

Project Erebus Environmental Statement Chapter 13: SLVIA Methodology

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Acronyms

Acronym	
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
CAA	Civil Aviation Authority
CCW	Countryside Council for Wales
cd	Candela
CEA	Cumulative Effects Assessment
CPRE	Campaign to Protect Rural England
DCO	Development Consent Order
ELC	European Landscape Convention
EIA	Environmental Impact Assessment
ES	Environmental Statement
GIS	Geographic Information System
GLVIA	Guidelines for Visual Impact Assessment
HAT	Highest Astronomical Tide
IALA	International Association of Lighthouse Authorities
ICAO	International Civil Aviation Organization
IR	Infra-Red
km	Kilometre
LAT	Lowest Astronomical Tide
LCA	Landscape Character Area
MCA	Marine Character Area
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MOD	Ministry of Defence
MW	Megawatt
NCA	National Character Area
NE	Natural England

Acronym	
NPS	National Policy Statement
NRW	Natural Resources Wales
O&M	Operation and Maintenance
OS	Ordnance Survey
PCC	Pembrokeshire County Council
PDZ	Pembrokeshire Demonstration Zone
PINS	Planning Inspectorate
PCNP	Pembrokeshire Coast National Park
RPG	Registered Park and Garden
SAR	Search and Rescue
SCA	Seascape Character Area
SL&V	Seascape, Landscape and Visual
SLVIA	Seascape, Landscape and Visual Impact Assessment
WTG	Wind Turbine Generator
ZOI	Zone of Influence
ZTV	Zone of Theoretical Visibility

Chapter 13 SLVIA Methodology

13.1 Introduction

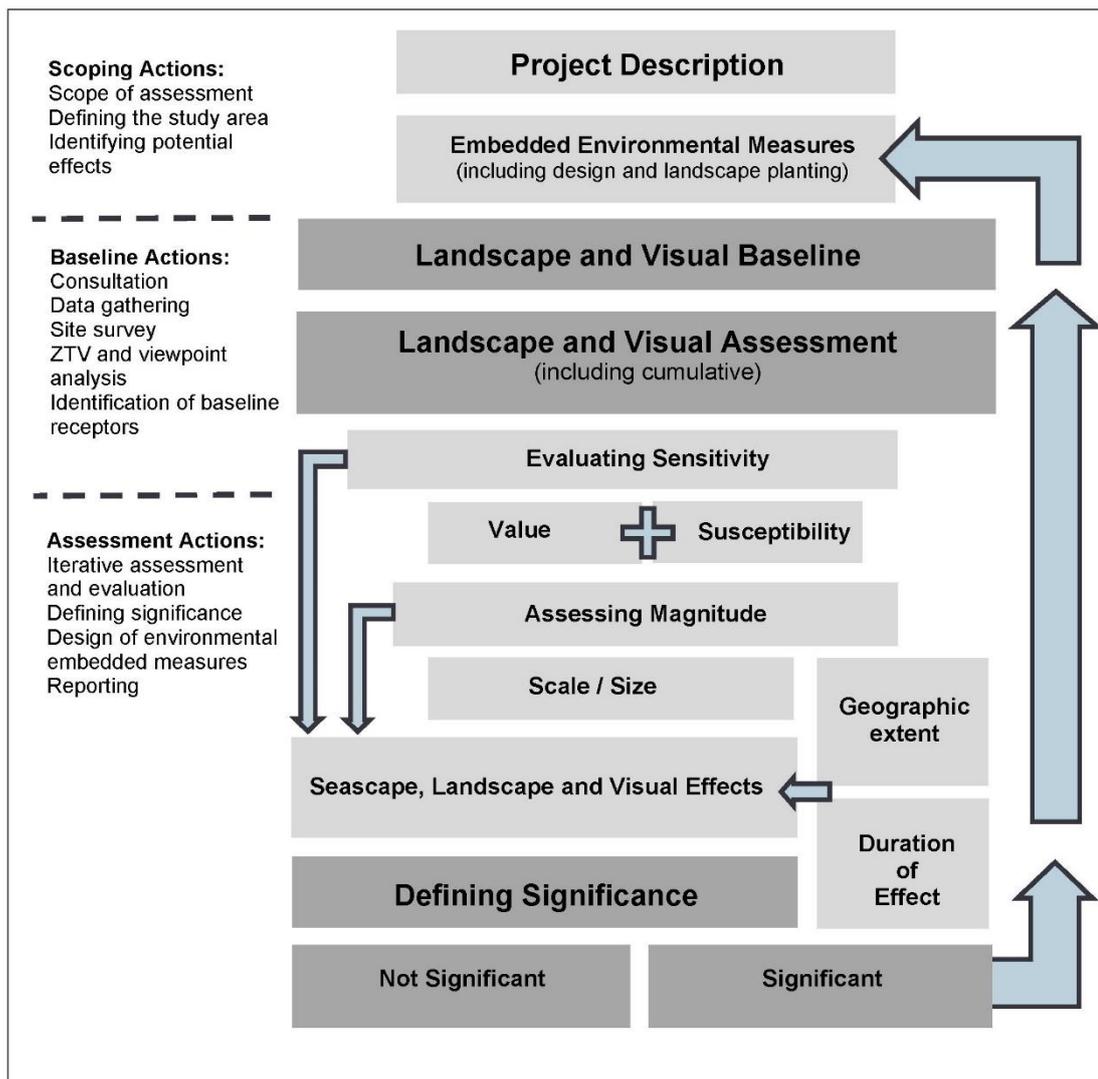
- 13.1.1.1 This appendix describes the methodology used within the seascape, landscape and visual impact assessment (SLVIA) of the EIA for the offshore infrastructure of Project Erebus (the Proposed Development), a demonstration scale Floating Offshore Wind (FLOW) development in the Celtic Sea region (Volume 2, Figure 13.1).
- 13.1.1.2 The Proposed Development comprises 6-10 Wind Turbine Generators (WTGs) with a total capacity up to 100 MW. Each WTG is housed on a semi-submersible floating platform with a mooring system comprising a maximum of 5 catenary mooring lines, each up to 870 m in length, and drag embedment anchors. A single dynamic array cable is proposed, with a lazy wave configuration from the floating platform to seabed. The offshore export cable, up to 49 km in length, links the array area to landfall at West Angle Bay, Pembrokeshire.
- 13.1.1.3 This SLVIA methodology appendix is 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 visual effects;
 - assessing cumulative seascape, landscape and visual effects;
 - evaluation of significance;
 - nature of effects; and
 - visual representations.

13.2 Overview of the SLVIA methodology

- 13.2.1.1 The assessment has been undertaken in accordance with the Landscape Institute and 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 Table 13.1.
- 13.2.1.2 The SLVIA assesses the likely effects that the construction and operation of the Proposed Development on the seascape, landscape and visual resource, encompassing effects on seascape/landscape character, designated landscapes, visual effects and cumulative effects.
- 13.2.1.3 The SLVIA is based on the Rochdale Envelope described in as described in Chapter 4: Proposed Development Description. 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 Chapter 13: Seascape, landscape and visual impact assessment.

13.2.1.4 The evaluation of sensitivity takes account of the value and susceptibility of the receptor to the Proposed Development. 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.

Table 13.1 – Overview of approach to SLVIA



13.2.1.5 The assessment has also considered the cumulative effects likely to result from additional changes to the seascape, landscape and visual amenity caused by the Proposed Development in conjunction with other developments that occurred in the past, present or are likely to occur in the foreseeable future.

13.2.1.6 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).

- 13.2.1.7 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.

13.2.2 *Interface between seascape and landscape assessment*

- 13.2.2.1 Together, the SLVIA and the onshore Landscape and Visual Impact Assessment (LVIA) provide a whole project assessment of the effects of the Project. The offshore elements of the Project (the Proposed Development) are assessed in the SLVIA and the onshore elements of the Project (the onshore substation, onshore cable corridor, and landfall location) are assessed in the LVIA. Both the SLVIA and the LVIA follow a broadly similar assessment methodology that uses the same glossary and terminology.
- 13.2.2.2 The SLVIA also refers to potential interrelated effects likely to result from any areas where the construction, operation and decommissioning of the offshore and onshore elements combine, or inter-relate to affect receptors within the SLVIA study area. An example could include effects on views where both offshore and onshore elements are visible, potentially resulting in whole project landscape and visual effects as a result of the construction, operation and decommissioning of the offshore and onshore elements.
- 13.2.2.3 The Marine Policy Statement (MPS) (UK Government, 2011) states the European Landscape Convention (ELC) definition of landscape (which includes marine areas) as *“an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors”*. It adds that in the context of the UK Marine Policy Statement, *“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.”*
- 13.2.2.4 The assessment of seascape character effects in this SLVIA therefore focuses particularly on areas of onshore landscape with views of the coast or seas and marine environment, as perceived by people, on the premise that the most important effect of offshore windfarms is on the perception of seascape character from the coast.
- 13.2.2.5 This definition of seascape is best reflected by the seascape baseline provided by the Pembrokeshire Seascape Character Assessment (PCNP, 2013), which defines Seascape Character Areas (SCAs) that include land which has a strong visual relationship with the sea/tidal waters and coastal landscapes such as dunes or cliffs (Volume 2, Figure 13.3b). The effect of the Proposed Development on seascape character is considered within the boundaries of these SCAs.
- 13.2.2.6 The effect of the Proposed Development on landscape character is considered on landscape character areas (LCAs) outside and inland of these SCAs, where there may be some intervisibility of the Proposed Development, but where the land is unlikely to have a strong visual relationship with the sea/tidal waters. These parts of LCAs that fall outside the defined SCAs are identified in Volume 2, Figure 13.5b. They are considered unlikely to experience significant effects as a result of the Proposed Development because it is located in the sea, and these landscapes that do not have a strong visual relationship with the sea and character is fundamentally defined by other characteristics.

13.2.3 Defining the Study Area

- 13.2.3.1 The Proposed Development is located offshore in the Celtic Sea, approximately 35.0km from the closest section of the mainland Pembrokeshire coastline at St Ann's Head, and 30.1km from the closest land at Skomer Island. Broadly, the SLVIA Study Area is formed by the Celtic Sea, the West and South Pembrokeshire Coastal Waters and Islands, Milford Haven, and the Pembrokeshire coastline between St David's Head in the north to Stackpole Head in the south.
- 13.2.3.2 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 Proposed Development more difficult.
- 13.2.3.3 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*'. Para 5.2 and p70 of GLVIA3 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*'.
- 13.2.3.4 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 45km radius for WTGs greater than 150m to blade tip (para 48, p12), however it does not go beyond turbines above 150m 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 Proposed Development.
- 13.2.3.5 The SLVIA focuses on locations from where it may be possible to see the Proposed Development, as defined by the Blade Tip ZTV (Volume 2, Figure 13.11a). The ZTV is based on turbines of 270m to tip (above HAT) and represents the Maximum Development Scenario (MDS) considered in the assessment. Consideration of the blade tip ZTV indicates that theoretical visibility of the Proposed Development mainly occurs within 50 km and that beyond 50 km, the geographic extent of visibility becomes very restricted. At distances over 50 km, the lateral (or horizontal) spread of the Proposed Development also occupies a very 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 theoretically visible.
- 13.2.3.6 The influence of earth curvature limits the apparent height and visual influence of the WTGs visible at long distance (such as over 50km), as the lower parts of the turbines will be partially hidden behind the apparent horizon, leaving only the upper parts visible above the skyline.
- 13.2.3.7 The variation of weather conditions influencing visibility off the coast has also informed the SLVIA study area. Based on review of Met Office visibility data presented in Table 13.12 of Chapter 13, visibility frequency drops sharply at longer distances, such that 'excellent' visibility over 50 km occurred for only 10% of the time over a 10-year period. Views of the Proposed Development at distances over 50 km are therefore experienced infrequently.

- 13.2.3.8 The spatial scope of the SLVIA Study Area is therefore defined as 50 km from the Proposed Development as illustrated in Volume 2, Figure 13.2, as the outer limit of the area where significant effects could occur, based on professional judgement, guidance, consultations with relevant stakeholders, the ZTV, prevailing visibility conditions and identification of potential impact pathways. Seascape, landscape and visual effects of the Proposed Development outside the 50km radius SLVIA Study Area are scoped out of SLVIA as they are unlikely to be significant.

13.3 Iterative assessment and design

- 13.3.1.1 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 design 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 are incorporated into the Proposed Development in order to mitigate potential seascape, landscape and visual effects, which are identified as follows.

13.3.2 Potential effects during construction and decommissioning

- 13.3.2.1 Potential effects on the seascape, landscape and visual resource may occur during the construction and decommissioning phases of the Proposed Development, 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 array area, which may alter the seascape character of the array area 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, including laying new offshore export cables to shore, which 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, including laying new offshore export cables to shore, which will be visible from the coast.
 - Whole Proposed Development effects:

- Whole Proposed Development effects could occur as a result of multiple construction and decommissioning activities related to the onshore and / or the offshore elements of the Project affecting a seascape, landscape or visual receptor. Effects will be influenced by the construction phasing of the offshore and offshore elements of the Project, the geographic location of receptors and visibility of the onshore and offshore elements.

13.3.3 Potential effects during operation and maintenance

13.3.3.1 Potential effects on the seascape, landscape and visual resource may occur during the operation and maintenance of the Proposed Development over its operational lifetime, including:

- Seascape effects:
 - Effects on perceived seascape character (SCAs), arising as a result of the operational WTGs, substations and maintenance activities located within the array area, which may alter the seascape character of the array area 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 Proposed Development 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.

13.4 Guidance, data sources and site surveys

13.4.1 Guidance on methodology

13.4.1.1 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.

- 13.4.1.2 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.
- 13.4.1.3 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.
- 13.4.1.4 OPEN's 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.
- 13.4.1.5 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.

13.4.2 *Data sources*

- 13.4.2.1 The data sources that have been collected and used to inform this SLVIA are summarised in Table 13.2.

Table 13.2 – Data sources used to inform the SLVIA

Source	Date	Summary
CADW		Register of Historic Landscapes in Wales (available online: https://cadw.gov.wales/advice-support/historic-assets/conservation-areas-and-other-historic-assets/other-historic-assets-0)
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/)
Google Earth Pro	2020	Aerial photography
Long Distance Walkers Association	2020	Overview map for Long Distance Paths and Walks (available online: https://www.ldwa.org.uk/ldp/public/ldp_overview_map.php)

Source	Date	Summary
Met Office	2010-2020	Visibility Data. Visibility bands every 1km up to 30km, then every 5km up to 50km, then every 10km up to 70km, and >70km
National Trust	2020	Any specific visitor attractions / tourist destinations (available online: https://www.nationaltrust.org.uk/days-out)
NRW	2015	National Seascape Assessment for Wales (NRW Evidence Report No. 80) https://naturalresources.wales/media/682028/mca-00-technical-report-summary-method-appendix.pdf
NRW	2009	Wales National Landscape Character Areas https://naturalresources.wales/evidence-and-data/maps/nlca/?lang=en
NRW		LANDMAP https://naturalresources.wales/guidance-and-advice/business-sectors/planning-and-development/evidence-to-inform-development-planning/landmap-the-welsh-landscape-baseline/?lang=en
NRW	2021	Dark Skies and Light Pollution Map Wales https://luc.maps.arcgis.com/apps/opstdashboard/index.html#/1cd6ba8a1d7d4a62aff635cfcbaf4aec
Oceanwise		Marine and coastal mapping data, ferry routes.
OPEN internal dataset	2020	Public Rights of Way
Ordnance Survey	2019	1:50,000 scale mapping
Ordnance Survey	2019	1:25,000 scale mapping
Ordnance Survey Open Data	2019	OS County Region, Local Unitary Authority, Railways, Road and Settlements
Ordnance Survey	2019	OS Terrain 5 Digital Terrain Model (DTM)
Royal Yachting Association (RYA)	2013	Cruising routes for recreational yachting
PCNP/NRW	2013	PCNP Seascape Character Assessment https://www.pembrokeshirecoast.wales/wp-content/uploads/archive/npa_2013_13_06_26_ordinary_spg_report_web_only_full_version_of_annex_2.pdf
PCNP	2020	PCNP Landscape Character Supplementary Planning Guidance (SPG) (Interim SPG for LDP2) https://www.pembrokeshirecoast.wales/planning/planning-policy/local-development-plan-2/supplementary-planning-

Source	Date	Summary
		guidance-ldp2/landscape-supplementary-planning-guidance-interim/
Pembrokeshire County Council	2019	Pembrokeshire Landscape Character Assessment (Consultation Draft) https://www.pembrokeshire.gov.uk/adopted-local-development-plan/landscape-character-assessment
Pembrokeshire County Council	2013	Pembrokeshire County Council Local Development Plan (LDP) and Local Development Plan Review (LDP2) https://www.pembrokeshire.gov.uk/local-development-plan
Sustrans	2020	National Cycle Network (GIS dataset) (available online: https://www.sustrans.org.uk/)

13.4.3 *Appropriate level of assessment*

- 13.4.3.1 The SLVIA methodology provides for an approach to identifying receptors that could be significantly affected by the Proposed Development that need to be 'scoped in' for further assessment in the SLVIA and receptors that could not be significantly affected and that can be 'scoped out' of the assessment.
- 13.4.3.2 The general principle is that receptors that could be significantly affected will be identified based on their sensitivity/importance/value and the spatial and temporal scope of the assessment. Consultation has also informed the selection of potential receptors that could be significantly affected by the Proposed Development.
- 13.4.3.3 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 environmental 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 consent decision.
- 13.4.3.4 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 within the ZTV is undertaken in Chapter 13, using desk-based information and ZTV analysis (Volume 2, Figure 13.14 – 13.17). 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 Proposed Development which require a 'detailed assessment'; and
 - a 'detailed assessment' approach is undertaken for seascape, landscape and visual receptors/effects that are identified in the preliminary assessment 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 (Volume 2, Figure 13.14 – 13.17) and wireline/photomontage visualisations (Volume 2, Figures 13.21 – 13.39).

13.4.3.5 To ensure the provision of a proportionate EIA and an ES that is focused on likely significant effects, the assessment takes into account the considerable levels of existing environmental information available, extensive local geographical knowledge and understanding of the site and surroundings gained from ongoing site selection analysis and environmental surveys. The spatial and temporal scope of the assessment enables the identification of receptors which may experience a change as a result of the Proposed Development.

13.4.4 Desk-based and site survey work

13.4.4.1 The SLVIA undertaken as part of the ES has been informed by desk-based studies, stakeholder consultations and field survey work undertaken within the SLVIA Study Area. The landscape, seascape and visual baseline has been informed by desk-based review of landscape and seascape character assessments, and the ZTV, to identify receptors that may be affected by the Proposed Development and produce written descriptions of their key characteristics and value.

13.4.4.2 Interactions have been identified between the Proposed Development and seascape, landscape and visual receptors, to predict potentially significant effects arising and measures are proposed to mitigate effects.

13.4.4.3 For those receptors where a detailed assessment is 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), seascape based surveys to Skomer and Skokholm Islands, micro-siting of viewpoint locations, panoramic baseline photography and visual assessment survey from all representative viewpoints. These surveys were undertaken in June and August 2021 as described in Table 13.3. Field work over the duration of the assessment has been partly restricted due to the travel restrictions in place during the COVID-19 pandemic, including requirements for assessors to 'stay local/at home' during certain periods, restricted access to certain visitor locations due to closures and limited accommodation availability.

Table 13.3 – Site surveys undertaken

Survey date	Scope of survey	Survey status
June 2021	Seascape, landscape and visual assessment surveys primarily within the Pembrokeshire Coast National Park, coastal waters and islands, to undertake viewpoint photography and collect baseline data on seascape character, landscape character and visual amenity associated with views of the Proposed Development and in accordance with methodology such as in GLVIA3 (Landscape Institute, 2013) and TGN 06/19 (Landscape Institute, 2019).	Surveys completed, with further surveys to be undertaken from remaining night-time viewpoints.
August 2021	Completion of night-time viewpoint photography from Viewpoint D and further inter-related surveys within the onshore LVIA Study Area.	Surveys completed

13.5 Assessing visual effects

- 13.5.1.1 Visual effects are concerned wholly with the effect of the Proposed Development 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.”*
- 13.5.1.2 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. Visual effects may include changes 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.
- 13.5.1.3 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 Proposed Development.

13.5.2 Zone of Theoretical Visibility (ZTV)

- 13.5.2.1 Plans mapping the Zone of Theoretical Visibility (ZTV) are used to analyse the extent of theoretical visibility of the Proposed Development, 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. The ZTV provides a starting point in the assessment process and accordingly tend towards giving a ‘worst case’ or greatest calculation of the theoretical visibility.

13.5.3 Viewpoint analysis

- 13.5.3.1 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.
- 13.5.3.2 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.
- 13.5.3.3 The SLVIA therefore includes viewpoint analysis prepared for each viewpoint and presented as supporting assessment in the SLVIA. The viewpoint analysis 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.
- 13.5.3.4 The viewpoint analysis is used to assist the visual assessment of visual receptor locations reported in the PEIR and ES.

13.5.4 Evaluating visual sensitivity to change

13.5.4.1 In accordance with paragraphs 6.31-6.37 of GLVIA3, 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 Proposed Development on the view and visual amenity.

Value of the view

13.5.4.2 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.

- **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.
- **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

13.5.4.3 Susceptibility relates to the nature of the viewer experiencing the view and how susceptible they are to the potential effects of the Proposed Development. 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.

- **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.

- 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 offshore elements of the Proposed Development may be influenced by the viewer's attention or interest in the view, which may be focused in a particular direction, from a static or transitory position, over a long or short duration, and with high or low clarity. For example, if the principal outlook from a settlement is aligned directly towards the offshore elements of the Proposed Development, 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 offshore elements of the Proposed Development.

Visual sensitivity rating

13.5.4.4 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 13.4 below.

Table 13.4 – Visual sensitivity to change criteria

Sensitivity Factor	Higher	Lower
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.
	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.
	View has high scenic qualities relating to the content and	View has low scenic qualities relating to the content and

Sensitivity Factor	Higher	Lower
	composition of the visible landscape.	composition of the visible landscape.
Susceptibility to change	Viewer who is likely or liable to be influenced by the Proposed Development.	Viewer who is unlikely or not liable to be influenced by the Proposed Development.
	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 Proposed Development 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 proposed development.
	Viewers are focused on the experience 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	

13.5.5 Visual magnitude of change

13.5.5.1 The magnitude of change on views is an expression of the scale of the change that will result from the Proposed Development and is dependent on a number of variables regarding the size or scale of the change. 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.

Size or scale of change

13.5.5.2 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 Proposed Development, based on the following criteria:

- **Distance:** the distance between the visual receptor/viewpoint and the Proposed Development. Generally, the greater the distance, the lower the magnitude of change, as the Proposed Development will constitute a smaller scale component of the view.
- **Size:** the amount and size of the Proposed Development that will be seen. Visibility may range from small or partial visibility of the Proposed Development to all of the offshore elements being visible. Generally, the larger and greater number of the Proposed Development that appear in the view, the higher the magnitude of change. This is also related to the degree to which the Proposed Development may be wholly or partly screened by landform, vegetation (seasonal) and / or built form. Conversely open views are likely to reveal more of the Proposed Development, 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 Proposed Development 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 Proposed Development. Generally, the more of the proportion of a view that is affected, the higher the magnitude of change will be. If the Proposed Development 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 Proposed Development 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 Proposed Development 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 Proposed Development in relation to other developments. The magnitude of change of Proposed Development 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 Proposed Development will be viewed against the skyline or a background seascape may affect the level of contrast and magnitude. If the Proposed Development add to an already developed skyline the magnitude of change will tend to be lower.
- **Number:** generally, the greater the number of separate Proposed Development 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 Proposed Development may be subject to various phases of development change and the way the Proposed Development may be viewed could be intermittent or continuous and / or seasonally, due to periodic management or leaf fall.

Geographical extent

- 13.5.5.3 The geographic extent over which the visual effects 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 Proposed Development 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.
- 13.5.5.4 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 country park 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 land or defined recreational area.
- 13.5.5.5 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 '2km' or '10%' of the total length of the route.
- 13.5.5.6 The geographical extent of a visual effect experienced from a specific viewpoint may be limited to that location alone, for example a public viewpoint recommended in tourist literature such as a well visited hill summit or a particular location within a built up or well vegetated area, where an uncharacteristically open or restricted view exists.

Duration and reversibility

- 13.5.5.7 The duration and reversibility of visual effects are based on the period over which the Proposed Development are likely to exist (during construction and operation) and the extent to which the Proposed Development will be removed (during decommissioning), with effects reversed at the end of that period.
- 13.5.5.8 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.

Visual magnitude of change rating

- 13.5.5.9 The 'magnitude' or 'degree of change' resulting from the Proposed Development is described as 'High', 'High-medium', 'Medium', 'Medium-low', 'Low' and 'Negligible' as defined in Table 13.5. The basis for the assessment of magnitude for each receptor has been made clear using evidence and professional judgement.

Table 13.5 – Visual magnitude of change ratings

Magnitude of change	Definition
High	The Proposed Development will result in a high level of alteration to the existing view, forming the prevailing influence and/or introducing elements that are uncharacteristic in the baseline view. The addition of the Proposed Development will result in a large-scale change, loss or addition to the baseline view.
Medium-high	Intermediate rating with combination of criteria from high magnitude (described above) and medium magnitude (described below).
Medium	The Proposed Development will result in a medium level of alteration to the existing view, forming a readily apparent influence and/or introducing elements that are potentially uncharacteristic in the baseline view. The addition of the Proposed Development will result in a medium-scale change, loss or addition to the baseline view.
Medium-low	Intermediate rating with combination of criteria from medium magnitude (described above) and low magnitude (described below).
Low	The Proposed Development will result in a low level of alteration to the existing view, providing a slightly apparent influence and/or introducing elements that are characteristic in the baseline view. The addition of the Proposed Development will result in a small-scale change, loss or addition to the baseline view.
Negligible	The Proposed Development will result in a negligible alteration to the existing view, providing a barely discernible influence and/or introducing elements that are substantially characteristic in the baseline view. The addition of the Proposed Development will result in negligible change, loss or addition to the baseline view.

13.5.5.10 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 13.6.

Table 13.6 – Visual magnitude of change criteria/examples

Magnitude of change	Examples of criteria
High	<p>The Proposed Development will be the prevailing feature, forming the major focus of visual attention due to its large vertical scale and lateral spread, filling a large proportion of the field of view, with contrasts in form, line, colour, texture, luminance or motion contributing to the prevailing influence.</p> <ul style="list-style-type: none"> • Size and Scale: A large scale and 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.

Magnitude of change	Examples of criteria
	<p>Typically experienced from representative viewpoints illustrating a visual effect likely to be experienced by larger numbers of people, relative to the activity, and may also be experienced from a specific viewpoint.</p>
Medium	<p>The Proposed Development will be plainly visible, so will not be missed by casual observers, but will not strongly attract visual attention or dominate the view because of its apparent size. The Proposed Development is obvious and will have sufficient size to contrast with other seascape/ landscape elements, but with insufficient visual contrast to strongly attract visual attention and insufficient size to occupy most of an observer's field of view.</p> <ul style="list-style-type: none"> • Size and Scale: A medium scale and readily apparent 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. • 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. <p>Typically experienced from representative viewpoints illustrating a visual effect likely to be experienced by a medium number of people, relative to the activity, and may also be experienced from a specific viewpoint.</p>
Low	<p>The Proposed Development will be visible when scanning in its general direction; otherwise it may be missed by casual observers. Small and/or faint, but when the observer is scanning the horizon or looking more closely at an area, can be detected and sometimes noticed by casual observers; however, most people would not notice it without some active looking.</p> <ul style="list-style-type: none"> • Size and Scale: A small scale and slightly apparent change, could being missed by the casual observer. • 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 from other developments with visual rationale, appearing reasonably well accommodated within its surroundings. <p>Typically experienced from illustrative viewpoints likely to be experienced by low numbers of people, relative to the activity and may also be experienced from a specific viewpoint.</p>
Negligible	<p>The Proposed Development will be visible only after extended viewing and is near the limit of visibility or is barely visible, such that it would not be seen by a person who was unaware of it in advance and therefore looking for it. Even</p>

Magnitude of change	Examples of criteria
	<p>under those circumstances, it may be seen only after looking at it closely for an extended period.</p> <ul style="list-style-type: none"> • Size and Scale: A very small scale or barely negligible change, need to 'look for it'. • 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. • 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. <p>Typically experienced from illustrative viewpoints likely to be experienced by low numbers of people, relative to the activity and may also be experienced from a specific viewpoint.</p>

13.5.6 *Evaluating visual effects and significance*

- 13.5.6.1 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 13.9 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 Proposed Development and their conclusion, have been presented in a comprehensive, clear and transparent manner.
- 13.5.6.2 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).
- 13.5.6.3 A significant effect is more likely to occur where a combination of the variables results in the Proposed Development having a defining effect on the view or visual amenity or where changes affect a visual receptor that is of high sensitivity.
- 13.5.6.4 A non-significant effect is more likely to occur where a combination of the variables results in the Proposed development having a non-defining effect on the view or visual amenity or where changes affect a visual receptor that is of low sensitivity.

Visibility

- 13.5.6.5 The varied clarity or otherwise of the atmosphere will reduce the number of days (the 'frequency') upon which views of the Proposed Development will be available from the coastline and hinterland, and is likely to inhibit clear views, rendering the WTGs located at long distance offshore, as visually recessive within the wider seascape. The effects of the construction and operation of the Proposed Development will vary according to the weather and prevailing visibility. This means that effects that are may be significant in the SLVIA under 'very good' or 'excellent' (i.e. worst-case/optimum) visibility conditions, may be not significant under moderate, poor or very poor visibility conditions.

- 13.5.6.6 Within the visual assessment there is an assessment of the frequency or 'likelihood' of effect' for each viewpoint, based on the distance of the Proposed Development, Met Office visibility data and professional judgement based on experience of viewing offshore wind farms in different conditions and distances. Likely visibility frequency has therefore been taken into consideration in the assessment of magnitude and significance, with greater weighting for viewpoints located at very long distances, over 40km, where 'excellent' visibility is required and is known to occur infrequently.
- 13.5.6.7 For receptors and viewpoints located at closer range, where visibility frequency is likely to be higher, and less of a factor in the magnitude of change, judgements are based on a worst-case position of optimum visibility. The photographs used in the photomontages shown in Volume 2 Figures 13.20 – Figure 13.40 were captured in June 2021 in excellent visibility conditions and show this maximum potential visibility of the Proposed Development. In reality the degree and extent of visual effects arising from the Proposed Development will be influenced by the prevailing weather and visibility conditions and such excellent visibility occurs relatively infrequently.

13.6 Assessing seascape/landscape effects

- 13.6.1.1 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.”*

13.6.2 Landscape character

- 13.6.2.1 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 landuse 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.”*

13.6.3 Seascape character

- 13.6.3.1 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.”*

13.6.3.2 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.”*

13.6.4 Seascape / landscape effects

13.6.4.1 As described in Section 13.2.2, the assessment of seascape character effects in the SLVIA focuses particularly on areas of onshore landscape with views of the coast or seas and marine environment, as perceived by people, on the premise that the most important effect of offshore windfarms is on the perception of seascape character from the coast.

13.6.4.2 The effect of the Proposed Development on seascape character is considered within the boundaries of defined Seascape Character Areas (SCAs) and the PCNP that has a strong visual relationship with the sea/tidal waters and coastal landscapes such as dunes or cliffs. The effect of the Proposed Development on landscape character is considered on landscape character areas (LCAs) outside and inland of these SCAs, where the land is unlikely to have a strong visual relationship with the sea/tidal waters.

13.6.4.3 In respect of the Proposed Development, the potential seascape / landscape effects, occurring during the construction, operation and decommissioning periods of the Proposed Development 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 Pembrokeshire Coast National Park (PCNP) 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.

13.6.4.4 Seascape and landscape effects arising from the Proposed Development will be indirect effects, which will be perceived from the wider landscape, outside the array area.

13.6.5 Evaluating seascape / landscape sensitivity to change

13.6.5.1 The assessment of sensitivity takes account of the seascape / landscape value and the susceptibility of the receptor to the Proposed Development.

- 13.6.5.2 Seascap / 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.

Sensitivity of seascape/landscape receptor

- 13.6.5.3 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 or the development proposed and the value related to that receptor.

Value of the seascape/landscape receptor

- 13.6.5.4 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.

- **Seascape/landscape designations** - A receptor that lies within the boundary of a recognised landscape related planning designation will be of increased value, depending on the proportion of the receptor that is affected and 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.
- **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 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.
- **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, 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 susceptibility to change

- 13.6.5.5 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 Proposed Development without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies. Some landscape 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 be special landscape qualities that underpin designated landscapes.
- 13.6.5.6 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 susceptibility to the type of development proposed (construction, operation and decommissioning of the Proposed Development) are based on the following criteria.
- **Overall strength and robustness:** Collectively the overall characteristics and qualities of a particular seascape/landscape result in a strong and robust landscape that is capable of reasonably accommodating the influence of the Proposed Development without undue adverse effects on the special landscape qualities (in the case of a designated landscape) or the key characteristics for which an area of seascape/landscape character or a particular element it is valued.
 - **Landscape scale and topography:** The scale and topography are large enough to physically accommodate the influence of the Proposed Development. Topographical features such as more complex, distinctive or small-scale coastal landforms are likely to be more susceptible than simple, broad and homogenous coastal landforms.
 - **Openness and enclosure:** Openness in the seascape/landscape may increase susceptibility to change because it can result in wider visibility, however open seascape/landscape may also be larger scale and simple, which will decrease susceptibility. Conversely, enclosed seascape/landscapes can offer more screening potential, limiting visibility to a smaller area, however they may also be smaller scale and more complex which will increase susceptibility. In general, large scale, simple and open seascapes/coastlines are likely to be less susceptible to the Proposed Development than more enclosed, complex seascapes/coasts (such as indented bays, headlands etc).
 - **Skyline:** Prominent and distinctive skylines and horizons with important landmark features that are identified in the landscape character assessment, are generally considered to be more susceptible to development in comparison to broad, simple skylines which lack landmark features or contain other infrastructure features.
 - **Relationship with other development and landmarks:** Contemporary landscapes where there are existing similar developments (WTGs or energy developments) or other forms of development (industry, mineral extraction, masts, urban fringe / large settlement, major transport routes) that already have a characterising influence result in a lower susceptible to development in comparison to areas characterised by smaller scale, historic development and landmarks.
 - **Perceptual qualities:** Notable landscapes that are acknowledged to be particularly scenic, wild or tranquil are generally considered to be more susceptible to development in comparison to ordinary, cultivated or farmed / developed landscapes where perceptions of 'wildness' and tranquillity are less tangible. Landscapes which are either remote or appear natural may vary in their susceptibility to development.

- **Landscape context and association:** the extent to which the Proposed Development will influence the character of seascape/landscape receptors across the study area relates to the associations that exist between the seascape/landscape receptor within which the Proposed Development are located and the seascape/landscape receptor from which the Proposed Development is being experienced. In some situations this association will be strong, i.e., where the seascapes/landscapes are directly related, and in other situations weak (where the landscape association is weak). The context and visual connection to areas of adjacent seascape/landscape character or designations has a bearing on the susceptibility to development.

Seascape/landscape sensitivity rating

13.6.5.7 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. Criteria that tend towards higher or lower sensitivity are set out in Table 13.7 below.

Table 13.7 – Seascape/landscape sensitivity to change

Sensitivity Factor	Higher	Lower
Value	Designation: Designated seascape/landscapes with national policy level protection or defined for their natural beauty.	Seascape/landscapes without formal designation. Despoiled or degraded seascape/landscape with little or no evidence of being valued by the community.
	Quality: Higher quality seascape/landscapes with consistent, intact and well-defined, distinctive attributes.	Lower quality seascape/landscapes with indistinct elements or features that detract from its inherent attributes.
	Rarity: Rare or unique seascape/landscape character types, features or elements.	Widespread or 'common' seascape/landscape character types, features or elements.
	Aesthetic / scenic: Aesthetic / scenic or perceptual aspects of designated wildlife, ecological or cultural heritage features that contribute to seascape/landscape character.	Limited wildlife, ecological or cultural heritage features, or limited contribution to seascape/landscape character.
	Perceptual qualities: Seascape/landscape with perceptual qualities of wildness, remoteness or tranquillity.	Seascape/landscape where potential qualities of wildness, remoteness or tranquillity are no longer present or experienced, often

Sensitivity Factor	Higher	Lower
		as a result of existing development influences.
	Cultural associations: Seascape/landscape with strong cultural associations that contributes to scenic quality.	Seascape/landscape with few cultural associations.
Susceptibility to change	Strength and robustness: Fragile seascape/landscape vulnerable and lacking the ability to accommodate change.	Robust landscape that is capable of reasonably accommodating change without undue adverse effects.
	Landscape scale: A smaller scale seascape/landscape, with complex, distinctive or small-scale coastal landforms.	A seascape/landscape of a suitably large enough scale to accommodate the development, with simple, broad and homogenous coastal landforms.
	Openness / enclosure: Openness may increase susceptibility if there is wider visibility, however open seascape/landscape may also be larger scale and simple which would decrease susceptibility.	Enclosed seascape/landscapes 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
	Skyline: Distinctive undeveloped skylines with landmark features.	Developed, non-distinctive skylines without landmark features.
	Relationship with other development: Little association with other contemporary development, or strong associations occur with smaller scale or historic development.	Strong or direct association with other similar contemporary developments and seascape/landscape character influenced by development.
	Perceptual qualities: Perceptual qualities associated with particular scenic qualities, wildness or tranquillity.	Contemporary, cultivated / settled or developed landscapes with fewer perceptual qualities are likely to have a lower susceptibility.
	Seascape/landscape association: Adjacent seascape/landscape character context connected by associated character and views.	Host landscape character is separate from surrounding / adjacent seascape/landscape character with weak association.
Sensitivity to change	<p>High ←————→ Medium ←————→ Low</p>	

13.6.6 **Seascape/landscape magnitude of change**

13.6.6.1 The magnitude of change on seascape/landscape receptors is an expression of the scale of the change that will result from the Proposed Development and is dependent on a number of variables regarding the size or scale of the change. 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.

Size or scale of change

13.6.6.2 This criterion relates to the size or scale of change to the seascape/landscape that will arise as a result of the Proposed Development, 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 Proposed Development, 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 Proposed Development 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 Proposed Development in relation to these key characteristics. If the Proposed Development 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 Proposed Development 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 Proposed Development 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 Proposed Development that will be seen. Visibility of the Proposed Development may range from one WTG blade tip to all of the WTGs; generally, the greater the amount of the Proposed Development that can be seen, the higher the scale of change. The degree to which the Proposed Development is perceived to be on the horizon or 'within' the seascape/landscape. Generally, the magnitude of change is likely to be lower if the Proposed Development is largely perceived to be on the horizon at distance, rather than 'within' the seascape/landscape.

Geographical extent

- 13.6.6.3 The geographic extent over which the seascape/landscape effects has been 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 the geographical extents of the significant and non-significant effects.
- 13.6.6.4 The extent of the effects will vary depending on the specific nature of the Proposed Development and is principally assessed through analysis of the extent of perceived changes to the seascape/landscape character through visibility of the Proposed Development.
- 13.6.6.5 Landscape effects are described in terms of the geographical extent or physical area that will be affected (described as a linear or area measurement). 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.
- **Seascape/landscape character:** The extent of the effects on seascape/landscape character will vary depending on the specific nature of the Proposed Development. 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 Proposed Development in terms of its character, key characteristics and elements.
 - **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

- 13.6.6.6 The duration and reversibility of seascape/landscape effects has been based on the period over which Proposed Development are likely to exist (during construction and operation) and the extent to which these elements has been removed (during decommissioning) and its 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.
 - Seascape/landscape magnitude of change rating

- 13.6.6.7 The 'magnitude' or 'degree of change' resulting from the Proposed Development 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. The geographic extent, 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 13.8.

Table 13.8 – Seascape/landscape magnitude of change ratings

Magnitude of change	Definition
High	The Proposed Development will result in a high level of alteration to the baseline characteristics or special qualities of the seascape/landscape, forming the prevailing influence and/or introducing elements that are uncharacteristic in the baseline landscape/seascape. The addition of the Proposed Development will result in a large-scale change, loss or addition to the baseline seascape/landscape.
Medium-high	Intermediate rating with combination of criteria from high magnitude (described above) and medium magnitude (described below).
Medium	The Proposed Development will result in a medium level of alteration to the baseline characteristics or special qualities of the seascape/landscape, forming a readily apparent influence and/or introducing elements that are potentially uncharacteristic in the baseline seascape/landscape. The addition of the Proposed Development will result in a medium-scale change, loss or addition to the baseline seascape/landscape.
Medium-low	Intermediate rating with combination of criteria from medium magnitude (described above) and low magnitude (described below).
Low	The Proposed Development will result in a low level of alteration to the baseline characteristics or special qualities of the seascape/landscape, providing a slightly apparent influence and/or introducing elements that are characteristic in the baseline seascape/landscape. The addition of the Proposed Development will result in a small-scale change, loss or addition to the baseline seascape/landscape.
Negligible	The Proposed Development will result in a negligible alteration to the baseline characteristics or special qualities of the seascape/landscape, providing a barely discernible influence and/or introducing elements that are substantially characteristic in the baseline seascape/landscape. The addition of the Proposed Development will result in negligible change, loss or addition to the baseline seascape/landscape.

13.6.7 *Evaluating seascape/landscape effects and significance*

- 13.6.7.1 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 13.9 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 Proposed Development and their conclusion, has been presented in a comprehensive, clear and transparent manner.
- 13.6.7.2 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).
- 13.6.7.3 A significant effect will occur where the combination of the variables results in the Proposed Development 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.
- 13.6.7.4 A non-significant effect will occur where the effect of the Proposed Development 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.

13.7 Evaluation of significance

- 13.7.1.1 The significance of the effect upon seascape, landscape and visual receptors is determined by correlating the magnitude of the impact and the sensitivity of the receptor, as presented in Table 13.9.
- 13.7.1.2 The significance of the effect on each seascape/landscape character and visual receptor is dependent on all of the factors considered in the sensitivity of the receptor and the magnitude of change resulting from the Proposed Development. Factors which influence levels of sensitivity and magnitude of change assessed in the SLVIA are set out in full in Volume 3 Technical Appendix 13.1: SLVIA Methodology. Judgements on sensitivity and magnitude of change are combined to arrive at an overall assessment as to whether the Proposed Development will have an effect that is significant or not significant on each seascape/ landscape and visual receptor.
- 13.7.1.3 The matrix in Table 13.9 is used as a guide to help inform the threshold of significance when combining sensitivity and magnitude to assess significance. On this basis potential impacts are assessed as of negligible, minor, moderate and major. In those instances where there would be no effect, the magnitude has been recorded as 'Zero' and the level of effect as 'None'.
- 13.7.1.4 For the purposes of this assessment, any effects with a significance level of major and major/moderate have been deemed significant in EIA terms (dark shaded boxed in Table 13.9). 'Moderate' levels of effect (indicated in mid-grey in Table 13.9) have the 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. These assessments are explained as part of the assessment, where they occur.

- 13.7.1.5 Significance can therefore occur at a range of levels depending on the magnitude and sensitivity, however in all cases, a significant effect is considered more likely to occur where a combination of the variables results in the Proposed Development having a defining effect on the landscape/seascape character or view. Definitions are not provided for the individual categories of significance shown in the matrix and the reader should refer to the detailed definitions provided for the factors that combine to inform sensitivity and magnitude. Effects assessed as being either moderate/minor, minor, minor/negligible or negligible level are assessed as non-significant (white shaded boxes in Table 13.9).
- 13.7.1.6 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.

Table 13.9 – Impact Significant Matrix

		Sensitivity				
		High	Medium-high	Medium	Medium-low	Low
Magnitude	High	Major (Significant)	Major (Significant)	Major / moderate (Significant)	Moderate (either significant or not significant)	Moderate (either significant or not significant)
	Medium-high	Major (Significant)	Major/ moderate (Significant)	Moderate (either significant or not significant)	Moderate (either significant or not significant)	Moderate / minor (Not significant)
	Medium	Major / moderate (Significant)	Moderate (either significant or not significant)	Moderate (either significant or not significant)	Moderate / minor (Not significant)	Minor (Not significant)
	Medium-low	Moderate (either significant or not significant)	Moderate (either significant or not significant)	Moderate/ minor (Not significant)	Minor (Not significant)	Minor (Not significant)
	Low	Moderate / minor (Not significant)	Moderate / minor (Not significant)	Minor (Not significant)	Minor (Not significant)	Negligible (Not significant)
	Negligible	Minor (Not significant)	Minor (Not significant)	Minor (Not significant)	Negligible (Not significant)	Negligible (Not significant)

13.8 Nature of effects

13.8.1 Overview

- 13.8.1.1 The nature of effects refers to whether the landscape and/or visual effect of the Proposed Development is positive or negative (herein referred to as 'beneficial' and 'adverse').
- 13.8.1.2 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'.
- 13.8.1.3 Cumulative effects have been described in Section 13.10, and 'short-term, medium-term and long-term, permanent and temporary' effects are described in Section 13.5 and 13.6 under the heading 'Duration of Effect'. Transboundary effects are relevant only to the SLVIA and concern the overlap of the SLVIA 50km study area with EU maritime waters.

13.8.2 Direct and indirect effects

- 13.8.2.1 Direct landscape effects relate to the host landscape and concern both physical and perceptual effects on the receptor.
- 13.8.2.2 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.
- 13.8.2.3 Visual effects are considered as direct effects, as the view itself may be directly altered by the proposed development.

13.8.3 Positive and negative effects

- 13.8.3.1 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.
- 13.8.3.2 In this assessment the nature of effects refers to whether the landscape and / or visual effect of the Proposed Development is positive or negative (herein referred to as 'beneficial' / 'neutral' or 'adverse').
- 13.8.3.3 In relation to many forms of development, SLVIA will identify 'beneficial' and 'adverse' effects by assessing these under the term 'Nature of Effect'. The seascape, landscape and visual effects of wind farms are difficult to categorise in either of these brackets as, 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.

- 13.8.3.4 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 Proposed 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.

13.9 Assessing night-time visual effects

- 13.9.1.1 The assessment of night-time visual effects is based on the description of proposed WTG lighting set out in the project design envelope and the ICAO/CAA regulations and standards described above.
- 13.9.1.2 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.
- 13.9.1.3 A worst-case approach is applied to the assessment that considers the potential effects of medium-intensity 2,000 cd 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. A further assessment of the likely residual effects is therefore made factoring in embedded mitigation, i.e. that the 2,000cd aviation lights will be dimmed to 10% of their value (200 cd) if meteorological conditions permit (when visibility is greater than 5 km).
- 13.9.1.4 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 Proposed Development.
- 13.9.1.5 The study area for the visual assessment of WTG lighting is shown in Volume 2, Figure 13.10 and is coincident with the 50km SLVIA Study Area, however is particularly focused on the closest areas of the Marloes and Dale coastline and Angle Peninsula, within approximately 40 km.

- 13.9.1.6 The assessment of the lighting of the Proposed Development 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).
- 13.9.1.7 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.
- 13.9.1.8 The proposed aviation lighting will not have significant effects on the perception of landscape or seascape character, which is not readily perceived at night in darkness, particularly in rural areas. The matter of visible aviation and marine navigation lighting assessment is wholly a visual concern and the assessment presented focusses on that premise.

Significance criteria for night-time effects

- 13.9.1.9 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.
- 13.9.1.10 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 Proposed Development.
- 13.9.1.11 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.
- 13.9.1.12 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 in Section 13.5.4 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.

- 13.9.1.13 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 13.10 below.

Table 13.10 – Magnitude of change criteria for night-time visual effects

Level of magnitude	Definition of magnitude
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.

- 13.9.1.14 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 13.9, which gives an understanding of the threshold at which significant effects may arise.
- 13.9.1.15 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.
- 13.9.1.16 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.

13.10 Assessing cumulative seascape, landscape and visual effects

13.10.1 Overview

- 13.10.1.1 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.'*
- 13.10.1.2 NatureScot's guidance, Assessing the Cumulative Impact of Onshore Wind Energy Developments (NatureScot 2012) 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 (2012) guidance defines:
- 13.10.1.3 *"Cumulative effects as the additional changes caused by a proposed development in conjunction with other similar developments or as the combined effect of a set of developments taken together (NatureScot, 2012: p4);*
- 13.10.1.4 *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, 2012, p10); and*
- 13.10.1.5 *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, 2012, p11).*
- 13.10.1.6 In line with guidance (NatureScot 2012), the SLVIA focuses on the key cumulative impacts which are likely to influence decision making, rather than assessing every potential cumulative effect.

13.10.2 Scope of the Cumulative Assessment

- 13.10.2.1 The main SLVIA in Section 13.7 – 13.9 of Chapter 13, considers effects of the construction and operation of the Proposed Development with a baseline of operational wind energy development.
- 13.10.2.2 The cumulative SLVIA in Section 13.12 of Chapter 13 considers effects of the construction and operation of the Proposed Development cumulatively with other consented, application stage and scoping stage projects, as listed in Table 13.11 and shown in the cumulative development plan (Volume 2, Figure 13.21).
- 13.10.2.3 A comprehensive 'long list' of projects has been compiled with potential for cumulative impact interactions. The following projects listed in Table 13.11 are identified from the long-list within the SLVIA Study Area (Zone of Influence) (Volume 2, Figure 13.21) that may have potential to contribute to cumulative impacts with the Proposed Development that are of relevance for the assessment of cumulative seascape, landscape and visual impacts. A preliminary assessment of each project within the SLVIA Study Area is provided in Section 13.12 of Chapter 13 to identify the potential for cumulative interaction and whether the project will be scoped in or scoped out of the cumulative SLVIA of the Proposed Development.

Table 13.11 - Other Energy Developments Considered in the Cumulative SLVIA

Project	Distance to Array Area	Preliminary Assessment
Consented		
META East Pickard Bay	37 km	Scoped in
META Dale Roads	39.6 km	Scoped in
META Warrior Way	51.7 km	Scoped out
Bombora Wave Energy – mWave	40 km	Scoped out
Application stage		
Greenlink Interconnector	17.8 km	Scoped out
Pembroke Dock Slipway	48.5 km	Scoped out
Milford Haven Port Authority (MHPA)	43.5 km	Scoped out
Rhoscrowther Wind Farm	43.7 km	Scoped in
Scoping stage		
Pembrokeshire Wave Demonstration Zone (PDZ)	20.8 km	Scoped out
Project Valorous	3.3 km	Scoped in

13.10.2.4 The cumulative assessment of the Proposed Development considers the potential for significant cumulative seascape, landscape and visual effects with two consented projects – META East Pickard Bay and META Dale Roads; one application stage project – Rhoscrowther Wind Farm; and one scoping stage project – Project Valorous. A cumulative assessment of the likely significant cumulative effects of the Proposed Development is undertaken in relation to each of these scenarios.

Consented scenario

13.10.2.5 The 'consented scenario' assesses the additional effects of the Proposed Development in addition to the consented META East Pickard Bay and META Dale Roads projects that may soon be present in the seascape. This scenario assumes that the consented projects have become part of a theoretical baseline situation. The assessment seeks to establish whether the addition of the Proposed Development with these consented projects results in new, different or additional effects, over and above those that were assessed in Section 13.7 (Visual Effects), 13.8 (Seascape Effects) and 13.9 (Landscape Effects) of Chapter 13. The effects identified are considered as being likely to arise, on the assumption that the projects have received planning consent and are likely to be built and become operational.

Application Stage Scenario

- 13.10.2.6 The 'application stage scenario' assesses the additional effects of the Proposed Development in addition to Rhoscrowther Wind Farm, which may become present in the landscape. This scenario assumes that Rhoscrowther Wind Farm has become part of a theoretical baseline situation and also seeks to establish whether the addition of the Proposed Development with Rhoscrowther Wind Farm results in new, different or additional effects. The effects identified in the application stage scenario are considered as being less likely to arise than the consented scenario, as it is possible that application stage projects will not gain consent or become operational.

Scoping Stage Scenario

- 13.10.2.7 The 'scoping stage scenario' reports on the total cumulative effect of Project Erebus and Project Valorous, focusing on the additional cumulative effect that may arise because of Project Valorous. This 'scoping stage' scenario assumes that as the demonstration project that is being developed first, Project Erebus has become part of a theoretical baseline situation, and that the cumulative effects may arise because of Project Valorous, since there is no possibility that Project Valorous will precede Project Erebus. The assessment seeks to establish whether the addition of Project Valorous results in new, different or additional effects. The assessments are high level and can be extended and assessed with greater confidence as more information comes forward in the Project Valorous application and its ES.

13.10.3 Types of Cumulative Effect

Cumulative Visual Effects

- 13.10.3.1 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 Proposed Development 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

- 13.10.3.2 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 Proposed Development will be assessed as follows.

- 13.10.3.3 If the Proposed Development forms 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 Proposed Development is unlikely to be significant.
- 13.10.3.4 If the addition of the Proposed Development 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.
- 13.10.3.5 If the addition of the Proposed Development 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 Proposed Development is likely to be significant.

13.10.4 Assessing Cumulative Seascape, Landscape and Visual Effects

Cumulative Sensitivity of Landscape and Visual Receptors

- 13.10.4.1 In evaluating cumulative sensitivity in the cumulative SLVIA (section 13.12 of Chapter 13), the sensitivity to change of seascape, landscape and visual receptors are retained from the main assessment in sections 13.7 – 13.9).

Cumulative Magnitude of Change

- 13.10.4.2 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 Proposed Development cumulatively. The cumulative magnitude of change is assessed according to a number of criteria, described below.
- 13.10.4.3 ***The location, position and visual relationship of the Proposed Development:*** Depending on the viewpoint/viewing angle from the coast, the Proposed Development 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.
- 13.10.4.4 ***The location of the Proposed Development in relation to other developments:*** If the Proposed Development 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 Proposed Development is 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.

- 13.10.4.5 **The extent of the developed skyline:** the proportion (or horizontal angle) of the view that is affected by the combined lateral spread of the Proposed Development and other projects on the horizon. If the lateral spread/horizontal angle of the Proposed Development will add notably to the developed horizon in a view, the cumulative magnitude of change will tend to be higher.
- 13.10.4.6 **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 Proposed Development 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.
- 13.10.4.7 **The scale comparison between developments:** If the Proposed Development is 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.
- 13.10.4.8 **The consistency of image of the proposal in relation to other developments:** The cumulative magnitude of change of the Proposed Developments 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.
- 13.10.4.9 **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.
- 13.10.4.10 **The magnitude of change of the Proposed Development as assessed in the project alone assessment:** Where the Proposed Development 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.
- 13.10.4.11 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 Proposed Development 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 Proposed Development 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 Proposed Development 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 Proposed Development will result in a negligible incremental change, loss or addition to the seascape/landscape receptor or view.
- 13.10.4.12 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

- 13.10.4.13 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 Proposed Development, 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.
- 13.10.4.14 Less extensive, but nevertheless significant cumulative seascape, landscape and visual effects may also arise as a result of the addition of the Proposed Development 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.
- 13.10.4.15 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.
- 13.10.4.16 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 Proposed Development extends across seascape/landscape character areas or clear visual/topographic thresholds in a view.
- 13.10.4.17 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.

13.11 Visual representations

13.11.1 Overview

- 13.11.1.1 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), the Guidelines for Landscape and Visual Impact Assessment, Third Edition (GLVIA 3) (Landscape Institute and IEMA, 2013) and the Landscape Institute Technical Guidance Note on Visual Representation of Development Proposals (2019).
- 13.11.1.2 ZTVs and visual representations are produced on the assumption that the Proposed Development WTGs are floating on Highest Astronomical Tide (HAT) sea level at their maximum blade tip height (270m). Sea level is modelled at 4.14m above Ordnance datum (OD), which is equivalent of HAT for Milford Haven (7.85m above Chart Datum (CD)).

13.11.2 Zone of Theoretical Visibility (ZTV)

- 13.11.2.1 The ZTVs in Volume 2 Figure 13.11 to Figure 13.18 have been calculated using computer software to generate a ZTV of the Proposed Development to demonstrate the theoretical extent of visibility from any point in the study area.
- 13.11.2.2 The ZTVs are based on Ordnance Survey Terrain 5 digital terrain model (DTM) data, to produce detailed ZTV plots to assess particular effects, such as along the coastline. The computer model will include the entire study area and takes account of atmospheric refraction and the Earth's curvature. 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.
- 13.11.2.3 Cumulative ZTV plots based on the intervisibility of the Proposed Development and other relevant developments within the study area have also been produced.
- 13.11.2.4 There are limitations which should be considered in the interpretation and use of the ZTV as follows.
- 13.11.2.5 Where the ZTV has been calculated using Ordnance Survey Terrain 5 DTM, 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.
- 13.11.2.6 The ZTVs are based on theoretical visibility from 2m above ground level.
- 13.11.2.7 The Blade Tip ZTV does not indicate the decrease in visibility that occurs with increased distance from the array area. The nature of what is visible from 3km away will differ markedly from what is visible from 10km away, although both are indicated on the Blade Tip ZTV as having the same level of visibility.
- 13.11.2.8 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 seven WTGs may gain views of the smallest extremity of blade tips, or of seven full WTGs. This can make a considerable difference in the effects of the Proposed Development on that area.
- 13.11.2.9 These limitations mean that while the ZTV is used as a starting point in the assessment, providing an indication of where the Proposed Development 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.

13.11.2.10 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.

13.11.3 Methodology for baseline photography

Overview

13.11.3.1 Once a view has been selected, the location is visited, confirmed, and assessed with the aid of a wireline or similar visualisation 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.

13.11.3.2 The following photographic information is recorded:

- date, time, weather conditions and visual range;
- GPS recorded 12 figure grid reference accurate to ~5-10 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 Proposed Development.

13.11.3.3 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 (35mm negative size) complementary metal oxide semiconductor (CMOS) sensor. The photographs were taken on a tripod with a pano-head at a height of approximately 1.5m above ground.

13.11.3.4 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.

13.11.3.5 Guidelines for LVIA (GLVIA3) para 8.22 state – ‘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’.*

13.11.3.6 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 Proposed Development may be most visible.

Methodology for production of visualisations

13.11.3.7 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.

13.11.3.8 A photomontage is a visualisation which superimposes an image of a proposed development 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.

- 13.11.3.9 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.
- 13.11.3.10 Tonal alterations are made using Adobe software to create an even range of tones across the photographs once joined.
- 13.11.3.11 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.
- 13.11.3.12 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.
- 13.11.3.13 Wireline representations that illustrate the Proposed Development 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 OS Terrain 5 DTM. 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.
- 13.11.3.14 Daytime visualisations and wirelines show a WTG model which represents the maximum development scenario of the Proposed Development in the array area and allow the potential proportions of the WTGs to be appreciated from the visualisations.
- 13.11.3.15 Fully rendered photomontages have been produced for the agreed viewpoints using Resoft WindFarm software, to provide a photorealistic image of the appearance of the Proposed Development. In the daytime photomontages modelled representations are combined with the baseline view photographs to create a photorealistic rendered photomontage image of the development.
- 13.11.3.16 '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 Proposed Development 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 Proposed Development.
- 13.11.3.17 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 297mm (half A1) which provides for a relatively large scale image.
- 13.11.3.18 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.

13.11.3.19 Rendering of the WTGs in the photomontages is as photorealistic as possible to the conditions shown in each viewpoint photograph. There may be 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 Proposed Development will 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 Proposed Development.

Night-time visualisations

13.11.3.20 The visual effect of the Proposed Development at night has been assessed in Chapter 13, informed by the night-time photomontage visualisations produced from representative viewpoints, to visually represent aviation and marine navigation lighting at night. A worst-case approach is applied in the photomontages and assessment that considers the potential effects of medium-intensity 2000cd lights in clear visibility.

13.11.3.21 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.

13.11.3.22 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 be 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

13.11.3.23 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.

13.11.3.24 The photomontage visualisations of the Proposed Development (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 Proposed Development will look like in reality due to factors such as: different lighting, weather and seasonal conditions which vary through time and the resolution of the image;
- the images 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 Proposed Development proposal these images are best viewed at the viewpoint location shown;
- the images must be printed and viewed at the correct size (260mm by 820mm);
- 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.

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