and particularly sunsets. Development seen from higher level views, where viewer elevation results in geometric layout pattern perceived as closer than on the horizon line.	Development located away from sunrise and sunset positions. Development seen from lower level views, where viewer elevation results in skyline development, on or over the horizon line.
Seascape pattern and foci: Complex or unified pattern which would be disrupted by development. Important focal points e.g. islands, islets, headlands, distinctive sweeping beaches, and high hills.	Presence of existing vertical or other elements at sea including shipping/ ferries and offshore WTGs. Lack of intact pattern. Lack of natural or historic feature focal points.
Tranquillity: Where stillness is a key feature, or where/ when movement is highly natural, irregular or dramatic. Very limited or no industrial/ semi-industrial structures. Where the area is unlit at night and is classified as such in a dark skies study.	Busier areas where development movement relates to other forms of mechanical movement present e.g. commercial shipping, ferries, boats, vehicles, WTGs. Presence of industrial/ semi-industrial structures especially at sea, or on coast. Coast is already well lit at night. Lights at sea and land.

Higher sensitivity	Lower sensitivity
Wildness: Undeveloped seascape Wild character Highly natural, semi-natural, unmanaged.	Highly developed seascape. Highly modified/ managed
Remoteness: Remote or isolated. Receptor perceived to be at distance from centres of population and human interventions.	Not remote. Receptor perceived to be close to centres of population and human interventions.
Visual characteristics:	
Key views (land to sea, sea to land, sea to sea): Open or framed views from key viewpoints. Views to key features e.g. islands, other coasts, headlands. Views from well used sea area for leisure focussed on seascape/ scenic quality. Distinctive undeveloped skylines with landmark features.	Few or no views from key viewpoints. Sea not used for leisure sailing. Developed, non-distinctive skylines without landmark features.
Intervisibility and associations of the development area with receptors: Strong intervisibility with coast in terms of length and/ or area and/ or relatively close to. Adjacent seascape/ landscape character context connected by associated character and views.	Poor intervisibility with coast in terms of length and/ or area and/ or relatively far away. Host landscape character is separate from surrounding/ adjacent seascape/ landscape character with weak association.
Typical receptors – type and number: Coast path and users of paths and access land. Visitors to heritage features. Promenade and pier users. Leisure sailors.	Users of ferries. Shipping. People in urban areas at work. Users of roads (unless corniche). Users of railways.
How seascape is experienced: From remote or little used stretch of sea with little shipping or boat use. From secluded coastline, intimate coastal roads and footpaths. From important viewpoints and elevated positions where the focus is the view and not the activity.	From ferry/ shipping. From main coastal, busy roads. Crowded beaches where focus is on beach activities (rather than enjoyment of seascape character).
Relationship between seascape area and adjacent coast:	
Contribution to setting: Is perceived from a sensitive/designated coast or seascape character area, within its	Is perceived from a less sensitive/non-designated coast or seascape character area and/or is located outside the immediate

Higher sensitivity		Lower sensitivity
immediate setting, at close range and in the foreground seascape.		setting, at distance in the background seascape.
Sensitivity to change:		
High →	Medium	Low →

SEASCAPE/ LANDSCAPE MAGNITUDE OF CHANGE

OVERVIEW

1.5.15 The magnitude of change affecting seascape/ landscape receptors is an expression of the scale of the change that will result from the VE array areas and is dependent on a number of variables regarding the size or scale of the change.

SIZE OR SCALE OF CHANGE

1.5.16 This criterion relates to the size or scale of change to the seascape/ landscape that will arise as a result of the VE array areas, based on the following factors.

- Seascape/ landscape elements: The degree to which the pattern of elements that makes up the seascape/ landscape character will be altered by the VE array areas, by removal or addition of elements in the seascape/ landscape. The magnitude of change will generally be higher if the features that make up the seascape/ landscape character are extensively removed or altered, and/or if many new offshore elements are added to the seascape/ landscape.
- Seascape/ landscape characteristics: This relates to the extent to which the effect of the VE array areas changes, physically or perceptually, the key characteristics of the seascape/ landscape that may be important to its distinctive character. This may include, for example, the scale of the landform, its relative simplicity or irregularity, the nature of the seascape/ landscape context, the grain or orientation of the seascape/ landscape, the degree to which the receptor is influenced by external features and the juxtaposition of the VE array areas in relation to these key characteristics. If the VE array areas are located in a seascape/ landscape receptor that is already affected by other similar development, this may reduce the magnitude of change if there is a high level of integration and the developments form a unified and cohesive feature in the seascape/ landscape.
- Seascape/ landscape designation: In the case of designated landscapes, the degree of change is considered in light of the effects on the special landscape qualities which underpin the designation and the effect on the integrity of the designation. All landscapes change over time and much of that change is managed or planned. Often landscapes will have management objectives for ‘protection’ or ‘accommodation’ of development. The scale of change may be localised, or occurring over parts of an area, or more widespread affecting whole landscape receptors and their overall integrity.
- Distance: The size and scale of change is also strongly influenced by the proximity of the VE array areas to the receptor and the extent to which the development can be seen as a characterising influence on the landscape. Consequently, the scale or magnitude of change is likely to be lower in respect of landscape receptors that are distant from the VE array areas and/ or screened by intervening landform, vegetation and built form to the extent that the scale of their influence on landscape receptors is small or limited. Conversely, landscapes closest to the development are likely to be most affected. Host landscapes (where the development is located within a ‘host’

landscape character unit) will be directly affected whilst adjacent areas of landscape character will be indirectly affected.

- Amount and nature of change: The amount of the VE array areas that will be seen. Visibility of the VE array areas may range from one WTG blade tip to all of the WTGs; generally, the greater the amount of the VE array areas that can be seen, the higher the scale of change. The degree to which the VE array areas are perceived to be on the horizon or 'within' the seascape/ landscape. Generally, the magnitude of change is likely to be lower if the VE array areas are largely perceived to be on the horizon at distance, rather than 'within' the seascape/ landscape.

SEASCAPE/ LANDSCAPE MAGNITUDE OF CHANGE RATING

1.5.17 The 'magnitude' or 'degree of change' resulting from the VE array areas is described as 'High', 'High-medium', 'Medium', 'Medium-low' 'Low' or 'Negligible'. In assessing magnitude of change, the assessment focuses on the size or scale of change and its geographical extent. The duration and reversibility are stated separately in relation to the assessed effects (i.e., as short/ medium/ long-term and temporary/ permanent). The basis for the assessment of magnitude for each receptor has been made clear using evidence and professional judgement. The levels of magnitude of change that can occur are defined in Table 1.3.

Table 1.3 Seascape/ landscape magnitude of change

Magnitude of change	Description/reason
High	Size/ Scale: A large-scale change and major loss of key landscape elements/ characteristics or the addition of large scale or numerous new and uncharacteristic features or elements that will affect the seascape/ landscape character and the special landscape qualities/ integrity of a landscape designation. Directly affecting a host seascape/ landscape receptor or indirectly affecting a nearby receptor.
Medium-high	Intermediate rating with combination of criteria from high or medium magnitude.
Medium	Size/ Scale: A medium scale change and moderate loss of some key landscape elements/ characteristics or the addition of some new medium scale uncharacteristic features or elements that could partially affect the seascape/ landscape character and the special landscape qualities/ integrity of a landscape designation. Directly affecting a host seascape/ landscape receptor or indirectly affecting a nearby receptor.
Medium-low	Intermediate rating with combination of criteria from medium or low magnitude.

Magnitude of change	Description/reason
Low	Size/ Scale: A small-scale change and minor loss of a few landscape elements/ non key characteristics, or the addition of some new small-scale features or elements of limited characterising influence on seascape/ landscape character/ designations.
Negligible	Size/ Scale: A very small- scale change that may include the loss or addition of some landscape elements of limited characterising influence. The seascape/ landscape characteristics and character will be subject to negligible levels of change.

EVALUATING SEASCAPE/ LANDSCAPE EFFECTS AND SIGNIFICANCE

1.5.18 The level of seascape/ landscape effect is evaluated through the combination of seascape/ landscape sensitivity and magnitude of change. Once the level of effect has been assessed, a judgement is then made as to whether the level of effect is 'significant' or 'not significant' as required by the relevant EIA Regulations. This process is assisted by the matrix in Table 1.8 which is used to guide the assessment. The factors considered in the evaluation of the sensitivity and the magnitude of the change resulting from the VE array areas and their conclusion, has been presented in a comprehensive, clear and transparent manner.

1.5.19 Further information is also provided about the nature of the effects (whether these will be direct/ indirect; temporary/ permanent/ reversible; beneficial/ neutral/ adverse or cumulative).

GEOGRAPHICAL EXTENT

1.5.20 The geographic extent over which the seascape/ landscape effects would be experienced is also assessed, which is distinct from the size or scale of effect. This evaluation is not combined in the assessment of the level of magnitude, but instead expresses the extent of the receptor that will experience a particular magnitude of change and therefore defines the geographical extents of the significant and non-significant effects.

1.5.21 The extent of the effects will vary depending on the specific nature of the VE array areas and is principally assessed through analysis of the extent of perceived changes to the seascape/ landscape character through visibility of the VE array areas.

1.5.22 Landscape effects are described in terms of the geographical extent or physical area that will be affected (and may be described as a linear or area measurement, or by features in the landscape that are affected). This should not be confused with the scale of the development or its physical footprint. The manner in which the geographical extent of the seascape/ landscape effect is described for different seascape/ landscape receptors is explained as follows.

1.5.23 Seascape/ landscape character: The extent of the effects on seascape/ landscape character will vary depending on the specific nature of the VE array areas. This is not simply an expression of visibility or the extent of the ZTV, but also includes a specific assessment of the extent of landscape character that will be changed by the VE array areas in terms of its character, key characteristics and elements.

1.5.24 Landscape Designations: In the case of a designated landscape, this refers to the extent the special landscape qualities of the designation are affected and whether this can be defined in terms of area or linear measurements, or subjectively through professional judgement (with the support of an expert topic group and/ or peer review) and whether the integrity of the designation is affected.

DURATION AND REVERSIBILITY

1.5.25 The duration and reversibility of seascape/ landscape effects has been based on the period over which VE array areas are likely to exist (during construction and operation) and the extent to which these elements would be removed (during decommissioning) and the effects reversed at the end of that period. Long-term, medium-term and short-term seascape/ landscape effects are defined as follows:

- long-term – more than 10 years (may be defined as permanent or reversible);
- medium-term – 6 to 10 years; and
- short-term – 1 to 5 years.

SIGNIFICANT SEASCAPE/ LANDSCAPE EFFECTS

1.5.26 A significant effect will occur where the combination of the variables results in the VE array areas having a defining effect on the seascape/ landscape receptor, or where changes of a lower magnitude affect a seascape/ landscape receptor that is of particularly high sensitivity. A major loss or irreversible effect over an extensive area or seascape/ landscape character, affecting landscape elements, characteristics and/ or perceptual aspects that are key to a nationally valued landscape are likely to be significant.

NON-SIGNIFICANT LANDSCAPE EFFECTS

1.5.27 A non-significant effect will occur where the effect of the VE array areas is not defining, and the landscape character of the receptor continues to be characterised principally by its baseline characteristics. Equally a small-scale change experienced by a receptor of high sensitivity may not significantly affect the special landscape quality or integrity of a designation. Reversible effects, on elements, characteristics and character that are of small-scale or affecting lower value receptors are unlikely to be significant.

1.6 ASSESSING VISUAL EFFECTS

OVERVIEW

1.6.1 Visual effects are concerned wholly with the effect of the VE array areas on views, and the general visual amenity and are defined by the Landscape Institute in GLVIA 3, paragraphs 6.1 as follows:

"An assessment of visual effects deals with the effects of change and development on views available to people and their visual amenity. The concern ... is with assessing how the surroundings of individuals or groups of people may be specifically affected by changes in the context and character of views."

1.6.2 Visual effects are identified for different receptors (people) who will experience the view at their place of residence, within their community, during recreational activities, at work, or when travelling through the area. The visual effects may include the following:

1.6.3 Visual effect: a change to an existing static view, sequential views, or wider visual amenity as a result of development or the loss of particular landscape elements or features already present in the view; and

1.6.4 Cumulative visual effects: the cumulative or incremental visibility of similar types of development may combine to have a cumulative visual effect.

1.6.5 The level of visual effect (and whether this is significant) is determined through consideration of the sensitivity of each visual receptor (or range of sensitivities for receptor groups) and the magnitude of change that will be brought about by the construction, operation and decommissioning of the VE array areas.

ZONE OF THEORETICAL VISIBILITY

1.6.6 Plans mapping the ZTV are used to analyse the extent of theoretical visibility of the VE array areas, across the study area and to assist with viewpoint selection. The ZTV does not however, take account of the screening effects of buildings, localised landform and vegetation, unless specifically noted (see individual figures). As a result, there may be roads, tracks and footpaths within the study area which, although shown as falling within the ZTV, are screened or filtered by built form and vegetation, which will otherwise preclude visibility.

1.6.7 The ZTVs provide a starting point in the assessment process and accordingly tend towards giving a 'worst case' or greatest calculation of the theoretical visibility.

VIEWPOINT ANALYSIS

1.6.8 Viewpoint analysis is used to assist the assessment and is conducted from selected viewpoints within the study area. The purpose of this is to assess both the level of visual effect for particular receptors and to help guide the design process and focus the assessment. A range of viewpoints are examined in detail and analysed to determine whether a significant visual effect will occur. By arranging the viewpoints in order of distance it is possible to define a threshold or outer geographical limit, beyond which significant effects will be unlikely.

1.6.9 The assessment involves visiting the viewpoint location and viewing wirelines and photomontages prepared for each viewpoint location. The fieldwork is conducted in periods of fine weather with good visibility and considers seasonal changes such as reduced leaf cover or hedgerow maintenance.

1.6.10 The SLVIA therefore includes viewpoint analysis prepared for each viewpoint and presented as supporting assessment in the SLVIA. A summary table of the findings is also provided in order of distance from the VE array areas. This summary table assists in defining the direction, elevation, geographical spread and nature of the potential visual effects and identify areas where significant effects are likely to occur. This approach seeks to provide clarity and confidence to consultees and decision makers by allowing the detailed judgements on the magnitude of visual change to be more readily scrutinised and understood.

1.6.11 The viewpoint analysis is used to assist the visual assessment of visual receptor locations reported in the PEIR and ES.

EVALUATING VISUAL SENSITIVITY TO CHANGE

OVERVIEW

1.6.12 In accordance with paragraphs 6.31-6.37 of GLVIA3 (Landscape Institute, 2013), the sensitivity of visual receptors has been determined by a combination of the value of the view and the susceptibility of the visual receptors to the change likely to result from the VE array areas on the view and visual amenity.

VALUE OF THE VIEW

1.6.13 The value of a view or series of views reflects the recognition and the importance attached either formally through identification on mapping or being subject to planning designations, or informally through the value which society attaches to the view(s). The value of a view has been classified as high, medium-high, medium, medium-low or low and the basis for this assessment has been made clear using evidence and professional judgement, based on the following criteria.

1.6.14 Formal recognition - The value of views can be formally recognised through their identification on OS or tourist maps as formal viewpoints, sign-posted and with facilities provided to add to the enjoyment of the viewpoint such as parking, seating and interpretation boards. Specific views may be afforded protection in local planning policy and recognised as valued views. Specific views can also be cited as being of importance in relation to landscape or heritage planning designations, for example the value of a view has been increased if it presents an important vista from a designed landscape or lies within or overlooks a designated area, which implies a greater value to the visible landscape.

1.6.15 Informal recognition - Views that are well-known at a local level and/or have particular scenic qualities can have an increased value, even if there is no formal recognition or designation. Views or viewpoints are sometimes informally recognised through references in art or literature and this can also add to their value. A viewpoint that is visited or appreciated by a large number of people will generally have greater importance than one gained by very few people.

SUSCEPTIBILITY TO CHANGE

1.6.16 Susceptibility relates to the nature of the viewer experiencing the view and how susceptible they are to the potential effects of the VE array areas. A judgement to determine the level of susceptibility therefore relates to the nature of the viewer and their experience from that particular viewpoint or series of viewpoints, classified as high, medium-high, medium, medium-low or low and based on the following criteria.

1.6.17 Nature of the viewer - The nature of the viewer is defined by the occupation or activity of the viewer at the viewpoint or series of viewpoints. The most common groups of viewers considered in the visual assessment include residents, motorists, and people taking part in recreational activity or working. Viewers, whose attention is focused on the landscape, or with static long-term views, are likely to have a higher sensitivity. Viewers travelling in cars or on trains will tend to have a lower sensitivity as their view is transient and moving. The least sensitive viewers are usually people at their place of work as they are generally less sensitive to changes in views.

1.6.18 Experience of the viewer - The experience of the visual receptor relates to the extent to which the viewer's attention or interest may be focused on the view and the visual amenity they experience at a particular location. The susceptibility of the viewer to change arising from the VE array areas may be influenced by the viewer's attention or interest in the view, which may be focused in a particular direction, from a static or transitory position, over a long or short duration, and with high or low clarity. For example, if the principal outlook from a settlement is aligned directly towards the VE array areas, the experience of the visual receptor will be altered more notably than if the experience relates to a glimpsed view seen at an oblique angle from a car travelling at speed. The visual amenity experienced by the viewer varies depending on the presence and relationship of visible elements, features or patterns experienced in the view and the degree to which the landscape in the view may accommodate the influence of the VE array areas.

VISUAL SENSITIVITY RATING

1.6.19 An overall level of sensitivity has been applied for each visual receptor or view – high, medium-high, medium, medium-low or low – by combining individual assessments of the value of the view and the susceptibility of the visual receptor to change. Each visual receptor, meaning the particular person or group of people likely to be affected at a specific viewpoint, is assessed in terms of their sensitivity. The basis for the assessments has been made clear using evidence and professional judgement in the evaluation of each receptor. Criteria that tend towards higher or lower sensitivity are set out in Table 1.4 below.

Table 1.4 Visual sensitivity to change

Higher sensitivity	Lower sensitivity
Value	
Specific viewpoint identified in OS maps and/ or tourist information and signage.	Viewpoint not identified in OS maps or tourist information and signage.
Facilities provided at viewpoint to aid the enjoyment of the view.	No facilities provided at viewpoint to aid enjoyment of the view.
View afforded protection in planning policy.	View is not afforded protection in planning policy.
View is within or overlooks a designated landscape, which implies a higher value to the visible landscape.	View is not within, nor does it overlook, a designated landscape.

Higher sensitivity	Lower sensitivity
View has informal recognition and well-known at a local level, as having particular scenic qualities.	View has no informal recognition and is not known as having particular scenic qualities.
View or viewpoint is recognised through references in art or literature.	View or viewpoint is not recognised in references in art or literature.
Susceptibility to change	
Viewer who is likely or liable to be influenced by the VE array areas.	Viewer who is unlikely or not liable to be influenced by the VE array areas.
Viewers such as walkers, or tourists, whose main attention and interest are on their surroundings.	Viewers whose main attention is not focused on their surroundings, such as people at work, or specific forms of recreation.
Residents that gain static, long-term views of the VE array areas in their principal outlook.	Viewers who are transient and dynamic, such as those travelling in cars or on trains, where the view is of short duration.
Viewpoint is visited or used by a large number of people.	View is visited or gained by very few people.
A view that is focused in a specific directional vista, with notable features of interest in a particular part of the view.	Open views with no specific point of interest, or specific directional vista away from direction of the VE array areas.
Viewers where the experience is of a high level of visual amenity at the location due to its overall pleasantness as an attractive visual setting or backdrop to activities.	The visual amenity experienced at the location by viewers is less pleasant or attractive than might otherwise be the case.
Sensitivity to change:	
High →	Medium / Low →

VISUAL MAGNITUDE OF CHANGE

OVERVIEW

1.6.20 The visual magnitude of change is an expression of the scale of the change that will result from the VE array areas and is dependent on a number of variables regarding the size or scale of the change and the geographical extent over which the change will be experienced. A separate assessment is also made of the duration and reversibility of visual effects.

SIZE OR SCALE OF CHANGE

1.6.21 An assessment has been made about the size or scale of change in the view that is likely to be experienced as a result of the VE array areas, based on the following criteria:

- Distance: the distance between the visual receptor/viewpoint and the VE array areas. Generally, the greater the distance, the lower the magnitude of change, as the VE array areas will constitute a smaller scale component of the view.

- Size: the amount and size of the VE array areas that will be seen. Visibility may range from small or partial visibility of the VE array areas, to all of the offshore elements being visible. Generally, the larger and greater number of the VE array areas that appear in the view, the higher the magnitude of change. This is also related to the degree to which the VE array areas may be wholly or partly screened by landform, vegetation (seasonal) and/ or built form. Conversely open views are likely to reveal more of the VE array areas, particularly where this is a key characteristic of the landscape.
- Scale: the scale of the change in the view, with respect to the loss or addition of features in the view and changes in its composition. The scale of the VE array areas may appear larger or smaller relative to the scale of the receiving seascape/ landscape.
- Field of view: the vertical/ horizontal field of view (FoV) and the proportion of the view that is affected by the VE array areas. Generally, the more of the proportion of a view that is affected, the higher the magnitude of change will be. If the VE array areas extend across the whole of the open part of the outlook, the magnitude of change will generally be higher as the full view will be affected. Conversely, if the VE array areas cover just a narrow part of an open, expansive and wide view, the magnitude of change is likely to be reduced as they will not affect the whole open part of the outlook. This can in part be described objectively by reference to the horizontal/ vertical FoV affected, relative to the extent and proportion of the available view.
- Contrast: the character and context within which the VE array areas will be seen and the degree of contrast or integration of any new features with existing landscape elements, in terms of scale, form, mass, line, height, colour, luminance and motion. Contrasts and changes may arise particularly as a result of the rotation movement of the WTG blades, as a characteristic that gives rise to effects. Developments which contrast or appear incongruous in terms of colour, scale and form are likely to be more visible and have a higher magnitude of change.
- Consistency of image: the consistency of image of the VE array areas in relation to other developments. The magnitude of change of VE array areas is likely to be lower if its WTG height, arrangement, and layout design are broadly similar to other developments in the seascape, in terms of its scale, form and general appearance. New development is more likely to appear as logical components of the landscape with a strong rationale for their location.
- Skyline/ background: Whether the VE array areas will be viewed against the skyline or a background seascape may affect the level of contrast and magnitude. If the VE array areas add to an already developed skyline the magnitude of change will tend to be lower.
- Number: generally, the greater the number of separate developments seen simultaneously or sequentially, the higher the magnitude of change. Further effects will occur in the case of separate developments and their spatial relationship to each other will affect the magnitude of change. For example, development that appears as an extension to an existing development will tend to result in a lower magnitude of change than a separate, new development.
- Nature of visibility: the nature of visibility is a further factor for consideration. The VE array areas may be subject to various phases of development change and the manner in which the VE array areas may be viewed could be intermittent or continuous and/ or seasonally, due to periodic management or leaf fall.

VISUAL MAGNITUDE OF CHANGE RATING

1.6.22 The 'magnitude' or 'degree of change' resulting from the VE array areas is described as 'High', 'High-medium', 'Medium', 'Medium-low' 'Low' and 'Negligible' as defined in Table 1.5. In assessing the magnitude of change the assessment has focused on the size or scale of change and its geographical extent. The duration and reversibility are stated separately in relation to the assessed effects (i.e., as short/ medium/ long-term and temporary/ permanent). The basis for the assessment of magnitude for each receptor has been made clear using evidence and professional judgement. Examples of criteria that tend towards higher or lower magnitude of change that can occur on views and visual receptors are set out in Table 1.5.

Table 1.5 Visual magnitude of change ratings

Magnitude of change	Magnitude of change	Description/reason
High	The VE array areas will result in a high level of alteration to the baseline view, forming the prevailing influence and/ or introducing elements that are substantially uncharacteristic in the existing view. The addition of the VE array areas will result in a high change, loss or addition to the baseline view.	> Size and Scale: A large, prominent and/ or prevailing change to the view. > Number: Involving the loss/ addition of a large number of features/ elements. > Distance: Typically appearing closer to the viewer in the fore to middle ground. > FoV: Affecting a large vertical angle and wide horizontal FoV. > Nature of Visibility: Multiple phase development, continuously and sequentially visible. > Contrast: Strong degree of contrast with surroundings with little or no screening. > Skyline: Visible on the skyline as a new feature. > Consistency of Image: Contrasting with other developments, lacking in visual rationale.
Medium-high	Intermediate rating with combination of criteria from high or medium magnitude of change category.	
Medium	The VE array areas will result in a medium level of alteration to the baseline view, forming a readily apparent influence and/or introducing elements that are potentially uncharacteristic in the existing view.	> Size and Scale: A moderate, readily apparent and/ or noticeable change to the view. > Number: Involving the loss/ addition of a number of features/ elements. > Distance: Typically appearing in the middle ground. > FoV: Affecting a medium vertical angle and moderate horizontal FoV. > Nature of Visibility: Multiple phase development, intermittently and sequentially visible.

Magnitude of change	Magnitude of change	Description/reason
	The addition of the VE array areas will result in a medium change, loss or addition to the baseline view.	> Contrast: Contrast with surroundings and may benefit from some screening. > Skyline: Visible on the skyline along with other features. > Consistency of Image: Different from other developments, some visual rationale.
Medium-low	Intermediate rating with combination of criteria from high or medium magnitude of change category.	
Low	The VE array areas will result in a low level of alteration to the baseline view, providing a slightly apparent influence and/or introducing elements that are characteristic in the existing view. The addition of the VE array areas will result in a low change, loss or addition to the baseline view.	> Size and Scale: A small, slightly apparent and/ or perceptible change. > Number: Involving the loss/ addition of a small number of features/ elements. > Distance: Typically appearing in the background. > FoV: Affecting a small vertical angle and narrow horizontal FoV. > Nature of Visibility: Simple, single development, intermittently and infrequently visible. > Contrast: Some parity/ 'fits' with surroundings and may benefit from screening. > Skyline: Partly visible on a developed skyline or not visible on the skyline. > Consistency of Image: Similar to other developments with visual rationale, appearing reasonably well accommodated within its surroundings.
Negligible	The VE array areas will result in a negligible alteration to the existing view. If visible it may form a barely discernible influence and/or introduce elements that are substantially characteristic in the baseline view. The addition of the VE	> Size and Scale: A negligible, barely discernible and/or inconspicuous change. > Number: Involving the loss/addition of a small number of features/ elements. > Distance: Typically appearing in the far distance. > FoV: Affecting a very small vertical and narrowest horizontal FoV. > Nature of Visibility: Simple, single development, intermittently and infrequently visible.

Magnitude of change	Magnitude of change	Description/reason
	array areas will result in negligible incremental change, loss or addition to the baseline view.	> Contrast: Blends with surroundings and/ or is well screened. > Skyline: Partly visible on a developed skyline or not visible on the skyline. > Consistency of Image: Similar from other developments with strong visual rationale, appearing well accommodated within its surroundings.

EVALUATING VISUAL EFFECTS AND SIGNIFICANCE

OVERVIEW

1.6.23 The level of visual effect is evaluated through the combination of visual sensitivity and magnitude of change. Once the level of effect has been assessed, a judgement is then made as to whether the level of effect is 'significant' or 'not significant' as required by the relevant EIA Regulations. This process is assisted by the matrix in Table 1.8 which is used to guide the assessment. The factors considered in the evaluation of the sensitivity and the magnitude of the change resulting from the VE array areas and their conclusion, have been presented in a comprehensive, clear and transparent manner.

1.6.24 Further information is also provided about the nature of the effects (whether these will be direct/ indirect; temporary/ permanent/ reversible; beneficial/ neutral/ adverse or cumulative).

GEOGRAPHICAL EXTENT

1.6.25 The geographic extent over which the visual impacts will be experienced has also been assessed. This is distinct from the size or scale of effect and is described in terms of the physical area or location over which it will be experienced (described as a linear or area measurement). The extent of the effects will vary according to the specific nature of the VE array areas and is principally assessed through ZTV, field survey and viewpoint analysis of the extent of visibility likely to be experienced by visual receptors. The geographical extent of visual effects is described as per the following examples.

1.6.26 The geographical extent can be described as an area measurement or proportion of the total area of the receptor affected. For example, effects on people within a particular area such as a golf course or area of common land can be illustrated via a 'representative viewpoint' that represents a similar visual effect, likely to be experienced by larger numbers of people within that area. The geographical extent of that visual effect can be expressed as approximately '5 hectares' or '10%' of an area of common land or defined recreational area.

1.6.27 The geographical extent can be described as a linear measurement (m or km) according to the length of route affected. For example, effects on people travelling on a route through the landscape such as a road or footpath can be illustrated via a 'representative viewpoint' that represents a similar visual effect, likely to be experienced by larger numbers of people along that route. The geographical extent of that visual effect can be expressed as approximately '2 km' or '10%' of the total length of the route.

1.6.28 The geographical extent of a visual effect experienced from a specific viewpoint may be limited to that location alone. An example of a 'specific viewpoint' is a public viewpoint recommended in tourist literature such as a well visited hill summit. An example of an 'illustrative viewpoint' is a particular location within a built up or well vegetated area where an uncharacteristically open or restricted view exists.

DURATION AND REVERSIBILITY

1.6.29 The duration and reversibility of visual effects are based on the period over which the VE array areas are likely to exist (during construction and operation) and the extent to which the VE array areas will be removed (during decommissioning), with effects reversed at the end of that period.

1.6.30 Long-term, medium-term and short-term visual effects are defined as follows:

- long-term – more than 10 years (may be defined as permanent or reversible);
- medium-term – 6 to 10 years; and
- short-term – 1 to 5 years.

SIGNIFICANT VISUAL EFFECTS

1.6.31 A significant effect is more likely to occur where a combination of the variables results in the VE array areas having a defining effect on the view or visual amenity or where changes affect a visual receptor that is of high sensitivity.

NON-SIGNIFICANT VISUAL EFFECTS

1.6.32 A non-significant effect is more likely to occur where a combination of the variables results in the VE array areas having a non-defining effect on the view or visual amenity or where changes affect a visual receptor that is of low sensitivity.

WEATHER CONDITIONS

1.6.33 The assessment of visual effects is undertaken in clear weather with good to excellent visibility. This means that the viewpoint assessment represents a maximum effect assessment of the likely visual effects. The same viewpoint may be experienced under less optimal viewing conditions resulting in a significant effect appearing as non-significant, due to the change in the variable weather conditions. Due to the conditions of the assessment the reverse (a non-significant effect appearing as significant) is unlikely to occur.

1.7 ASSESSING NIGHT-TIME EFFECTS OF LIGHTING

INTRODUCTION

1.7.1 The assessment of night-time visual effects is based on the description of proposed WTG lighting set out in the project design envelope in Volume 2, Chapter 10: Seascape, Landscape and Visual and the relevant ICAO/ CAA regulations and standards, including Air Navigation Order 2016: Civil Aviation (CAA, 2016).

1.7.2 The effect of the visible lights will be dependent on a range of factors, including the intensity of lights used, the clarity of atmospheric visibility and the degree of negative/ positive vertical angle of view from the light to the receptor. In compliance with EIA regulations, the likely significant effects of a 'worst-case' scenario for WTG lighting are assessed and illustrated in this visual assessment.

1.7.3 A worst-case approach is applied to the assessment that considers the potential effects of medium-intensity 2,000 candela (cd) aviation lights in clear visibility. It should be noted however, that medium intensity lights are only likely to be operated at their maximum 2,000 cd during periods of poor visibility. Photomontages showing 2,000 cd aviation lights are provided from representative viewpoints to support a worst-case assessment approach.

1.7.4 It should be noted that the WTGs would also include infra-red lighting on the WTG hubs, which would not be visible to the human eye. Details of the lighting would be agreed with the MoD. The focus of the night-time visual assessment in this assessment is on the visible lighting requirements of the VE array areas.

1.7.5 The study area for the visual assessment of WTG lighting is shown in Figure 10.21 and is coincident with the 60 km SLVIA study area.

1.7.6 The assessment of the lighting of the VE array areas is intended to determine the likely effects on the visual resource i.e. it is an assessment of the visual effects of aviation lighting on views experienced by people at night. The assessment of WTG lighting does not consider effects of aviation lighting on landscape or seascape character (i.e. landscape or seascape effects).

1.7.7 ICAO indicates a requirement for no lighting to be switched on until 'Night' has been reached, as measured at 50 cd/m2 or darker. It does not require 2,000 candela medium intensity to be on during 'twilight', when landscape character may be discerned. The aviation and marine navigational lights may be seen for a short time during the twilight period when some recognition of landscape features/ profiles/ shapes and patterns may be possible. It is considered however, that level of recognition does not amount to an ability to appreciate in any detail landscape character differences and subtleties, nor does it provide sufficient natural light conditions to undertake a landscape character assessment.

1.7.8 The assessment of the lighting of the VE array areas is primarily intended to determine the likely significant effects on the visual resource i.e. it is an assessment of the visual effects of aviation lighting on views experienced by people at night. The matter of visible aviation and marine navigation lighting assessment is primarily a visual matter and the assessment presented focusses on that premise.

1.7.9 The Scottish Government's Aviation Lighting Working Group is working on guidance to streamline the process for night-time lighting assessments. While this guidance has yet to be published, there is some consensus that the perception of landform/ skylines at night is a relevant consideration (with perception being a component of visual effects), however there is also widespread agreement that it is not possible to undertake landscape/ coastal character assessment after the end of civil twilight, when it is technically 'dark' and WTG aviation lighting is switched on.

1.7.10 To date the only formal recognition of this approach to assessment is the Scottish Ministers' Decision for the Crystal Rig IV PLI. The Reporters concluded in their report at paragraph 4.141:

"It can be seen from the summaries of evidence above that the parties differ as to whether the proposed aviation lighting would be a visual impact alone. We consider that without being able to see and fully appreciate the features of the landscape and the composition of views it is not possible to carry out a meaningful landscape character assessment. On this matter, we find that the proposed lighting is indeed a visual concern, as the applicant asserts."

1.7.11 In the absence of guidance being available, it is considered reasonable to adopt the findings of Scottish Ministers, following a detailed Public Inquiry as this represents precedence for focusing on the assessment of effects of turbine lighting as a visual matter.

1.7.12 Assessment of proposed WTG lighting on coastal character at night is therefore focused on particular areas where the landform of the foreshore, coastal landforms and inshore islands etc may be perceived at night with lights in the background on the sea skyline i.e. where a perceived character effect may occur as a component of visual effects; and for particular designations where dark skies are a specific 'special quality' defined in their citation.

SIGNIFICANCE CRITERIA FOR NIGHT-TIME EFFECTS

1.7.13 The nature of the daytime and night-time effects from visible aviation and marine navigation lighting are clearly very different, in that during day light hours visibility of moving WTG rotors gives rise to effects that are very different to the pinpoint effects of lighting at night. It is considered therefore, that the same criteria should not be used to assess these differences in daytime and night-time effect.

1.7.14 In relation to the sensitivity of visual receptors, this is defined through the application of professional judgement in relation to the interaction between the 'value' of the view experienced by the visual receptor and the 'susceptibility' of the visual receptor (or 'viewer', not the view) to the particular form of change likely to result from the VE array areas.

1.7.15 The factors weighed in reaching a decision on 'value' of the view are not all applicable at night-time, in the same way they may be during the day. It is not appropriate, for example, to attribute value to views at night when the detail of the view, or of elements that add value to it within a landscape, cannot readily be discerned. Furthermore, the popularity of a viewpoint during the day may be completely different to its use at night. Value factors assessed for day-time viewpoints may therefore be of less relevance to the value judgement for night-time viewpoints, which is factored into the following assessments.

1.7.16 In reaching a view on the significance of the likely visual effects from the visible aviation lighting, it is relevant to consider what parts of the landscape - where darkness qualities are well displayed - are likely to be affected by visibility of the aviation lights and, in turn, to understand what people might be doing in these areas at night to be susceptible to visibility of aviation lights. Descriptions of 'susceptibility' provided for daytime viewpoints and receptors are considered appropriate for the purposes of establishing receptor sensitivity at night-time, however the susceptibility of people experiencing night-time views will depend on the degree to which their perception is affected by existing baseline lighting. In brightly lit areas, or when travelling on roads from where sequential experience of lighting may be experienced, the susceptibility of receptors is likely to be lower than from within areas where the baseline contains no or limited existing lighting.

1.7.17 In relation to the other key component in determining significance of effect, the magnitude of change, reference to 'loss of important features' and 'composition of the view' are not readily discernible or relevant at night and, on this basis, a distinct set of criteria to explain the magnitude of change at night, as a consequence of the appearance of aviation lights, is set out in Table 1.6 below.

Table 1.6 Magnitude of change criteria for night-time visual effects

Magnitude of change	Definition of Magnitude of change
High	Addition of aviation and marine navigation lighting results in large scale of change/large intrusion to the existing night-time baseline conditions/darkness in the view, due to a full and/ or close range view of visible aviation lighting and/ or a high degree of contrast/ low degree of integration with level of baseline lighting in the view. Results in obtrusive light which compromises or diminishes the view of the night sky.
Medium	Addition of aviation lighting results in moderate scale of change/moderate intrusion to the existing night-time baseline conditions/ darkness in the view, due to partial and/ or middle distance view of visible aviation lighting and/ or moderate level of contrast/ integration with level of baseline lighting in the view. Results in light that may partially compromise or diminish the view of the night sky, but which is not considered obtrusive.
Low	Addition of aviation and marine navigation lighting results in small scale of change/minor intrusion to the existing night-time baseline conditions/ darkness in the view, due to limited and/ or distant view of aviation lighting and/ or low degree of contrast/ high degree of integration with level of baseline lighting in the view. Results in light that does not compromise or diminish the view of the night sky, nor is it considered obtrusive.
Negligible	Addition of aviation and marine navigation lighting results in a largely indiscernible change/negligible intrusion to the existing night-time baseline conditions/ darkness in the view, due to glimpsed view of lighting and/ or slight degree of contrast/ very high degree of integration with level of baseline lighting in the view. Results in light that does not compromise or diminish the view of the night sky, nor is it considered obtrusive.

1.7.18 The significance of effects of aviation and marine navigation lighting is assessed through a combination of the sensitivity of the visual receptor and the magnitude of change that would result from the visible aviation lighting, taking into account the considerations described above, and informed by the matrix in Table 1.8, which gives an understanding of the threshold at which significant effects may arise.

1.7.19 A significant effect occurs where the aviation and marine navigation lighting would provide a defining influence on a view or visual receptor. A not significant effect would occur where the effect of the aviation and marine navigation lighting is not material, and the baseline characteristics of the view or visual receptor continue to provide the definitive influence. In this instance the aviation lighting may have an influence, but this influence would not be definitive.

1.7.20 In determining significance, particular attention is paid to the potential for 'Obtrusive Light' i.e. whether the lighting impedes a particular view of the night sky; creates sky glow, glare or light intrusion (ILP, 2011) in a prominent, incongruous or intrusive way.

1.8 ASSESSING CUMULATIVE SEASCAPE, LANDSCAPE AND VISUAL EFFECTS METHODOLOGY

APPROACH TO ADDITIONAL OR COMBINED CUMULATIVE EFFECTS

1.8.1 The Cumulative Effects Assessment (CEA) takes into account the impact associated with the VE array areas together with other relevant plans, projects and activities. Cumulative effects are therefore the additional or combined effect of the VE array areas in combination with the effects from a number of different projects, on the same receptor or resource. Further detail on CEA methodology is set out in Volume 2, Chapter 3: EIA Methodology.

1.8.2 GLVIA3 (Landscape Institute and IEMA 2013, p120) defines cumulative landscape and visual effects as those that *"result from additional changes to the landscape and visual amenity caused by the proposal in conjunction with other developments (associated with or separate to it), or actions that occurred in the past, present or are likely to occur in the foreseeable future."*

1.8.3 NatureScot's guidance, Assessing the Cumulative Impact of Onshore Wind Energy Developments (NatureScot, 2021) is widely used across the UK to inform the specific assessment of the cumulative effects of windfarms. Both GLVIA3 and NatureScot's guidance provide the basis for the methodology for the cumulative SLVIA undertaken in the SLVIA. The NatureScot (2021) guidance defines:

"Cumulative effects as the additional changes caused by a generation assets of the Project in conjunction with other similar developments or as the combined effect of a set of developments taken together (NatureScot, 2021: p4);

Cumulative landscape effects are those effects that can impact on either the physical fabric or character of the landscape, or any special values attached to it' (NatureScot, 2021, p10); and

Cumulative visual effects are those effects that can be caused by combined visibility, which occurs where the observer is able to see two or more developments from one viewpoint and/ or sequential effects which occur when the observer has to move to another viewpoint to see different developments" (NatureScot, 2021, p11).

1.8.4 In line with NatureScot guidance and GLVIA3, cumulative effects are assessed in this SLVIA as the additional changes caused by the VE array areas in conjunction with other similar developments (not the totality of the cumulative effect). The CEA assesses the cumulative effect of the VE array areas with other projects (Section 11.13 of Volume 2, Chapter 10: Seascape, Landscape and Visual) against the baseline (Section 11.7 of Volume 2, Chapter 10: Seascape, Landscape and Visual), with the assessment of significance apportioning the amount of the effect that is attributable to the VE array areas.

1.8.5 The contribution of the VE array areas to the cumulative effect upon the baseline character/ view is assessed and information provided on *"how the effects of the applicant's proposal would combine and interact with the effects of other development"* (PINS, 2019). Adjacent developments may complement one another, or may be discordant with one another, and it is the increased or reduced level of significance of effects which arises as a result of this change that is assessed in the CEA, such as through design discordance or proliferation of multiple developments affecting characteristics or new geographic areas, and ultimately if character changes occur because of multiple developments becoming a prevailing characteristic of the seascape or view.

TIERED APPROACH TO CEA

1.8.6 In accordance with NatureScot guidance and GLVIA3 (para 7.13), existing projects and those which are under construction are included in the SLVIA baseline and described as part of the existing environment (Section 11.7 of Volume 2, Chapter 10: Seascape, Landscape and Visual), including the extent to which these have altered character and views, and affected sensitivity to windfarm development. An assessment of the additional effect of the VE array areas is undertaken in conjunction with a baseline that includes operational and under-construction projects as part of the main assessment in Section 11.7 of Volume 2, Chapter 10: Seascape, Landscape and Visual. This includes assessment of the VE array areas against magnitude factors such as its size, scale, spread and landscape context, as well as cumulative effect factors relating to the operational and under-construction wind farms, such as its increase in spread, aesthetic relationship, and contrasts of size and spacing of turbines of the projects.

1.8.7 A further assessment of the additional cumulative seascape, landscape and visual effects of the VE array areas with other potential future projects is undertaken in Section 11.13 of Volume 2, Chapter 10: Seascape, Landscape and Visual.

1.8.8 In undertaking this CEA for the VE array areas, it is important to bear in mind that other projects and plans under consideration will have differing potential for proceeding to an operational stage and hence a differing potential to ultimately contribute to a cumulative impact alongside the VE array areas. Therefore, a tiered approach has be adopted. This provides a framework for placing relative weight upon the potential for each project/ plan to be included in the CEA to ultimately be realised, based upon the project/ plan's current stage of maturity and certainty in the projects' parameters. The tiered approach which will be utilised within the CEA of the VE array areas employs the following tiers as set out in Table 1.7.

Table 1.7 Tiered approach to CEA

Tier	Description
Tier 1	> Permitted (consented) application(s), whether under the PA2008 or other regimes, but not yet implemented; and > Submitted application(s) whether under the PA2008 or other regimes but not yet determined.
Tier 2	> Projects on the Planning Inspectorate's Programme of Projects where a scoping report has been submitted.
Tier 3	> Projects on the Planning Inspectorate's Programme of Projects where a scoping report has not been submitted. > Identified in the relevant Development Plan (and emerging Development Plans – with appropriate weight being given as they move closer to adoption) recognising that there will be limited information available on the relevant proposals; > Identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, where such development is reasonably likely to come forward.

PROJECTS FOR INCLUSION IN THE CEA FOR SEASCAPE, LANDSCAPE AND VISUAL

1.8.9 The projects and plans selected as relevant to the CEA presented within the SLVIA are based upon the results of a screening exercise (see Section 11.13 of Volume 2, Chapter 10: Seascape, Landscape and Visual). Each project or plan has been considered on a case by case basis for screening in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/ temporal scales involved. A comprehensive 'long list' of projects was reviewed, and projects within the cumulative search area base plan compiled within the 60 km SLVIA study area (Figure 10.22), with potential for cumulative impact interactions. The specific projects scoped into the CEA for seascape, landscape and visual receptors, are set out in Section 11.13 of Volume 2, Chapter 10: Seascape, Landscape and Visual.

1.8.10 The range of potential cumulative effects that are identified and included in the CEA, is a subset of those considered for the VE array areas alone assessment. This is because some of the potential impacts identified and assessed for the VE array areas alone, are localised and temporary in nature and will therefore have limited or no potential to interact with similar changes associated with other plans or projects. The receptors have therefore been scoped out of the cumulative effects assessment as set out in Section 11.13 of Volume 2, Chapter 10: Seascape, Landscape and Visual.

1.8.11 Similarly, some of the potential impacts considered within the VE array areas alone assessment are specific to a particular phase of development (e.g. construction, operation and maintenance or decommissioning). Where the potential for cumulative effects with other plans or projects only have potential to occur where there is spatial or temporal overlap with the VE array areas during certain phases of development, impacts associated with a certain phase may be omitted from further consideration where no plans or projects have been identified that have the potential for cumulative effects during this period.

TYPES OF CUMULATIVE EFFECT

CUMULATIVE VISUAL EFFECTS

1.8.12 Cumulative visual effects consist of combined and sequential effects:

- Combined visibility - occurs where the observer is able to see two or more developments from one viewpoint. Combined visibility may either be where several developments are within the observer's main angle of view at the same time, or, where the observer has to turn to see the various developments. The cumulative visual effect of the VE array areas may be significant, or not significant, depending on factors influencing the cumulative magnitude of change, such as the degree of integration and consistency of image with other developments in combined views; and its position relative to other developments and the landscape context in successive views.
- Sequential visibility - occurs when the observer has to move to another viewpoint to see different developments. Sequential effects are assessed along regularly used routes such as major roads, railway lines and footpaths. The occurrence of sequential effects range from 'frequently sequential' (the features appear regularly and with short time lapses between, depending on speed of travel and distance between the viewpoints) to 'occasionally sequential' (long time lapses between appearances, because the observer is moving slowly and/or there are large distances between the viewpoints). The cumulative visual effect is more likely to be significant when frequently sequential.

CUMULATIVE SEASCAPE/ LANDSCAPE EFFECTS

1.8.13 Cumulative development within a particular area may build up to create different types of seascape/ landscape effect. The significance of the cumulative seascape/ landscape effects of the addition of the VE array areas will be assessed as follows.

1.8.14 If the VE array areas form a separate isolated feature from other developments within the seascape/ landscape, too infrequent and of insufficient significance to be perceived as a characteristic of the area, then the cumulative seascape/ landscape effect of the VE array areas is unlikely to be significant.

1.8.15 If the addition of the VE array areas results in offshore windfarms and/ or energy generation/ transmission developments forming a key characteristic of the seascape/ landscape, exerting sufficient presence as to establish or increase the extent of a 'seascape/ landscape with windfarms'; then the cumulative seascape/ landscape effect of the proposal may be significant or not significant, depending on the sensitivity of the receptor and magnitude of the change.

1.8.16 If the addition of the VE array areas results in offshore windfarms forming the prevailing characteristic of the seascape/ landscape, seeming to define the seascape/ landscape as a 'windfarm seascape/ landscape character type' then the cumulative seascape/ landscape effect of the VE array areas is likely to be significant.

CUMULATIVE SENSITIVITY OF LANDSCAPE AND VISUAL RECEPTORS

1.8.17 In evaluating cumulative sensitivity in the cumulative SLVIA (Section 11.13 of Volume 2, Chapter 10: Seascape, Landscape and Visual), the sensitivity to change of seascape, landscape and visual receptors are retained from the environmental assessment: operational phase in Section 11.11 of Volume 2, Chapter 10: Seascape, Landscape and Visual.

CUMULATIVE MAGNITUDE OF CHANGE

1.8.18 The cumulative magnitude of change is an expression of the degree to which seascape, landscape and visual receptors will be changed by the addition of the VE array areas cumulatively. The cumulative magnitude of change is assessed according to a number of criteria, described below.

- The location, position and visual relationship of the VE array areas: Depending on the viewpoint/viewing angle from the coast, the VE array areas may be viewed adjacent to other developments on the skyline, covering a wider lateral spread; they may form one grouping or could be viewed separately on the skyline (separated by space on the skyline); or could be viewed with one project being 'behind' the other project. The overall magnitude of change will vary depending on this visual relationship at different viewpoints and is likely to be higher when two projects are viewed adjacent to each other over a wider lateral spread; and lower when one project is viewed behind the other project.
- The location of the VE array areas in relation to other developments: If the VE array areas is seen in a part of the view or setting to a landscape receptor that is not affected by other development, this will generally increase the cumulative magnitude of change as it will extend influence into an area that is currently unaffected by development. Conversely, if the VE array areas are seen in the context of other developments, the cumulative magnitude of change may be lower as development is not being extended to otherwise undeveloped parts of the outlook or setting. This is particularly true where the scale and layout of the proposal is similar to that of the other developments as where there is a high level of integration and cohesion with an existing site the various developments may appear as a single site.
- The extent of the developed skyline: the proportion (or horizontal angle) of the view that is affected by the combined lateral spread of the VE array areas and other projects on the horizon. If the lateral spread/ horizontal angle of the VE array areas will add notably to the developed horizon in a view, the cumulative magnitude of change will tend to be higher.
- The number and scale of developments seen simultaneously or sequentially: Generally, the greater the number of clearly separate developments that are visible, the higher the cumulative magnitude of change will be. The addition of the VE array areas to a view or seascape/ landscape where a number of smaller developments are apparent will usually have a higher cumulative magnitude of change than one or two large developments as this can lead to the impression of a less co-ordinated or strategic approach.
- The scale comparison between developments: If the VE array areas are perceived to be of a similar scale to other visible developments, particularly those seen in closest proximity to it, the cumulative magnitude of change will generally be lower as it will have more integration with the other sites and will be less apparent as an addition to the cumulative situation.
- The consistency of image of the proposal in relation to other developments: The cumulative magnitude of change of the VE array areas is likely to be lower if its turbine

height, arrangement, layout design and visual appearance/ aesthetics are broadly similar to other developments in the seascape, as they are more likely to appear as relatively simple and logical components of the seascape.

- The context in which the developments are seen: If projects are seen in a similar seascape/ landscape context, the cumulative magnitude of change is likely to be lower due to visual integration and cohesion between the sites. If projects are seen in a variety of different settings, this can lead to a perception that development is unplanned and uncoordinated, affecting a wide range of landscape character and blurring the distinction between them.
- The magnitude of change of the VE array areas as assessed in the project alone assessment: Where the VE array areas is assessed to have a negligible or low magnitude of change on a view or seascape/ landscape receptor, there is more likely to be a low cumulative effect.

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

- High - where the magnitude of change arising from the addition of the VE array areas will result in a high cumulative change, loss or addition to the seascape/ landscape receptor or view;
- Medium - where the magnitude of change arising from the addition of the VE array areas will result in a medium change, loss or addition to the seascape/ landscape receptor or view;
- Low - where the magnitude of change arising from the addition of the VE array areas will result in a low change, loss or addition to the seascape/ landscape receptor or view; and
- Negligible - where the magnitude of change arising from the addition of the VE array areas will result in a negligible incremental change, loss or addition to the seascape/ landscape receptor or view.

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

SIGNIFICANCE OF CUMULATIVE EFFECTS

1.8.21 The objective of the cumulative assessment is to determine whether any effects that the construction and operation of the offshore infrastructure will have on seascape, landscape and visual receptors, when seen or perceived cumulatively with the construction and operation of the other projects, will be significant or not significant. Significant cumulative seascape, landscape and visual effects arise where the addition of the VE array areas, leads to offshore windfarms becoming a prevailing seascape, landscape or visual characteristic of a receptor that is sensitive to such change. Cumulative seascape/ landscape effects may evolve as follows:

- A small scale, single development will often be perceived as a new or ‘one-off’ landscape feature or landmark within the seascape. Except at a local site level, it usually cannot change the overall existing seascape character, or become a new characteristic element of a landscape/ seascape;
- With the addition of further development, it can become a characteristic element of the landscape/ seascape, as they appear as elements or components that are repeated. Providing there was sufficient ‘space’ or undeveloped landscape/ seascape between

each development, or the overlapping of several developments is not too dense; they would appear as a series of developments within the landscape/ seascape and would not necessarily become the dominant or defining characteristic of the seascape nor have significant cumulative effects; and

- The next stage would be to consider larger scale developments and/ or an increase in the number of developments within an area that either overlap or coalesce and/ or 'join-up' along the skyline. The effect is to create a landscape/ seascape where the offshore windfarm and/ or energy generation/ transmission element is a prevailing characteristic of the landscape/ seascape. The result would be to materially change the existing seascape/ landscape character and resulting in a significant cumulative effect. A landscape/ seascape characterised by offshore windfarm or energy generation/ transmission development may already exist as part of the baseline seascape context.

1.8.22 Less extensive, but nevertheless significant cumulative seascape, landscape and visual effects may also arise as a result of the addition of the VE array areas where it results in a seascape, landscape or view becoming defined by the presence of more than one offshore windfarm or similar/ large scale development, so that other patterns and components are no longer definitive, or where the proposal contrasts with the scale or design of an existing or development.

1.8.23 Higher levels of cumulative effect may arise when projects are clearly visible together in views, however provided that the projects are designed to achieve a high level of visual integration, with few notable visual differences between developments, these effects may not necessarily be significant. In particular, the effects of an extension to an existing development are often less likely to be significant, where the effect is concentrated, providing that the design of the developments are compatible and that the overall capacity of the seascape is not exceeded.

1.8.24 The capacity of the seascape/ landscape or view may be assessed as being exceeded where the seascape, landscape and visual receptor becomes defined by a particular type of development, or if the VE array areas extend across seascape/ landscape character areas or clear visual/ topographic thresholds in a view.

1.8.25 More substantial cumulative effects may result from developments that have some geographical separation, but remain highly inter-visible, potentially resulting in extending effects into new areas, such as an increased presence of development on a skyline, or the creation of multiple, separate offshore windfarm defined seascape/ landscapes.

1.9 EVALUATION OF SIGNIFICANCE

1.9.1 The matrix presented in Table 1.8 is used as a guide to illustrate the SLVIA process. In line with the emphasis placed in GLVIA3 upon the application of professional judgement, an overly mechanistic reliance upon a matrix is avoided through the provision of clear and accessible narrative explanations of the rationale underlying the assessment made for each landscape and visual receptor. Such narrative assessments provide a level of detail over and above the outline assessment provided by use of the matrix alone.

1.9.2 The landscape and visual assessment unavoidably, involves a combination of quantitative and qualitative assessment and wherever possible cross references have been made to objective evidence, baseline figures and/ or to photomontage visualisations to support the assessment conclusions. Often a consensus of professional opinion has been sought through consultation, internal peer review, and the adoption of a systematic, impartial, and professional approach. Importantly each effect results from its own unique set of circumstances and have been assessed on a case by case basis. The matrix as presented in Table 1.8 should therefore be considered as a guide; where deviations from this guide have been made, this is clearly explained in the assessment.

1.9.3 Significant landscape and visual effects are shaded red in Table 1.8. They relate to all those effects that result in a 'Major' or a 'Major/ Moderate' level of effect. Moderate levels of effect have potential, subject to the assessor's professional judgement, to be considered as significant or not significant, depending on the sensitivity and magnitude of change factors evaluated. Some moderate levels of effect may be considered significant, while others can be justified as not significant. There is a threshold here that hinges around professional judgement, which is applied to the relevant assessments and is explained with further justification in the narrative assessment of relevant receptors where moderate effects occur. White or un-shaded boxes in Table 1.8 indicate a non-significant effect.

1.9.4 In those instances where there will be no effect, the magnitude has been recorded as 'Zero' and the level of effect as 'None'.

Table 1.8 Evaluation of seascape, landscape and visual effects

Sensitivity	Magnitude of change					
	High	**Medium-high**	**Medium**	**Medium-low**	**Low**	**Negligible**
High	**Major (significant)**	**Major (significant)**	**Major / Moderate (significant)**	Moderate (significant or not significant)	Moderate / Minor (not significant)	Minor (not significant)
Medium-high	**Major (significant)**	**Major / Moderate (significant)**	Moderate (significant or not significant)	Moderate (significant or not significant)	Moderate / Minor (not significant)	Minor (not significant)
Medium	**Major / Moderate (significant)**	Moderate (significant or not significant)	Moderate (significant or not significant)	Moderate / Minor (not significant)	Minor (not significant)	Minor / Negligible (not significant)
Medium-low	Moderate (significant or not significant)	Moderate (significant or not significant)	Moderate / Minor (not significant)	Minor (not significant)	Minor / Negligible (not significant)	Negligible (not significant)
Low	Moderate / Minor (not significant)	Moderate / Minor (not significant)	Minor (not significant)	Minor / Negligible (not significant)	Negligible (not significant)	Negligible (not significant)

1.10 NATURE OF EFFECTS

OVERVIEW

1.10.1 The nature of effects refers to whether the landscape and/ or visual effect of the VE array areas is positive or negative (herein referred to as 'beneficial' and 'adverse').

1.10.2 The EIA Regulations 2017 state that the ES should define *"the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development"*.

1.10.3 Cumulative effects have been described in Section 1.8, and 'short-term, medium-term and long-term, permanent and temporary' effects are described in Section 1.6 under the heading 'Duration and Reversibility'. Transboundary effects concern the potential effects of the VE array areas on seascape, landscape and visual receptors in countries outside UK territorial waters.

1.10.4 The definition of the remaining terms used in this assessment is defined here.

DIRECT AND INDIRECT EFFECTS

1.10.5 Direct landscape effects relate to the host landscape and concern both physical and perceptual effects on the receptor.

1.10.6 Indirect landscape effects relate to those landscapes and receptors which separated by distance or remote from the development and therefore are only affected in terms of perceptual effects. The Landscape Institute also defines indirect effects as those which are not a direct result of the development but are often produced away from it or as a result of a complex pathway.

1.10.7 Visual effects are considered as direct effects, as the view itself may be directly altered by the VE array areas.

POSITIVE AND NEGATIVE EFFECTS

1.10.8 Guidance provided by the in GLVIA3 on the nature of effect (i.e., beneficial or adverse) states that *"in the LVIA, thought must be given to whether the likely significant landscape and visual effects are judged to be positive (beneficial) or negative (adverse) in their consequences for landscape or for views and visual amenity"*, but it does not provide guidance as to how that may be established in practice. The nature of effect is therefore one that requires interpretation and, where applied, this involves reasoned professional opinion.

1.10.9 The seascape, landscape and visual effects of wind farms are difficult to categorise as either beneficial or adverse because, unlike other disciplines, there are no definitive criteria by which the effects of wind farms can be measured as being categorically 'beneficial' or 'adverse'. In some disciplines, such as noise or ecology, it is possible to quantify the effect of a wind farm in numeric terms, by objectively identifying or quantifying the proportion of a receptor that is affected and assessing the nature of that effect in justifiable terms. However, this is not the case in relation to landscape and visual effects where the approach combines quantitative and qualitative assessment.

1.10.10 Generally, in the development of 'new' wind farms, a precautionary approach has been adopted, which assumes that significant landscape and visual effects are weighed on the adverse side of the planning balance. Unless it is stated otherwise, the effects considered in the assessment have been considered to be adverse. Beneficial or neutral effects may, however, arise in certain situations and are stated in the assessment where relevant. The following definitions have been used.

- Beneficial effects - contribute to the seascape, landscape and visual resource through the enhancement of desirable characteristics or the introduction of new, beneficial attributes. The development contributes to the landscape by virtue of good design or the introduction of new landscape planting. The removal of undesirable existing elements or characteristics can also be beneficial, as can their replacement with more appropriate components.
- Neutral effects - occur where the development fits with the existing seascape/ landscape character or visual amenity. The development neither contributes to nor detracts from the landscape and visual resource and can be accommodated with neither beneficial or adverse effects, nor where the effects are so limited that the change is hardly noticeable. A change to the seascape, landscape and visual resource is not considered to be adverse simply because it constitutes an alteration to the existing situation.
- Adverse effects - are those that detract from the seascape/ landscape character or quality of visual attributes experienced, through the introduction of elements that contrast, in a detrimental way, with the existing characteristics of the seascape, landscape and visual resource, or through the removal of elements that are key in its characterisation.

FREQUENCY AND LIKELIHOOD OF VISUAL EFFECTS – WEATHER CONDITIONS

1.10.11 The judgements made in the SLVIA are based on optimum 'very good' to 'excellent' visibility of the VE array areas. This assumption is assessed as the worst-case scenario, but in reality, the degree and extent of visual effects arising from the construction and operation of the offshore infrastructure is a combination of several different factors, including the prevailing weather conditions. The prevailing weather can determine changes in character and visibility, with varied wind, light and tidal movements and the clarity or otherwise of the atmosphere. Collectively, these will combine to reduce the number of days over which views of the VE array areas will be available from the coastline and hinterland, or to inhibit views, rendering them more visually recessive within the wider seascape. Viewing conditions and visibility has been found to vary in the study area, and the effects of the wind farm will vary greatly according to the weather. This means that effects that are assessed to be significant may be not-significant under different, less clear conditions.

1.10.12 Although the SLVIA is based on 'very good' to 'excellent' visibility conditions, a description of visibility frequency is provided using METAR visibility data from the nearest Met Office stations that record visibility highlight potential trends in the visibility conditions of the study area. Both GLVIA3 (8.15) and NatureScot guidance (NatureScot 2017, para 39) refer to use of Met Office visibility data to assess typical visibility conditions within an area. Most synoptic observing stations have sensors which provide a measurement of visibility. Visibility sensors measure the meteorological optical range which is defined as the length of atmosphere over which a beam of light travels before its luminous flux is reduced to 5% of its original value. The use of light within the visible spectrum allows the sensor to most accurately simulate human perception of visibility. Reasonably accurate measurements are possible over a range of visibility extending from a few tens of metres to a few tens of kilometres.

1.10.13 Although there are limitations to how this data can be applied to judgements about offshore wind farm visibility, the visibility data provides some understanding and evidence basis for evaluating the visibility of the WTGs against their background.

1.10.14 Met Office visibility data has been assessed from the nearest weather station that records visibility, at Manston weather station (the closest weather station to the VE array area, located in Kent, to the south of the SLVIA study area). Visibility is categorised into distance ranges, such as <1 km, 1 to 2 km, 2 to 3 km etc and a frequency table has been compiled revealing the total number of observations within each distance category at hourly intervals for each month. The data has been summarised and mapped to highlight trends in the visibility conditions of the study area, such as the distance category which has the most visibility observations recorded, and approximate number of viewing days lost to low visibility weather conditions. Visibility data is then assessed to set out the frequency of visibility (over a 10 year period) at different distance ranges, based on Met Office visibility definitions: < 1 km Very Poor; 1 – 4 km Poor; 4 -10 km Moderate; 10 – 20 km Good; 20 – 40 km Very Good; 40 km > Excellent.

1.10.15 The Met Office visibility data is then interpreted to allow more specific quantification of the likely frequency of visibility of the VE array areas from the coastal viewpoints (as a % and average number of days per year), based on the distance of each viewpoint location from the windfarm site. The Met Office visibility frequency data is used to inform an assessment of the 'likelihood of effect' from each viewpoint, in order to qualify any significant effects assessed in optimum visibility conditions with how likely they are to actually occur given the prevailing weather/ visibility conditions.

1.11 VISUAL REPRESENTATIONS

OVERVIEW

1.11.1 Zones of Theoretical Visibility (ZTVs) and visualisations (wirelines or wirelines and photomontages) are graphical images produced to assist and illustrate the SLVIA and the cumulative assessment. The methodology used for viewpoint photography and photomontages has been produced in accordance with the NatureScot guidance on Visual Representation of Wind Farms, Version 2.2 (2017), GLVIA 3 and the Landscape Institute Technical Guidance Note on Visual Representation of Development Proposals (2019).

ZONE OF THEORETICAL VISIBILITY (ZTV)

1.11.2 The ZTVs in Figures 11.7 to Figure 10.16 have been calculated using computer software to generate a ZTV of the VE array areas, to demonstrate the theoretical extent of visibility from any point in the study area.

1.11.3 A 3D computer model has been developed of the existing landscape using digital terrain data as follows.

1.11.4 Ordnance Survey Terrain 50 is used to produce the main or standard bare ground ZTV plot and wirelines, these tiles provide a digital record of the existing landform of Great Britain, or Digital Terrain Model (DTM) at 10 m elevation intervals based on 50 m grid squares and models representing the specified geometry and position of the offshore elements. The computer model will include the entire study area and takes account of the effects caused by atmospheric refraction and the Earth's curvature.

1.11.5 Ordnance Survey Terrain 5 is used to produce more detailed ZTV plots including land within 5 km of the coast of the SLVIA study area, where required to assess particular effects, such as along the coastline, or within a detailed part of the study area. The computer model will include the entire study area and takes account of atmospheric refraction and the Earth's curvature.

1.11.6 The resulting ZTV plots have been overlaid on Ordnance Survey mapping at an appropriate scale and presented as figures using desktop publishing or graphic design software.

1.11.7 Cumulative ZTV plots based on the intervisibility of the VE array areas and other relevant developments within the study area have also been produced.

1.11.8 There are limitations in this theoretical production, and these should be considered in the interpretation and use of the ZTV as follows.

1.11.9 Where the ZTV has been calculated using Ordnance Survey Terrain 50 or Terrain 5 digital terrain data, this will not account for the screening effects of vegetation or built form unless added in the form of OS Vectormap data or digitally added and stated on the figure.

1.11.10 The ZTVs are based on theoretical visibility from 2 m above ground level.

1.11.11 The Blade Tip ZTV does not indicate the decrease in visibility that occurs with increased distance from the windfarm site. The nature of what is visible from 10 km away will differ markedly from what is visible from 40 km away, although both are indicated on the Blade Tip ZTV as having the same level of visibility.

1.11.12 There is a wide range of variation within the visibility shown on the ZTV, for example, an area shown on the blade tip ZTV as having visibility of 17-20 WTGs may gain views of the smallest extremity of blade tips, or of 20 full WTGs. This can make a considerable difference in the effects of the VE array areas on that area. The hub height ZTV has been used in conjunction with the blade tip ZTV to provide an indication of the degree to which the WTGs are visible.

1.11.13 These limitations mean that while the ZTV is used as a starting point in the assessment, providing an indication of where the VE array areas will be theoretically visible and tending to present a worst-case or over-estimate the actual visibility. The information drawn from the ZTV is checked by field survey observation.

1.11.14 The SLVIA includes a Horizontal Angle ZTV to show the horizontal field of view (in degrees) that may be affected by views of the WTGs.

METHODOLOGY FOR BASELINE PHOTOGRAPHY

OVERVIEW

1.11.15 Once a view has been selected, the location is visited, confirmed, and assessed with the aid of a wireline in the field. A photographic record is taken to record the view and the details of the viewpoint location and associated data are recorded to assist in the production of visualisations and to validate their accuracy.

1.11.16 The following photographic information is recorded and provided:

- date, time, weather conditions and visual range;
- GPS recorded 12 figure grid reference accurate to ~1-3 m;
- GPS recorded Above Ordnance Datum (AOD) height data;
- use of a fixed 50 mm focal length lens is confirmed;
- horizontal field of view (in degrees); and
- bearing to Target Site.

1.11.17 The photographs used to produce the photomontages were taken at the times of day and locations agreed with the consultees using Canon EOS 5D and 6D Digital SLR cameras, with a fixed lens and a full-frame (35 mm negative size) complementary metal oxide semiconductor (CMOS) sensor. The photographs were taken on a tripod with a pano-head at a height of approximately 1.5 m above ground.

1.11.18 All the resulting visualisations have been prepared to indicate other cumulative development in order that they may assist the cumulative assessment as well as the LVIA.

1.11.19 Whilst no two-dimensional image can fully represent the real viewing experience, the visualisation aims to provide a realistic representation of the offshore elements, based on current information and photomontage methodology.

WEATHER CONDITIONS

1.11.20 Guidelines for LVIA (GLVIA3) para 8.22 states:

> *"In preparing photomontages, weather conditions shown in the photographs should (with justification provided for the choice) be either:*
>
> *representative of those generally prevailing in the area; or*
>
> *taken in good visibility, seeking to represent a maximum visibility scenario when the development may be highly visible".*

1.11.21 In preparing photomontages for the SLVIA, photographs have been taken in favourable weather conditions during periods of 'very good' or 'excellent' visibility conditions - seeking to represent a maximum visibility scenario when the VE array areas may be most visible.

METHODOLOGY FOR PRODUCTION OF VISUALISATIONS

1.11.22 Photomontages have been produced in accordance with NatureScot Visual Representation of Windfarms Guidance (NatureScot, 2017) and Landscape Institute (2019) Technical Guidance Note (TGN) 06/19 Visual Representation of Development Proposals.

1.11.23 A photomontage is a visualisation which superimposes an image of a VE array areas upon a photograph or series of photographs. Photomontage is a widespread and popular visualisation technique, which allows changes in views and visual amenity to be illustrated and assessed, within known views of the 'real' landscape.

1.11.24 To create the baseline panorama, the frames are individually cylindrically projected and then digitally joined to create a fully cylindrically projected panorama using Adobe Photoshop or PTGui software. This process avoids the wide-angle effect that will result should these frames be arranged in a perspective projection, whereby the image is not faceted to allow for the cylindrical nature of the full 360-degree view but appears essentially as a flat plane.

1.11.25 Tonal alterations are made using Adobe software to create an even range of tones across the photographs once joined.

1.11.26 The baseline photographs and cumulative wireline visualisations shown for each viewpoint cover a 90-degree field of view (or in some cases, up to 360-degree), which accords with NatureScot guidance. These are cylindrically projected images and should be viewed flat at a comfortable arm's length.

1.11.27 The photographs are also joined to create planar projection panoramas using PTGui software. These are used in the creation of the 53.5 degree field of view photomontages.

1.11.28 Wireline representations that illustrate the VE array areas and set within a computer-generated image of the landform are used in the assessment to predict theoretical appearance of the WTGs. These are produced with Resoft WindFarm software and are based on a terrain model with a 50 m data grid (OS Panorama) with a more detailed area of terrain modelling (OS terrain 5) used for the coastal parts of the study area, which includes the majority of viewpoints used in the SLVIA. There are limitations in the accuracy of digital terrain model (DTM) data so that landform may not be picked up precisely and may result in WTGs being more or less visible than is shown, however, the use of OS Terrain 5 minimises these limitations. Where descriptions within the assessment identify the numbers of WTGs visible this refers to the illustrations generated and therefore the reality may differ to a degree from these impressions.

1.11.29 Daytime visualisations and wirelines show a WTG model which represents the maximum development scenario of the VE array areas in the windfarm site and allow the potential proportions of the WTGs to be appreciated from the visualisations.

1.11.30 Fully rendered photomontages have been produced for the agreed viewpoints using Resoft WindFarm software, to provide a photorealistic image of the appearance of the VE array areas. In the daytime photomontages modelled representations are combined with the baseline view photographs to create a photorealistic rendered photomontage image of the development.

1.11.31 'Panoramic photomontages' are produced in the SLVIA with a 53.5° HFoV, based on relevant guidance (NatureScot, 2017) and due to their suitability to encompass the horizontal spread of the VE array areas and show the turbines at a representative scale and distance. In some views, two adjacent 53.5° photomontages will be required to capture the horizontal spread of the VE array areas.

1.11.32 The 53.5 degree field of view wirelines and photomontages are prepared using a planar projected image and should also be viewed flat at a comfortable arm's length. These images are each printed on paper 841 x 297 mm (half A1) which provides for a relatively large scale image. Images viewed on a monitor screen should be viewed so that the image height of the 53.5 degree photomontage measures 26 cm on the screen (as per the printed image height).

1.11.33 In the wirelines, the WTGs are shown with the central WTGs facing the viewer directly, with the full rotor diameter visible at its tallest extent. In the photomontages, the WTG rotors are shown with a random appearance with the central WTGs facing the viewer directly.

1.11.34 WTGs with jacket foundations and the offshore substation platform(s) are shown in the photomontages from a selection of key views, with all other photomontages showing WTG with monopile foundations.

1.11.35 Rendering of the WTGs in the photomontages is as photorealistic as possible to the conditions shown in each viewpoint photograph. In order to address the difficulty of representing wind farms clearly within the photos, and in line with guidance (NatureScot, 2017) some enhancement and re-rendering of the existing operational offshore WTGs has been applied to ensure that they are clear in the finished 53.5 degree photomontages (but not in the 90 degree baseline panoramas), in order to improve the clarity of the illustration. As the VE array areas involves an addition to views with existing offshore wind farms, it is important that the existing wind farms appears clearly in the photographs relative to the proposed VE WTGs rendered into the view. Where required, the operational WTGs have been enhanced or re-rendered so that the images of both operational and proposed VE WTGs match where the depiction of existing WTGs at relatively long distances was not clear in the photographs (for example due to weather conditions).

1.11.36 There is some variation in the appearance and visibility of the WTGs between the viewpoints, as they are rendered to suit the conditions shown in each of the different viewpoint photographs, which have some unavoidable degree of variation in terms of lighting and weather conditions. The key requirement is that the WTGs need to be rendered with sufficient contrast against the skyline backdrop to illustrate their maximum visibility scenario in each image. Photomontages have been prepared to depict how the VE array areas may appear to illustrate the worst-case. The full suite of viewpoint photomontages should be viewed to gain an impression of the likely visual effects of the VE array areas.

NIGHT-TIME VISUALISATIONS

1.11.37 Night-time visualisations have been produced from several key viewpoints, to visually represent aviation and marine navigation lighting at night.

1.11.38 The visual effect of the VE array areas at night has been assessed in Section 11.11 of Volume 2, Chapter 10: Seascape, Landscape and Visual, informed by the night-time photomontage visualisations produced from three representative viewpoints:

- Viewpoint 2 – Dunwich Beach (Figure 10.27h-m);
- Viewpoint 6 - Aldeburgh (Figure 10.31h-m);
- Viewpoint 11 – Old Felixstowe (Figure 10.36h-m); and
- Viewpoint 12 – The Naze (The Naze Tower) (Figure 10.37h-m).

1.11.39 A worst-case approach is applied in the photomontages and assessment in Volume 6, Annex 2.2: Viewpoint Assessment, that considers the potential effects of medium-intensity 2,000 cd lights in clear visibility to support the assessment of the potential worst-case effect. The intensity of the other operational WTG aviation lights in the baseline photography is also used a guide to the likely intensity of the proposed aviation lighting shown in the photomontages.

1.11.40 Night-time visualisations have been produced using a combination of using Resoft's WindFarm software's aviation module software for positioning of the lights, 3D modelling software that can simulate lighting conditions, referencing existing lighting imagery/atmospheric conditions from the baseline photographs and professional judgement using photoshop.

1.11.41 The appearance of the lights in the night-time photomontages emulates how lights appear in the other parts of the baseline photographs. A light shown in a photograph tends to have a slight 'halo' (or bokeh) around it due to the way a camera lens renders out-of-focus points of light. This is not the way lights are seen in reality, as they tend to much more defined as point sources. However, the proposed lighting has been shown in this way for consistency with the lights in the baseline photographs.

INFORMATION ON LIMITATIONS OF VISUALISATIONS

1.11.42 The photographs and other graphic material such as wirelines and photomontages used in this assessment are for illustrative purposes only and, whilst useful tools in the assessment, are not considered to be completely representative of what has been apparent to the human eye. The assessments are carried out from observations in the field and therefore may include elements that are not visible in the photographs. Limitations of photomontages are set out further below.

1.11.43 The photomontage visualisations of the VE array areas (and any wind farm proposal) have a number of limitations when using them to form a judgement on visual impact. These include the following:

- a visualisation can never show exactly what the VE array areas will look like in reality due to factors such as: different lighting, weather and seasonal conditions which vary through time and the resolution of the image;
- the images provided give a reasonable impression of the scale of the WTGs and the distance to the WTGs but can never be 100% accurate;
- a static image cannot convey turbine movement, or flicker or reflection from the sun on the turbine blades as they move;
- the viewpoints illustrated are representative of views in the area, but cannot represent visibility at all locations;
- to form the best impression of the impacts of the VE array areas proposal these images are best viewed at the viewpoint location shown;
- the images must be printed and viewed at the correct size (260 mm by 820 mm);
- images should be held flat at a comfortable arm's length. If viewing these images on a wall or board at an exhibition, stand at arm's length from the image presented to gain the best impression;
- it is preferable to view printed images rather than view images on screen. Images on screen should be viewed using a normal PC screen with the image enlarged to the full screen height to give a realistic impression; and
- there are practical limitations to shooting viewpoint photographs only in very good or excellent visibility and at particular times of day. The photographs shown in the visualisations show the most favourable weather conditions available during photographic survey work.

Technical methodology - visualisations

1.11.44 In accordance with the requirements of Landscape Institute (2019) Technical Guidance Note 06/19, Table 1.9 below sets out the technical information for the preparation of the photomontage visualisation figures.

Table 1.9 Technical methodology - visualisations

Category	Details
Photography	
Visualisation type	Type 4 – where survey of viewpoint locations is not required
Camera location	Established via hand-held Garmin GPS
Level of accuracy of location	1-3 m (depending on satellites)
Camera	Canon EOS 5D Mark II and Canon EOS 6D Digital SLR. Full-frame (35 mm negative size) CMOS sensor.
Lens	50 mm fixed f1.4 lens
Tripod	Set to approximately 1.5 m. Nodal Ninja panoramic head with Adjust Leveller. Nodal Ninja panoramic head set to take photographs at 20 degree increments. Photographs of tripod positions are shown where available.
Photography process	Camera used on fully manual settings. Photographs taken in RAW image format. Bracketed exposures are taken for each view and those depicting the clearest images are selected to prepare the panoramic image
Preparation of panoramic photographs	PTGUI v12.8 is used to join and cylindrically project the images. Adobe Photoshop 2021 used to correct tonal alterations and create an even range of exposure across the photographs so that the individual photographs are not apparent. Planar panoramic images are prepared using Resoft Windfarm software or Hugin Panorama Stitcher
3D Model/Visualisation	
Topographic height data	Ordnance Survey Terrain 5 (5 m resolution). Ordnance Survey Terrain 50 (50 m resolution)
Use of coordinates in software	Coordinates are brought in from the surveyed GPS coordinates. Positions checked using aerial photography.
Markers for horizontal alignment	Existing OWF WTGs and their known coordinates.
Markers for vertical alignment	Existing OWF WTGs and their known coordinates.
Rendering software	Resoft Windfarm v.5.2.5.3 (WTGs in wirelines and photomontages). Sketchup or AutoCAD Map 3D 2018 (OSPs, Met Mast and jacket foundations). Autodesk 3ds Max 2018. Visual Nature Studio V 3.10.
Limitations	
Terrain data	There may therefore be local, small-scale landform that is not reflected in the data and subsequently the visualisation but may

Category	Details
	alter the real visibility of the VE array areas, either by screening theoretical visibility or revealing parts of the VE array areas that are not theoretically visible.
Movement	Static images are unable to capture the movement within the view or of the WTGs

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