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Morecambe Offshore Windfarm: Generation Assets

Environmental Statement

Volume 5

Appendix 18.1 SLVIA Methodology

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Glossary of Acronyms

AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
CAA	Civil Aviation Authority
CCC	Cumbria County Council
CEA	Cumulative Effects Assessment
CMOS	Complementary Metal Oxide Semiconductor
CPRE	Campaign to Protect Rural England
DCO	Development Consent Order
DTM	Digital Terrain Model
EIA	Environmental Impact Assessment
EOS	Electro-Optical System
ES	Environmental Statement
FoV	Field of View
GIS	Geographical Information System
GLVIA3	Guidelines for Landscape and Visual Impact Assessment, 3rd Edition
GPS	Global Positioning System
HAT	Highest Astronomical Tide
HFoV	Horizontal Field of View
ICAO	International Civil Aviation Organisation
IEMA	Institute of Environmental Management and Assessment
LCA	Landscape Character Area
LCT	Landscape Character Type
LDNPP	Lake District National Park Partnership
LI	Landscape Institute
LSE	Likely Significant Effects
LVIA	Landscape and Visual Impacts Assessment
MCA	Marine Character Areas
MHW	Mean High Water
MLW	Mean Low Water
MMO	Marine Management Organisation
MOD	Ministry of Defence
NRW	Natural Resources Wales
NSIP	Nationally Significant Infrastructure Project
OS	Ordnance Survey

OSP	Offshore substation platform
OWF	Offshore Windfarm
PDE	Project Design Envelope
PEIR	Preliminary Environmental Information Report
PINS	Planning Inspectorate
SLVIA	Seascape, Landscape and Visual Impact Assessment
TGN	Technical Guidance Note
UK	United Kingdom
UNESCO	United Nations Educational, Scientific and Cultural Organization
VRWFG	Visual Representation of Wind Farms Guidance
WTG	Wind turbine generators
ZoI	Zone of Influence
ZTV	Zone of Theoretical Visibility

Glossary of Unit Terms

cd	Candela
km	kilometre
kV	kilovolt
m	metre

Glossary of Terminology

Applicant	Morecambe Offshore Windfarm Ltd
Application	This refers to the Applicant's application for a Development Consent Order (DCO). An application consists of a series of documents and plans which are published on the Planning Inspectorate's (PINS) website.
Evidence Plan Process (EPP)	A voluntary consultation process with specialist stakeholders to agree the approach, and information to support, the Environmental Impact Assessment (EIA) and Habitats Regulations Assessment (HRA) for certain topics. The EPP provides a mechanism to agree the information required to be submitted to the PINS as part of the DCO application. This function of the EPP helps Applicants to provide sufficient information in their application, so that the Examining Authority can recommend to the Secretary of State whether or not to accept the application for examination and whether an appropriate assessment is required.
Expert Topic Group (ETG)	A forum for targeted engagement with regulators and interested stakeholders through the EPP.
Generation Assets (the Project)	Generation assets associated with the Morecambe Offshore Windfarm. This is infrastructure in connection with electricity production, namely the fixed foundation wind turbine generators (WTGs), inter-array cables, offshore substation platform(s) (OSP(s)) and possible platform link cables to connect OSP(s).
Inter-array cables	Cables which link the WTGs to each other and the OSP(s).
Landfall	Where the offshore export cables would come ashore.
Morgan and Morecambe Offshore Wind Farms: Transmission Assets	The transmission assets for the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm. This includes the OSP(s)[1], interconnector cables, Morgan offshore booster station, offshore export cables, landfall site, onshore export cables, onshore substations, 400kV cables and associated grid connection infrastructure such as circuit breaker infrastructure. Also referred to in this chapter as the Transmission Assets, for ease of reading.
Landscape character	A distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse
Likely Significant Effects (LSE)	Meaning that there may be (as opposed to is likely to be) a significant effect of a proposal on the integrity of the site and its conservation objectives.

[1] At the time of writing the Environmental Statement (ES), a decision had been taken that the offshore substation platforms (OSP(s)) would remain solely within the Generation Assets application and would not be included within the DCO application for the Morgan and Morecambe Offshore Wind Farms: Transmission Assets. This decision post-dated the Preliminary Environmental Information Report (PEIR) that was prepared for the Transmission Assets. The OSP(s) are still included in the description of the Transmission Assets for the purposes of this ES as the Cumulative Effects Assessment (CEA) carried out in respect of the Generation/Transmission Assets is based on the information available from the Transmission Assets PEIR.

Offshore export cables	The cables which would bring electricity from the OSP(s) to the landfall.
Offshore substation platform(s) (OSP(s))	A fixed structure located within the windfarm site, containing electrical equipment to aggregate the power from the WTGs and convert it into a more suitable form for export to shore.
Platform link cable	An electrical cable which links one or more OSP(s).
Seascape	Landscapes with views of the coast or seas, and coasts and adjacent marine environments with cultural, historical and archaeological links with each other.
Study area	This is an area which is defined for each EIA topic which includes the offshore development area as well as potential spatial and temporal considerations of the impacts on relevant receptors. The study area for each EIA topic is intended to cover the area within which an effect can be reasonably expected. For the purpose of the seascape, landscape and visual impact assessment, this area is a 60km radius area around the windfarm site, based on the Zone of Theoretical Visibility (ZTV) and area within which likely significant effects are likely to occur.
Visual amenity	The overall pleasantness of the views people enjoy of their surroundings, which provides an attractive visual setting or backdrop for the enjoyment of activities of the people living, working, recreating or travelling through an area.
Windfarm site	The area within which the WTGs, inter-array cables, OSP(s) and platform link cables will be present.
Wind turbine generator (WTG)	A fixed structure located within the windfarm site that converts the kinetic energy of wind into electrical energy.
Zone of Influence (ZoI)	The maximum anticipated spatial extent of a given potential impact.

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18.1 The future of renewable energy

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1 Introduction

1. This appendix describes the methodology used within the Seascape, Landscape, and Visual Impact Assessment (SLVIA) for the Morecambe Offshore Windfarm Generation Assets (the Project). The general impact assessment methodology applied for the Project Environmental Statement (ES) is set out in **Chapter 6 Environmental Impact Assessment Methodology** (Document Reference 5.1.6).

2. The SLVIA assesses the Project infrastructure to be located within the windfarm site (wind turbine generators (WTGs), inter-array cables, offshore substation platform(s) (OSP(s)), and possible platform link cables to connect OSP(s). The windfarm site location and SLVIA Project Design Envelope is set out in Figure 18.1 of **Chapter 18 SLVIA** (Document Reference 5.1.18).

3. This SLVIA methodology appendix has been structured as follows:

   - Overview of SLVIA methodology
   - Iterative assessment and design
   - Guidance, data sources and site surveys
   - Assessing seascape/landscape effects
   - Assessing visual effects
   - Assessing cumulative seascape, landscape and visual effects
   - Evaluation of significance
   - Nature of effects
   - Visual representations

2 Overview of the SLVIA methodology

4. The assessment has been undertaken in accordance with the Landscape Institute (LI) and Institute of Environmental Management and Assessment (IEMA) (2013) Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3), and other best practice guidance. An overview of the SLVIA process is provided here and illustrated, diagrammatically, in **Plate 2.1**.

5. The SLVIA process assesses the likely effects that the construction, operation and maintenance, and decommissioning of the Project will have on the seascape, landscape, and visual resource, encompassing effects on seascape/landscape character, designated landscapes, visual effects and cumulative effects.

6. The SLVIA is based on the Rochdale Envelope approach, described in **Chapter 5 Project Description** (Document Reference 5.1.5). In compliance

with Environmental Impact Assessment (EIA) regulations (The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017), the Likely Significant Effects (LSE) of a realistic 'worst-case' scenario are assessed and illustrated in the SLVIA. This worst-case scenario as appropriate for the SLVIA is described in **Chapter 18 SLVIA**.

7. Essentially, the seascape, landscape and visual effects (and whether they are significant) is determined by an assessment of the 'sensitivity' of each receptor or group of receptors and the 'magnitude of change' that would result from the Project.

8. The evaluation of sensitivity takes account of the value of the seascape/landscape or visual resource and susceptibility of these receptors to the change arising from the Project in order to assess how sensitive the receptor is to what is proposed. The assessment of sensitivity to change is then combined with an assessment of the magnitude of change arising from the Project, which takes account of the size and scale of the proposed change.

9. By combining assessments of sensitivity to change and magnitude of change, the 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.

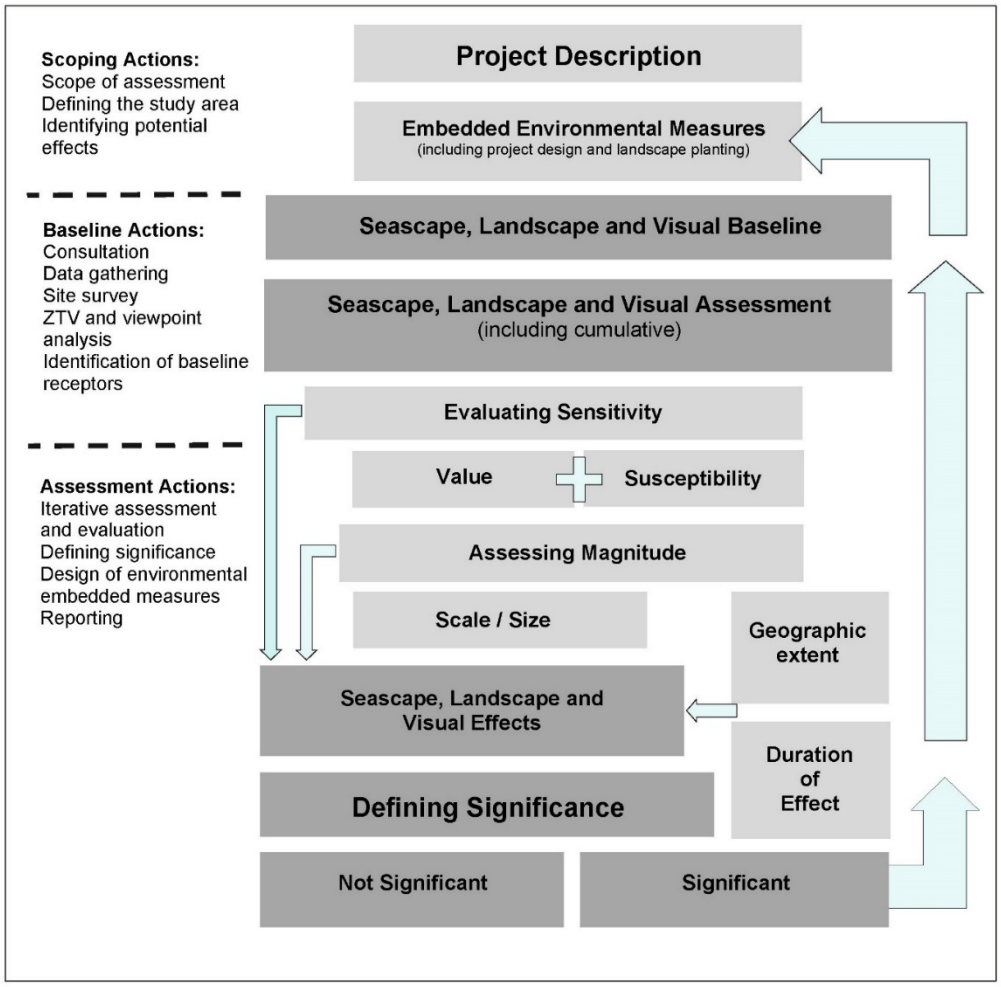

Plate 2.1 Overview of approach to the SLVIA

10. The assessment has also considered the whole Project, or combined effects, of the Project, as well as the cumulative effects likely to result from the Project and other similar projects.

11. In each case, an appropriate and proportionate level of assessment has been undertaken and agreed through consultation from scoping to PEIR 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).

12. The SLVIA 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.

2.1 Interface between seascape and landscape assessment

13. The SLVIA assesses infrastructure to be located within the windfarm site (WTG, inter-array cables, OSP(s) and possible platform link cables to connect

offshore substations) (Figure 18.1 of **Chapter 18 SLVIA**). The onshore infrastructure (the onshore substation, onshore export cables and landfall location) is assessed in the onshore Landscape and Visual Impacts Assessment (LVIA), as part of the Transmission Assets, which is undergoing a separate Development Consent Order (DCO), and as such has been assessed as a cumulative project.

2.2 Assessment of the foreshore

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

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

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

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

2.3 Defining the study area

18. The study area for the SLVIA is defined as a 60km radius area around the windfarm site of the DCO Order Limits, together with the Zone of Theoretical Visibility (ZTV) of the Project.

19. The SLVIA study area covers a radius of 60km from the windfarm site, as illustrated in Figure 18.2, **Chapter 18 SLVIA**. Broadly, the SLVIA study area is defined by the Irish Sea and the offshore waters, coastline and hinterland of North-West England, Morecambe Bay and North Wales, and the edges of the Isle of Man, to the northwest. The SLVIA study area is defined to extend far enough to include all areas within which significant effects could occur, using professional judgement. It is an outer limit to where significant effects could occur.

20. IEMA Guidance (IEMA, 2015 and 2017) recommends that a proportionate EIA should be undertaken, focused on the significant effects, and a proportionate approach within the ES topic chapter. This is because an overly large SLVIA study area may be considered disproportionate, if it makes the understanding of the key impacts of the Project more difficult.

21. This is supported by LVIA Guidance, produced by the LI (GLVIA3) (LI and IEMA, 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'*.

22. Paragraph 5.2 and page 70 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 Project may influence in a significant manner'.*

23. Other wind farm specific guidance, such as NatureScot's Visual Representation of Wind Farms Guidance (VRWFG) (NatureScot, 2017), recommends that ZTV distances are used for defining the study area based on WTG height. This guidance recommends a 45km radius for WTGs greater than 150m to blade tip (para 48, p12 of VRWFG), 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. However, 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 Project.

24. Beyond the DCO Limits, the SLVIA generally focuses on locations from where it may be possible to see the Project, as defined by the Blade Tip ZTV (Figure 18.4, **Chapter 18 SLVIA**).

25. The ZTV shown in Figure 18.4, **Chapter 18 SLVIA** (and Figure 18.5a-d at A1 scale, **Chapter 18 SLVIA**) are based on turbines of 345m to blade tip (above Highest Astronomical Tide (HAT), located around the perimeter of the windfarm site, and represents the Maximum Development Scenario considered in the assessment. The ZTV illustrates where there will be no visibility of these WTGs, as well as areas where there will be lower, or higher, numbers of WTGs visible.

26. Consideration of the blade tip ZTV (Figure 18.4, **Chapter 18 SLVIA**) indicates that the theoretical visibility of the Project mainly occurs within 60km, and that beyond 60km, the geographic extent of visibility becomes very restricted. At distances over 60km, the lateral (or horizontal) spread of the Project also occupies a small portion of available views and the apparent height (or 'vertical angle') of the WTGs will also appear very small, therefore, significant visual effects are unlikely to arise at greater than this distance, even if the WTGs are visible.

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

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

29. In considering the SLVIA study area, the sensitivity of the receiving seascape, landscape and visual receptors have also been reviewed, taking particular account of the landscape designations shown in Figure 18.12, **Chapter 18 SLVIA** and other principal visual receptors.

30. Potential cumulative effect interactions with other OWFs have also influenced the definition of the SLVIA study area. Other OWFs within the SLVIA study area are shown in Figure 18.18, **Chapter 18 SLVIA**.

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

3 Iterative assessment and design

32. The SLVIA is part of an iterative EIA process, which aims to 'design out' significant effects, via a range of environmental measures, including avoidance and designs that aim to reduce, or eliminate, significant effects. Design is an integrated part of the SLVIA process and environmental measures related to landscape design and management can be an important tool to mitigate significant effects. The EIA process can also call on a range of environmental and technical specialists that contribute other forms of

mitigation, which may also bring a range of benefits. Potentially significant seascape, landscape and visual effects, and the constraints and opportunities connected with their resolution, are identified through the SLVIA process. Where possible, embedded environmental measures (Commitments) are incorporated into the Project, in order to mitigate seascape, landscape and visual effects.

33. Embedded environmental measures are also recorded in the Schedule of Mitigation (Document Reference 5.5).

3.1 Potential effects during construction and decommissioning

34. Potential effects on the seascape, landscape and visual resource are likely during the construction and decommissioning periods of the Project and could include the following:

- Seascape effects:
  - Effects on perceived seascape character, arising as a result of construction and decommissioning activities (including laying new offshore export cables to shore), and structures located within the windfarm site, which may alter the seascape character of the windfarm site itself, and the perceived character of the wider seascape, through visibility of these changes
- Landscape effects:
  - Effects on perceived landscape character, arising as a result of construction and decommissioning activities, and structures that will be visible from the coast, and may therefore affect the perceived character of the landscape
  - Effects on the special landscape qualities and integrity of designated landscapes, arising 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 the structures located within the windfarm site itself, that will be visible from the coast
- Cumulative effects:
  - Effects of construction of the Project, which 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.

3.2 Potential effects during operation and maintenance

35. Potential effects on the seascape, landscape and visual resource that are likely to occur during the operation and maintenance of the Project, over its operational lifetime, include:

- Seascape effects:
  - Effects on perceived MCAs, arising as a result of the operational WTGs, substations and any maintenance activities located within the windfarm site, which may alter the seascape character of the windfarm site itself and the perceived character of the wider seascape
- Landscape effects:
  - Effects on perceived landscape character (LCAs and Designations), arising as a result of the operational WTGs, substations and any 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 any maintenance activities, marine navigation requirements and aviation lighting
- Cumulative effects:
  - Effects of operation of the Project 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

4 Guidance, data sources and site surveys

4.1 Guidance on methodology

36. This methodology accords with 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.

37. 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.

38. 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.

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

40. 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.

41. A full list of references, providing guidance on methodology is provided in **Section 8** and a glossary is provided at the beginning of this appendix.

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

4.2 Data sources

43. A list of the data sources used for this assessment is provided in **Table 4.1**.

Table 4.1 Data sources

Source	Date	Summary
Arnside and Silverdale AONB	2019 – 2024	Arnside and Silverdale Area of Outstanding Natural Beauty Management Plan 2019 – 2024
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 has been used to understand and illustrate baseline lighting levels. Available online: https://www.nightblight.cpre.org.uk/
Clwydian Range and Dee Valley Area of Outstanding Natural Beauty (AONB) Joint Committee	2014	Clwydian Range and Dee Valley AONB Management Plan 2014-2019. Available online: https://www.clwydianrangeanddeevalleyaonb.org.uk/wp-content/uploads/2020/07/979717185-Clwydian-Range-and-Dee-Valley-AONB-Mgt-Plan-2016.pdf
Conwy County Borough Council and Denbighshire County Council	2013	Conwy And Denbighshire Landscape Sensitivity and Capacity Assessment For Wind Energy Development (2013). Available online: https://www.denbighshire.gov.uk/en/documents/planning-and-building-regulations/ldp/evidence-monitoring-and-information/conwy-and-denbighshire-landscape-sensitivity-and-capacity-assessment-for-wind-energy-development.pdf
Conwy County Borough Council	2014	Supplementary Planning Guidance LDP11: Landscape Sensitivity and Capacity Assessment for Onshore Wind Turbine Development. Available online: https://www.conwy.gov.uk/en/Resident/Planning-Building-Control-and-Conservation/Strategic-Planning-Policy/Supplementary-planning-guidance-documents/Assets/Natural-environment/LDP11-Landscape-Sensitivity-and-Capacity-Assessment.pdf
Cumbria County Council (CCC)	2014	Cumulative Impacts of Vertical Infrastructure. Available online: https://cumbria.gov.uk/elibrary/Content/Internet/538/755/2789/4209014125.PDF
CCC	2011	Cumbria Landscape Character Guidance and Toolkit, Part One – Landscape Character Guidance and Part Two – Landscape Character Toolkit. Available online: https://www.cumbria.gov.uk/planning-environment/countryside/countryside-landscape/land/LandCharacter.asp
English Heritage	2020	Any specific visitor attractions/tourist destinations. Available online: https://www.english-

Source	Date	Summary
		heritage.org.uk/visit/places/#?page=1&place=&mp=false&fe=false
Flintshire County Council	1996	A Landscape Strategy for Flintshire. Available online: https://www.flintshire.gov.uk/en/PDFFiles/Planning/LDP-evidence-base/Local/Volume-1-The-Landscape-Strategy-Policies-and-Proposals-1996.pdf
Forest of Bowland AONB	2019 – 2024	Forest of Bowland AONB Management Plan 2019 – 2024
Google Earth Pro	2020	Aerial photography
Historic England	2022	Registered Parks and Gardens and United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Sites. Available online: https://historicengland.org.uk
Lake District National Park Partnership (LDNPP)	2021	Lake District National Park Landscape Character Assessment and Guidelines. Available online: https://www.lakedistrict.gov.uk/__data/assets/pdf_file/0041/388985/Final-LDNP-LCA-for-Adoption-May-2021-compressed.pdf
LDNPP	2021	Lake District National Park Partnership Management Plan 2020-2025. Available online: https://www.lakedistrict.gov.uk/__data/assets/pdf_file/0013/406210/Partnerships-Management-Plan-2020-2025-vFINAL.pdf
Lancashire County Council	2000	A Landscape Strategy for Lancashire Landscape Character Assessment. Available online: https://www.lancashire.gov.uk/media/152746/characterassesment.pdf
Lancashire County Council	2005	Landscape Sensitivity to Wind Energy Development in Lancashire. Available online: https://www.lancashire.gov.uk/media/152752/Wind-Energy-Development.pdf
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
Met Office	2009-2019	Visibility Data from Walney Island Weather Station for period 01/01/2012 to 31/12/2021. Visibility bands every 1km up to 30km, then every 5km up to 50km, then every 10km up to 70km, and >70km
MMO	2014	Marine Character Areas. MMO, September 2018 North West Inshore and North West Offshore Marine Plan (MMO 1134). Available online: https://www.gov.uk/government/publications/the-north-west-marine-plans-documents
MMO	2014	Mapping UK Shipping Density and Routes from AIS

Source	Date	Summary
		MMO Project No: 1066. Available online: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/317770/1066.pdf
National Trust	2020	National Trust visitor attractions/tourist destinations Available online: https://www.nationaltrust.org.uk/days-out
Natural England	2022	Multi-Agency Geographical Information for the Countryside website. Available online: MAGIC (defra.gov.uk)
Natural England	2018	National Character Areas. Available online: https://www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making/national-character-area-profiles#ncas-in-north-west-england
Natural England	2019	Geographical Information System (GIS) datasets for: National Parks. Available online: https://data.gov.uk/dataset/334e1b27-e193-4ef5-b14e-696b58bb7e95/national-parks-england Areas of Outstanding Natural Beauty. Available online: https://data.gov.uk/dataset/8e3ae3b9-a827-47f1-b025-f08527a4e84e/areas-of-outstanding-natural-beauty-england County Parks. Available online: https://data.gov.uk/dataset/e729abb9-aa6c-42c5-baec-b6673e2b3a62/country-parks-england Open Access Land. Available online: https://data.gov.uk/dataset/05fa192a-06ba-4b2b-b98c-5b6bec5ff638/crow-act-2000-access-layer Heritage Coasts. Available online: https://data.gov.uk/dataset/79b3515f-b00e-419a-9c7e-1d3163555886/heritage-coasts
Natural Resources Wales (NRW)	2022	LANDMAP website. Wales visual and sensory data. Available Online: https://naturalresources.wales/evidence-and-data/maps/browse-map-od-data-about-the -natural-environment
NRW	2019	Seascape and visual sensitivity to offshore wind farms in Wales: Strategic assessment and guidance (White, Michaels and King, 2019)
NRW	2015	National Seascape Assessment for Wales Natural Resources Wales Evidence Report No: 80, 2015. Available online: https://naturalresources.wales/media/682028/mca-00-technical-report-summary-method-appendix.pdf
OPEN internal dataset	2020	Public Rights of Way
Ordnance Survey (OS)	2019	1:50,000 scale mapping
OS	2019	1:25,000 scale mapping

Source	Date	Summary
OS Open Data	2019	OS County Region, Local Unitary Authority, Railways, Road and Settlements
OS	2019	OS Terrain 50 Digital Terrain Model (DTM)
OS	2019	OS Terrain 5 DTM
Royal Yachting Association	2013	Cruising routes for recreational yachting
Sefton Council	2003	Supplementary Planning Guidance in Sefton, Landscape Character of Sefton. Available online: https://www.sefton.gov.uk/media/1992/landscape-character-assessment-of-sefton.pdf
Sustrans	2020	National Cycle Network (GIS dataset). Available online: https://www.sustrans.org.uk/
Wirral Metropolitan Borough Council	2019	Wirral Landscape Character Assessment. Available online: https://www.wirral.gov.uk/planning-and-building/local-plans-and-planning-policy/local-planning-evidence-and-research-report-35

4.3 Appropriate level of assessment

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

45. The Scoping Report (Morecambe Offshore Windfarm, June 2022) presented a scoping assessment of the likely seascape, landscape and visual effects scoped in and scoped out of the SLVIA (Table 8.36 of the Scoping Report (Document Reference 5.4)). The Scoping Opinion (Document Reference 5.4) (PINS, 2022) provided the opinion of the Secretary of State as to the scope, and level of detail, of the information to be provided in the ES. The Scoping Opinion is summarised in Table 18.1 of **Chapter 18 SLVIA**. The effects of the Project on certain seascape, landscape and visual receptors were agreed as scoped out of the SLVIA, in agreement with PINS, and are not assessed any further in the ES.

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

- A 'preliminary assessment' approach for an environmental aspect/effect, which may include secondary baseline data collection (for example desk-based information) and qualitative assessment methodologies. A preliminary assessment of all seascape, landscape and visual receptors is undertaken within **Appendix 18.2 SLVIA Preliminary Assessment** (Document Reference 5.2.18.2) of the ES, using desk-based information and ZTV analysis (Figure 18.5 to Figure 18.14, **Chapter 18 SLVIA**). 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 Project, which require a 'detailed assessment'.
- A 'detailed assessment' approach is undertaken for seascape, landscape and visual receptors/effects, which have been identified in the preliminary assessment in **Appendix 18.2** as requiring detailed assessment. This detailed assessment may include primary baseline data collection (for example, through site surveys), quantitative and qualitative assessment methodologies, and modelling, such as ZTV analysis (Figure 18.5 to Figure 18.14, **Chapter 18 SLVIA**) and wireline/photomontage visualisations (Figures 18.24 to Figure 18.47 **Chapter 18 SLVIA**).

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

4.4 Desk-based and site survey work

48. The SLVIA undertaken as part of the ES has been informed by desk-based studies and field survey work undertaken (between April 2022 and September 2022) within the SLVIA study area. The landscape, seascape and visual baseline has been derived from a desk-based review of landscape and seascape character assessments and the ZTV, to identify receptors that may be affected by the Project, and to produce written descriptions of their key characteristics and value.

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

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

5 Assessing seascape/landscape effects

51. Landscape Effects are defined by the LI in GLVIA3, 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."*

52. In accordance with GLVIA3 the term 'landscape' encompasses areas of 'townscape' and coastal areas of 'seascape'. Areas of landscape and seascape are both relevant to this assessment and they are described as follows.

5.1 Landscape character

53. GLVIA3, 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*
  - *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."*

5.2 Seascape character

54. GLVIA3, 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."*

55. GLVIA3 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*
- *Contributions of coastal features to orientation and navigation at sea."*

5.3 Seascape/landscape effects

56. In respect of the Project, the potential seascape/landscape effects, occurring during the construction, operation and maintenance, and decommissioning phases of the Project may therefore include, but are not restricted to the following:

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

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

5.4 Evaluating seascape/landscape sensitivity to change

5.4.1 Overview

58. The assessment of sensitivity takes account of the seascape/landscape value and the susceptibility of the receptor to the Project.

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

60. The sensitivity of a seascape/landscape character receptor is an expression of the combination of the judgements made about the value of the seascape/landscape receptor and the susceptibility of the receptor to the specific type of change resulting from the Project.

5.4.2 Seascape/landscape susceptibility to change

61. 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 Project (i.e., change relating to the specific development proposed), without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies. Some landscape/seascape receptors are better able to accommodate development than others, due to certain characteristics that are indicative of capacity to accommodate change. These characteristics may or may not also include special landscape qualities that underpin designated landscapes.

62. The assessment of the susceptibility of the seascape/landscape receptor to change has been classified as high, medium-high, medium, medium-low or low and the basis for this assessment has been made clear, using evidence and professional judgement. Indicators of landscape/seascape susceptibility to the specific type of development proposed (construction, operation and maintenance, and decommissioning of the Project) are based on the criteria outlined below. Indicators of higher and lower susceptibility are described further in **Section 6.4.3**.

- **Natural** – form/topography/character of hinterland (relevant Landscape Character Type (LCT)), coastal edge (cliffs, rocky coasts, upper beach, dunes, intertidal etc) and tidal range.
- **Cultural/social** – use of the sea (navigation, fishing, leisure, energy etc), coast and hinterland (settlement, industry, marine related development such as harbours, ports, industry, agriculture etc) and historic features on the coast (forts, castles, lighthouses etc).
- **Quality/condition** – intactness (degree of completeness or fragmentation visually, presence of detractors) and state of repair (condition of natural and built features/elements).
- **Aesthetic and perceptual** – scale of sea (in relation to coastal form or offshore areas); openness/enclosure (the degree and nature of enclosure of the sea by land and framing of views); exposure (degree of shelter/exposure); aspect (relationship with the sun); seascape pattern and foci (features and element on sea surface, coast and hinterland); tranquillity (movement, man-made structures, dark skies); wildness (sense of natural character uninfluenced by man); and remoteness (perceived distance from population and human interventions).
- **Visual characteristics** – key views from land to sea, sea to land and sea to sea, including nature of views and elevation, presence of iconic features; intervisibility of area with important receptors (amount, length, extent, nature of intervisibility and distance from development); and how seascape is experienced.
- **Relationship between seascape area and adjacent coast** – contribution of seascape to the setting of an important coast/hinterland or character area; and key relationships between hinterland, coastal edge, intertidal area and sea.

5.4.3 Value of the seascape/landscape receptor

63. The value of a seascape/landscape character receptor is a reflection of the value that society attaches to that seascape/landscape. The assessment of the seascape/landscape value has been classified as high, medium-high, medium, medium-low or low and the basis for this assessment has been made clear, using evidence and professional judgement, based on the following range of factors. Indicators of higher and lower value are described further in **Section 6.4.2**.

- **Seascape/landscape designations** - A receptor that lies within the boundary of a recognised landscape related planning designation, or within its immediate setting, will be of increased value, depending on the

level of importance of the designation, which may be international, national, regional or local. The absence of designations does not, however, preclude value, as an undesignated landscape character receptor may be valued as a resource in the local or immediate environment, however, the absence of a landscape designation and location outside the immediate setting of a designation, may be an indicator of lower value.

- **Seascape/landscape quality** - The quality of a seascape/landscape character receptor is a reflection of its attributes, such as scenic quality, sense of place, rarity and representativeness and the extent to which its valued attributes have remained intact. A seascape/landscape with high scenic quality that contributes to special qualities, with consistent, intact, well-defined, and distinctive attributes, is considered to be of higher quality and, in turn, higher value, than a landscape where the introduction of elements has detracted from its character, has low scenic qualities and does not contribute to special qualities.
- **Seascape/landscape experience** - The experiential qualities that can be evoked by a landscape receptor can add to its value and relates to a number of factors, including the perceptual responses it evokes (for example wildness, remoteness, tranquillity), the cultural associations that may exist in literature or history, or the iconic status of the seascape/landscape in its own right, the recreational value of the seascape/landscape, and the contribution of other values relating to the nature conservation or archaeology of the area.

5.4.4 Seascape/landscape sensitivity rating

64. An overall sensitivity assessment of the seascape/landscape receptor has been made by combining the assessment of the value of the seascape/landscape character receptor and its susceptibility to change. The evaluation of seascape/landscape sensitivity has been applied for each seascape/landscape receptor - high, medium-high, medium, medium-low and low - by combining individual assessments of the value of the receptor and its susceptibility to change. The basis for the assessments has been made clear, using evidence and professional judgement, in the evaluation of sensitivity for each receptor, informed by criteria that tend towards higher or lower sensitivity and are set out in **Table 5.1**.

Table 5.1 Seascape/landscape sensitivity to change

Higher sensitivity	Lower sensitivity
Value	
Designation: Presence of designated seascape/landscapes with national policy level protection or defined for their natural beauty. Perceived as lying within immediate seascape setting of a designation.	Seascape/landscapes without formal designation. Despoiled or degraded seascape/landscape with little or no evidence of being valued by the community. Not within seascape setting of a landscape designation.
Aesthetic/scenic qualities: Higher quality seascape/landscapes with consistent, intact and well-defined, distinctive attributes. A seascape/landscape with high scenic quality that contributes to special qualities. Aesthetic/scenic or perceptual aspects of designated wildlife, ecological or cultural heritage features that contribute to seascape/landscape character.	Lower quality seascape/landscapes with indistinct elements or features that detract from its inherent attributes. A seascape/landscape with low scenic qualities that does not contribute to special qualities. Limited wildlife, ecological or cultural heritage features, or limited contribution to seascape/landscape character.
Perceptual qualities: Seascape/landscape with perceptual qualities with high level of perceived wildness, high level of remoteness or high tranquillity.	Seascape/landscape with no apparent wildness, low levels of perceived remoteness or low tranquillity, often as a result of existing development influences.
Cultural associations: Seascape/landscape with strong/rich cultural associations that contribute to scenic quality. Presence of heritage designations overlooking or within area of potential development.	Seascape/landscape with few/limited cultural associations. Absence of heritage designations overlooking or within area of potential development.
Recreational and community value: Area used extensively for leisure especially related to enjoying seascape character and views. Highly valued area and features/elements by people, communities of interest and place.	Area with limited use for leisure, or where leisure relates mainly to pursuing that activity and not the enjoyment of seascape character or views, or where leisure is dynamic/at speed. Area or features with attributed limited value by people.
Rarity: Rare or unique seascape/LCTs, features or elements.	Widespread or 'common' seascape/LCTs, features or elements.
Susceptibility to change	
Natural	
Hinterland: Mountainous or hilly hinterland i.e. long slopes rising from coast, high elevation.	Plateau or flat hinterland. Highly enclosed by topography or land cover.
Coastal edge: Intricate, complex, rugged forms and dramatic headlands/ends of peninsulas.	Flat, horizontal or gently undulating or largely straight coast. Simple forms. Man-made interventions/structures in area.
Tidal range: Where tidal range or streams add to the seascape qualities.	The tidal range or streams make a limited contribution to seascape qualities.

Higher sensitivity	Lower sensitivity
Cultural/social	
Use of the sea: Uses with limited infrastructure. Rural uses or semi-natural land. Small scale, traditional, historic settlements and harbours. Little association with other contemporary development.	Presence of energy production and large shipping vessels/trade routes nearby (not through area). Strong or direct association with other similar contemporary developments.
Use of the coast/hinterland: Uses with limited infrastructure. Rural uses or semi-natural land. Small scale, traditional, historic settlements and harbours. Little association with other contemporary development.	Presence of industry/energy production/dock infrastructure. Urban form. Strong or direct association with other similar contemporary developments.
Historic features on coast: Presence of coastal and island historic features such as forts, castles, chapels, monasteries, other buildings and structures and other heritage features which have a strong relationship with the coast and sea visually, physically or culturally.	Limited number or no heritage features.
Quality/condition	
Intactness: Intact and consistent character of seascape. Few or no detractors. Fragile seascape/landscape lacking ability to accommodate change.	Seascape character fragmented. Presence of detractors. Robust landscape capable of accommodating change.
State of repair: Well-maintained seascape or landscape character at coast.	Poorly maintained seascape or landscape character at coast.
Aesthetic and perceptual	
Scale: Small scale, enclosed, views to horizon limited by landform. Introduction of an element of scale into previously un-scaled area.	A seascape of large scale, with simple, broad and homogenous coastal landforms. Large scale views.
Openness and enclosure: Openness may increase susceptibility if there is wide visibility, however open seascape/landscape may also be larger scale and simple which would decrease susceptibility. Where openness is a key characteristic and introduction of built elements may compromise this.	Enclosed seascape/landscape can offer more screening potential, limiting visibility to a smaller area, however they may also be smaller scale and more complex which would increase susceptibility. Unframed open views unimpeded by natural elements or features.
Exposure: Sheltered and calm seascapes. Where seascape is extremely exposed such that the perceived wild, elemental nature is a key characteristic.	Open, exposed seascapes which does not provide a perception of elemental or wild seascape character.

Higher sensitivity	Lower sensitivity
Aspect: Development would interfere with notable views of sunrises and particularly sunsets. Development seen from higher level views, where viewer elevation results in geometric layout pattern perceived as closer than on the horizon line.	Development located away from sunrise and sunset positions. Development seen from lower-level views, where viewer elevation results in skyline development, on or over the horizon line.
Seascape pattern and foci: Complex or unified pattern which would be disrupted by development. Important focal points e.g., islands, islets, headlands, distinctive sweeping beaches, and high hills.	Presence of existing vertical or other elements at sea including shipping/ferries and offshore WTGs. Lack of intact pattern. Lack of natural or historic feature focal points.
Tranquillity: Where stillness is a key feature, or where/when movement is highly natural, irregular or dramatic. Very limited or no industrial/semi-industrial structures. Where the area is unlit at night and is classified as such in a dark skies study.	Busier areas where development movement relates to other forms of mechanical movement present e.g., commercial shipping, ferries, boats, vehicles, WTGs. Presence of industrial/semi-industrial structures especially at sea, or on coast. Coast is already well lit at night. Lights at sea and land.
Wildness: Undeveloped seascape Wild character Highly natural, semi-natural, unmanaged.	Highly developed seascape. Highly modified/managed.
Remoteness: Remote or isolated. Receptor perceived to be at distance from centres of population and human interventions.	Not remote. Receptor perceived to be close to centres of population and human interventions.
Visual characteristics	
Key views (land to sea, sea to land, sea to sea): Open or framed views from key viewpoints. Views to key features e.g., islands, other coasts, headlands. Views from well used sea area for leisure focussed on seascape/scenic quality. Distinctive undeveloped skylines with landmark features.	Few or no views from key viewpoints. Sea not used for leisure sailing. Developed, non-distinctive skylines without landmark features.
Intervisibility and associations of the development area with receptors: Strong intervisibility with coast in terms of length and/or area and/or relatively close to. Adjacent seascape/landscape character context connected by associated character and views.	Poor intervisibility with coast in terms of length and/or area and/or relatively far away. Host landscape character is separate from surrounding/adjacent seascape/landscape character with weak association.
Typical receptors – type and number: Coast path and users of paths and access land. Visitors to heritage features. Promenade and pier users. Leisure sailors.	Users of ferries. Shipping. People in urban areas at work. Users of roads (unless corniche). Users of railways.

Higher sensitivity	Lower sensitivity
How seascape is experienced: From remote or little used stretch of sea with little shipping or boat use. From secluded coastline, intimate coastal roads and footpaths. From important viewpoints and elevated positions where the focus is the view and not the activity.	From ferry/shipping. From main coastal, busy roads. Crowded beaches where focus is on beach activities (rather than enjoyment of seascape character).
Relationship between seascape area and adjacent coast	
Contribution to setting: Is perceived from a sensitive/designated coast or seascape character area, within its immediate setting, at close range and in the foreground seascape.	Is perceived from a less sensitive/non-designated coast or seascape character area and/or is located outside the immediate setting, at distance in the background seascape.
Sensitivity to change:	
High →	Medium → Low

5.4.5 Seascape/landscape magnitude of change

5.4.5.1 Overview

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

5.4.5.2 Size or scale of change

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

5.4.5.3 Seascape/landscape magnitude of change rating

67. The 'magnitude', or 'degree of change', resulting from the Project is described as 'High', 'Medium-high', 'Medium', 'Medium-low' 'Low' or 'Negligible'. In assessing magnitude of change, the assessment focuses on the size or scale of change and its geographical extent. The duration and reversibility are stated separately in relation to the assessed effects (i.e., as short/medium/long-term, and temporary/permanent). The basis for the assessment of magnitude for each receptor has been made clear, using evidence and professional judgement. The levels of magnitude of change that can occur are defined in **Table 5.2**.

Table 5.2 Seascape/landscape magnitude of change

Magnitude of change	Description/reason
High	The Project will result in a large-scale change and major loss of key landscape elements/characteristics or the addition of large scale or numerous new and uncharacteristic features or elements that will affect the seascape/landscape character and the special landscape qualities/integrity of a landscape designation. Directly affecting a host seascape/landscape receptor or indirectly affecting a nearby receptor.
Medium-high	Intermediate rating, with a combination of criteria from high or medium magnitude.
Medium	The Project will result in a medium scale change and moderate loss of some key landscape elements/characteristics or the addition of some new medium scale uncharacteristic features or elements that could partially affect the seascape/landscape character and the special landscape qualities/integrity of a landscape designation. Directly affecting a host seascape/landscape receptor or indirectly affecting a nearby receptor.
Medium-low	Intermediate rating with combination of criteria from medium or low magnitude.
Low	The Project will result in a small-scale change and minor loss of a few landscape elements/non key characteristics, or the addition of some new small-scale features or elements of limited characterising influence on seascape/landscape character/designations.
Negligible	The Project will result in a very small-scale change that may include the loss or addition of some landscape elements of limited characterising influence. The seascape/landscape characteristics and character will be unaffected.

5.4.6 Evaluating seascape/landscape effects and significance

68. 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 7.2**, 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 Project, and their conclusion, have been presented in a comprehensive, clear and transparent manner.

69. 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).

5.4.6.1 Geographical extent

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

71. The extent of the effects will vary, depending on the specific nature of the Project, and is principally assessed through analysis of the extent of perceived changes to the seascape/landscape character, through visibility of the Project.

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

- **Seascape/landscape character:** The extent of the effects on seascape/landscape character will vary, depending on the specific nature of the Project. 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 Project, 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.

5.4.6.2 Duration and reversibility

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

- **Long-term** – more than 10 years (may be defined as permanent or reversible)
- **Medium-term** – Six to 10 years
- **Short-term** – One to five years

5.4.6.3 Significant seascape/landscape effects

74. A significant effect will occur where the combination of the variables results in the Project 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.

5.4.6.4 Non-significant landscape effects

75. A non-significant effect will occur where the effect of the Project 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.

6 Assessing visual effects

6.1 Overview

76. Visual effects are concerned wholly with the effect of the Project on views, and the general visual amenity, and are defined by the LI in GLVIA3, paragraphs 6.1 as follows:

77. *"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."*

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

- **Visual effect:** a change to an existing static view, sequential views, or wider visual amenity, as a result of development, or the loss of particular landscape elements, or features, already present in the view
- **Cumulative visual effects:** the cumulative, or incremental, visibility of similar types of development may combine to have a cumulative visual effect.

79. 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 maintenance, and decommissioning of the Project.

6.2 ZTV

80. Plans mapping the ZTV are used to analyse the extent of theoretical visibility of the Project, across the study area, and to assist with viewpoint selection. The ZTV does not, however, take account of the screening effects of buildings, or 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.

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

6.3 Viewpoint analysis

82. 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.

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

84. The SLVIA therefore includes the viewpoint analysis that has been prepared for each viewpoint and which is presented as supporting assessment in the SLVIA. A summary table of the findings is also provided, in order of distance from the Project. This summary table assists in defining the direction, elevation, geographical spread and nature of the potential visual effects and identifies 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.

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

6.4 Evaluating visual sensitivity to change

6.4.1 Overview

86. In accordance with paragraphs 6.31-6.37 of GLVIA3 (LI and IEMA, 2013), the sensitivity of visual receptors has been determined by a combination of the value of the view and the susceptibility of the visual receptors to the change that is likely to result from the Project, on the view and visual amenity.

6.4.2 Value of the view

87. The value of a view, or series of views, reflects the recognition and the importance attached to that view, either formally, through identification on mapping, or being subject to planning designations, or informally, through the value upon 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, such as parking, seating and interpretation boards, to add to the enjoyment of the viewpoint. 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 frequented by very few people.

6.4.3 Susceptibility to change

88. Susceptibility relates to the nature of the viewer experiencing the view and how susceptible they are to the specific changes arising from the Project. A judgement to determine the level of susceptibility, therefore relates to the specific change being proposed, 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 at 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 Project 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 Project, the experience of the visual receptor will be altered more notably than if the experience related 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 Project.

6.4.4 Visual sensitivity rating

89. 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 6.1**.

Table 6.1 Visual sensitivity to change

Higher sensitivity	Lower sensitivity
Value	
Specific viewpoint identified in OS maps and/or tourist information and signage.	Viewpoint not identified in OS maps or tourist information and signage.
Facilities provided at viewpoint to aid the enjoyment of the view.	No facilities provided at viewpoint to aid enjoyment of the view.
View afforded protection in planning policy.	View is not afforded protection in planning policy.
View is within or overlooks a designated landscape, which implies a higher value to the visible landscape.	View is not within, nor does it overlook, a designated landscape.
View has informal recognition and well-known at a local level, as having particular scenic qualities.	View has no informal recognition and is not known as having particular scenic qualities.
View or viewpoint is recognised through references in art or literature.	View or viewpoint is not recognised in references in art or literature.
Susceptibility to change	
Viewer who is likely or liable to be influenced by the Project.	Viewer who is unlikely or not liable to be influenced by the Project.
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 Project 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 Project.
Viewers where the experience is of a high level of visual amenity at the location due to its overall pleasantness as an attractive visual setting or backdrop to activities.	The visual amenity experienced at the location by viewers is less pleasant or attractive than might otherwise be the case.
Sensitivity to change	
High →	Medium → Low

6.4.5 Visual magnitude of change

6.4.5.1 Overview

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

6.4.5.2 Size or scale of change

91. 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 Project, based on the following criteria:

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

6.4.5.3 Visual magnitude of change rating

92. The ‘magnitude’ or ‘degree of change’ resulting from the Project is described as ‘High’, ‘Medium-high’, ‘Medium’, ‘Medium-low’ ‘Low’ and ‘Negligible’, as defined in **Section 5.4.5**. In assessing the magnitude of change, the assessment has focused on the size, or scale, of change and its geographical extent. The duration and reversibility are stated separately in relation to the assessed effects (i.e., as short/medium/long-term and temporary/permanent). The basis for the assessment of magnitude for each receptor has been made clear, using evidence and professional judgement. Examples of criteria that tend towards higher or lower magnitude of change that can occur on views and visual receptors are set out in **Table 6.2.**

Table 6.2 Visual magnitude of change ratings

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

Magnitude of change	Definition	Description/reason
	elements that are characteristic in the existing view. The addition of the Project will result in a low change, loss or addition to the baseline view.	▪ FoV: Affecting a small vertical angle and narrow horizontal FoV ▪ Nature of Visibility: Simple, single development, intermittently and infrequently visible ▪ Contrast: Some parity/'fits' with surroundings and may benefit from screening ▪ Skyline: Partly visible on a developed skyline or not visible on the skyline ▪ Consistency of Image: Similar to other developments with visual rationale, appearing reasonably well accommodated within its surroundings
Negligible	The Project will result in a negligible alteration to the existing view. If visible it may form a barely discernible influence and/or introduce elements that are substantially characteristic in the baseline view. The addition of the Project will result in negligible incremental change, loss or addition to the baseline view.	▪ Size and Scale: A negligible, barely discernible and/or inconspicuous change. ▪ Number: Involving the loss/addition of a small number of features/elements ▪ Distance: Typically appearing in the far distance ▪ FoV: Affecting a very small vertical and narrowest horizontal FoV ▪ Nature of Visibility: Simple, single development, intermittently and infrequently visible ▪ 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

6.4.6 Evaluating visual effects and significance

6.4.6.1 Overview

93. 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 7.2**, 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 Project and their conclusion, have been presented in a comprehensive, clear and transparent manner.

94. 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).

6.4.6.2 Geographical extent

95. The geographic extent over which the visual impacts will be experienced has also been assessed. This is distinct from the size or scale of effect and is described in terms of the physical area, or location, over which it will be experienced (described as a linear or area measurement). The extent of the effects will vary, according to the specific nature of the Project, 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.

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

97. 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.

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

6.4.6.3 Duration and reversibility

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

100. 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** – six to 10 years
- **Short-term** – one to five years

6.4.6.4 Significant visual effects

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

6.4.6.5 Non-significant visual effects

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

6.4.6.6 Weather conditions

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

6.5 Assessing night-time effects of lighting

6.5.1 Introduction

104. The assessment of night-time visual effects is based on the description of proposed WTG lighting, set out in the Project Design Envelope (PDE) in **Chapter 18 SLVIA** and the relevant International Civil Aviation Organisation (ICAO)/Civil Aviation Authority (CAA) regulations and standards, including Air Navigation Order 2016: Civil Aviation (CAA, 2016).

105. 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 LSE of a 'worst-case' scenario for WTG lighting are assessed and illustrated in this visual assessment.

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

107. 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 Ministry of Defence (MOD). The focus of the night-time visual assessment in this assessment is on the visible lighting requirements of the Project.

108. The study area for the visual assessment of WTG lighting is shown in Figure 18.16, **Chapter 18 SLVIA** and is coincident with the 60km SLVIA study area, however, it is particularly focused on the closest areas of the coastline.

109. The assessment of the lighting of the Project 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).

110. ICAO indicates a requirement for no lighting to be switched on until 'Night' has been reached, as measured at 50 cd/m^2 or darker. It does not require 2,000cd 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 a 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.

111. The assessment of the lighting of the Project is primarily intended to determine the LSE on the visual resource, i.e. it is an assessment of the visual effects of aviation lighting on views experienced by people at night. The matter of visible aviation and marine navigation lighting assessment is primarily a visual matter and the assessment presented focusses on that premise.

112. The Scottish Government has established an Aviation Lighting Working Group of key stakeholders (including NatureScot) to help ensure consistent assessment of night-time effects from visible WTG lighting. The group's

[2] Candela is the unit of luminous intensity in the International System of Units (SI).

objective is to produce guidance to streamline the process for night-time lighting assessments. Whilst this guidance has yet to be published, there is some consensus that the perception of landform/skylines at night is a relevant consideration (with perception being a component of visual effects), however, there is also widespread agreement that it is not possible to undertake landscape/coastal character assessment after the end of civil twilight, when it is technically 'dark', and WTG aviation lighting is switched on. With respect to landscape character, NatureScot (2023), advise that assessments focus on 'effects on perceived landscape sensitivities, in particular where qualities of wildness, remoteness and lack of man-made elements are features of the landscape'.

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

6.5.2 Significance criteria for night-time effects

114. 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.

115. 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 Project.

116. 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.

117. 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 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.

118. 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 6.3**.

Table 6.3 Magnitude of change criteria for night-time visual effects

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

119. 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 7.2**, which gives an understanding of the threshold at which significant effects may arise.

120. A significant effect occurs where the aviation and marine navigation lighting would provide a defining influence on a view or visual receptor. A non-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.

121. 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 (Institute of Lighting Professionals, 2011) in a prominent, incongruous, or intrusive way.

7 Assessing cumulative seascape, landscape, and visual effects

7.1 Methodology

7.1.1 Approach to additional or combined cumulative effects

122. The CEA takes into account the impact associated with the Project, together with other relevant plans, projects and activities. Cumulative effects are, therefore, the additional, or combined, effect of the Project, in combination with the effects from a number of different projects, on the same receptor or resource. Further detail on CEA methodology is set out in **Chapter 6 EIA Methodology**.

123. GLVIA3 (LI 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.'*

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

- *"Cumulative effects as the additional changes caused by a Project in conjunction with other similar developments or as the combined effect of a set of developments taken together (NatureScot, 2021: p4)*
- *Cumulative landscape effects are those effects that can impact on either the physical fabric or character of the landscape, or any special values attached to it' (NatureScot, 2021: p10)*
- *Cumulative visual effects are those effects that can be caused by combined visibility, which occurs where the observer is able to see two or more developments from one viewpoint and/or sequential effects which occur when the observer has to move to another viewpoint to see different developments" (NatureScot, 2021: p11).*

125. In line with NatureScot guidance and GLVIA3, cumulative effects are assessed in this SLVIA as the additional changes caused by the Project in conjunction with other similar developments (not the totality of the cumulative effect). The CEA assesses the cumulative effect of the Project with other projects (**Table 7.1**) against the baseline (**Chapter 18 SLVIA**, Section 18.5), with the assessment of significance apportioning the amount of the effect that is attributable to the Project.

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

7.1.2 Tiered approach to CEA

127. In accordance with NatureScot guidance and GLVIA3 (paragraph 7.13), existing projects and those which are under construction are included in the SLVIA baseline and described as part of the existing environment (**Chapter 18 SLVIA**, Section 18.5), including the extent to which these have altered character and views, and affected sensitivity to windfarm development. An assessment of the additional effect of the Project is undertaken, in conjunction with a baseline that includes operational and under-construction projects, as part of the main assessment in **Chapter 18 SLVIA**, Section 18.6. This includes assessment of the Project against magnitude factors, such as its size, scale, spread and landscape context, as well as cumulative effect factors, relating to

the operational and under-construction wind farms, such as its increase in spread, aesthetic relationship, and contrasts of size and spacing of turbines of the projects.

128. A further assessment of the additional cumulative seascape, landscape and visual effects of the Project with other potential future projects is undertaken in **Chapter 18 SLVIA**, Section 18.7.

129. In undertaking this CEA for the Project, it is important to bear in mind that other projects and plans under consideration will have differing potential for proceeding to an operational stage and, hence, a differing potential to ultimately contribute to a cumulative impact alongside the Project. Therefore, a tiered approach has be adopted. This provides a framework for placing relative weight upon the potential for each project/plan to be included in the CEA to ultimately be realised, based upon the project/plan's current stage of maturity and certainty in the projects' parameters. The tiered approach, which will be utilised within the CEA of the Project, employs the following tiers as set out in **Table 7.1**.

Table 7.1 Tiered approach to CEA

Tier	Description
Tier 1	▪ Permitted (consented) application(s), whether under the Planning Act 2008 or other regimes, but not yet implemented ▪ Submitted application(s) whether under the Planning Act 2008 or other regimes, but not yet determined
Tier 2	▪ Projects on the PINS's Programme of Projects, where a scoping report has been submitted
Tier 3	▪ Projects on the PINS's Programme of Projects, where a scoping report has not been submitted ▪ Identified in the relevant Development Plan (and emerging Development Plans – with appropriate weight being given as they move closer to adoption), recognising that there will be limited information available on the relevant proposals ▪ Identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, where such development is reasonably likely to come forward

7.1.3 Projects for inclusion in the CEA for seascape, landscape and visual

130. The projects and plans selected as relevant to the CEA presented within the SLVIA are based upon the results of a screening exercise (see Section 18.7 of **Chapter 18 SLVIA**). Each project or plan has been considered on a case-by-case basis for screening in or out of this chapter's assessment, based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved. A comprehensive 'long list' of projects was reviewed, and projects

within the cumulative search area base plan compiled within the 60 km SLVIA study area (Figure 18.18, **Chapter 18 SLVIA**), with potential for cumulative impact interactions. The specific projects scoped into the CEA for seascape, landscape and visual receptors, are set out in **Chapter 18 SLVIA** (Section 18.7).

131. The range of potential cumulative effects that are identified and included in the CEA, is a subset of those considered for the Project-alone assessment. This is because some of the potential impacts identified and assessed for the Project-alone, are localised and temporary in nature and will, therefore, have limited or no potential to interact with similar changes associated with other plans or projects. The receptors have, therefore, been scoped out of the cumulative effects assessment as set out in **Chapter 18 SLVIA** (Section 18.7).

132. Similarly, some of the potential impacts considered within the Project-alone assessment are specific to a particular phase of development (e.g., construction, operation and maintenance or decommissioning). Where the potential for cumulative effects with other plans or projects only have potential to occur during certain phases of development, impacts associated with a certain phase may be omitted when there is no potential for cumulative effects.

7.1.4 Types of cumulative effect

7.1.4.1 Cumulative visual effects

133. 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 Project 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.

7.1.4.2 Cumulative seascape/landscape effects

134. 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 Project will be assessed as follows:

- If the Project 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 Project is unlikely to be significant.
- If the addition of the Project results in OWFs 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.
- If the addition of the Project results in OWFs forming the prevailing characteristic of the seascape/landscape, seeming to define the seascape/landscape as a 'windfarm seascape/LCT' then the cumulative seascape/landscape effect of the Project is likely to be significant.

7.1.5 Assessing cumulative seascape, landscape and visual effects

7.1.5.1 Cumulative sensitivity of landscape and visual receptors

135. In evaluating cumulative sensitivity in the cumulative SLVIA (Section 18.7 of **Chapter 18 SLVIA**), the sensitivity to change of seascape, landscape and visual receptors is retained from the assessment of potential effects in Section 18.6 of **Chapter 18 SLVIA**.

7.1.5.2 Cumulative magnitude of change

136. 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 Project cumulatively. The cumulative magnitude of change is assessed according to a number of criteria, described below.

- **The location, position and visual relationship of the Project**: Depending on the viewpoint/viewing angle from the coast, the Project may be viewed adjacent to other developments on the skyline, covering a wider lateral spread; they may form one grouping or could be viewed

separately on the skyline (separated by space on the skyline); or could be viewed with one project being 'behind' the other project. The overall magnitude of change will vary, depending on this visual relationship at different viewpoints and is likely to be higher when two projects are viewed adjacent to each other over a wider lateral spread; and lower when one project is viewed behind the other project.

- **The location of the Project in relation to other developments**: If the Project is seen in a part of the view, or setting, to a landscape receptor that is not affected by any 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 Project 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.
- **The extent of the developed skyline**: The proportion (or horizontal angle) of the view that is affected by the combined lateral spread of the Project and other projects on the horizon. If the lateral spread/horizontal angle of the Project will add notably to the developed horizon in a view, the cumulative magnitude of change will tend to be higher.
- **The number and scale of developments seen simultaneously or sequentially**: Generally, the greater the number of clearly separate developments that are visible, the higher the cumulative magnitude of change will be. The addition of the Project to a view or seascape/landscape where a number of smaller developments are apparent, will usually have a higher cumulative magnitude of change than one or two large developments, as this can lead to the impression of a less co-ordinated or strategic approach.
- **The scale comparison between developments**: If the Project is perceived to be of a similar scale to other visible developments, particularly those seen in closest proximity to it, the cumulative magnitude of change will generally be lower, as it will have more integration with the other sites and will be less apparent as an addition to the cumulative situation.
- **The consistency of image of the Project in relation to other developments:** The cumulative magnitude of change of the Projects is likely to be lower if its turbine height, arrangement, layout design and visual appearance/aesthetics are broadly similar to other developments in the seascape, as they are more likely to appear as relatively simple and logical components of the seascape.

- **The context in which the developments are seen**: If projects are seen in a similar seascape/landscape context, the cumulative magnitude of change is likely to be lower, due to visual integration and cohesion between the sites. If projects are seen in a variety of different settings, this can lead to a perception that development is unplanned and uncoordinated, affecting a wide range of landscape character and blurring the distinction between them.
- **The magnitude of change of the Project as assessed in the Project-alone assessment:** Where the Project 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.

137. Definitions of cumulative magnitude of change are applied to the assessment as follows:

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

138. 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.

7.1.5.3 Significance of cumulative effects

139. The objective of the cumulative assessment is to determine whether any effects that the construction and operation and maintenance of the offshore infrastructure will have on seascape, landscape and visual receptors, when seen, or perceived, cumulatively with the construction and operation and maintenance of the other projects, will be significant or not significant. Significant cumulative seascape, landscape and visual effects arise where the addition of the Project, leads to OWFs 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
- 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 OWF, 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 OWFs, or energy generation/transmission development, may already exist as part of the baseline seascape context.

140. Less extensive, but nevertheless significant, cumulative seascape, landscape and visual effects may also arise as a result of the addition of the Project, where it results in a seascape, landscape or view becoming defined by the presence of more than one OWF, 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 development.

141. 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 is compatible, and that the overall capacity of the seascape is not exceeded.

142. 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 Project extends across seascape/LCAs, or clear visual/topographic thresholds, in a view.

143. 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 OWF defined seascape/landscapes.

7.2 Evaluation of significance

144. The matrix presented in **Table 7.2** is used as a guide to illustrate the SLVIA process. In line with the emphasis placed in GLVIA3, upon the application of professional judgement, an overly mechanistic reliance upon a matrix is avoided, through the provision of clear and accessible narrative explanations of the rationale underlying the assessment made for each landscape and visual receptor. Such narrative assessments provide a level of detail over and above the outline assessment provided by use of the matrix alone.

145. The landscape and visual assessment, unavoidably, involves a combination of quantitative and qualitative assessment and, wherever possible, cross references have been made to objective evidence, baseline figures and/or to photomontage visualisations, to support the assessment conclusions. Often a consensus of professional opinion has been sought through consultation, internal peer review, and the adoption of a systematic, impartial, and professional approach. Importantly, each effect results from its own unique set of circumstances and have been assessed on a case by case basis. The matrix, as presented in **Table 7.2**, should, therefore, be considered as a guide; where deviations from this guide have been made, this is clearly explained in the assessment.

146. Significant landscape and visual effects are shaded red in **Table 7.2**. They relate to all those effects that result in a 'Major' or a 'Major/Moderate' level of effect. Moderate levels of effect have potential, subject to the assessor's professional judgement, to be considered as significant, or not significant, depending on the sensitivity and magnitude of change factors evaluated. Some moderate levels of effect may be considered significant, while others can be justified as not significant. There is a threshold here, that hinges around professional judgement, which is applied to the relevant assessments, and is explained with further justification in the narrative assessment of relevant receptors, where moderate effects occur. White, or un-shaded, boxes in **Table 7.2** indicate a non-significant effect.

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

148. Following initial assessment, if the effect does not require additional mitigation (or none is possible), the residual effect would remain the same. If, however, additional mitigation is proposed, an assessment of the post-mitigation residual effect is provided.

Table 7.2 Evaluation of seascape, landscape, and visual effects

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

7.3 Nature of effects

7.3.1 Overview

149. The nature of effects refers to whether the landscape, and/or visual effect, of the Project is positive or negative (herein referred to as 'beneficial' and 'adverse').

150. 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'.

151. Cumulative effects have been described in **Section 7**, and 'short-term, medium-term and long-term, permanent and temporary' effects are described in **Section 5.4.6.2** (seascape/landscape effects) and **Section 6.4.6.3** (visual effects)'. Transboundary effects concern the potential effects of the Project on seascape, landscape and visual receptors in countries outside UK territorial waters.

152. The definition of the remaining terms used in this assessment is presented in the following sections.

7.3.2 Direct and indirect effects

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

154. Indirect landscape effects relate to those landscapes and receptors which are separated by distance, or are remote, from the development and, therefore, are only affected in terms of perceptual effects. The LI 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.

155. Visual effects are considered as direct effects, as the view itself may be directly altered by the Project.

7.3.3 Positive and negative effects

156. 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.

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

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

- **Beneficial effects** - contribute to the seascape, landscape and visual resource through the enhancement of desirable characteristics or the introduction of new, beneficial attributes. The development contributes to the landscape by virtue of good design or the introduction of new landscape planting. The removal of undesirable existing elements or characteristics can also be beneficial, as can their replacement with more appropriate components.
- **Neutral effects** - occur where the development fits with the existing seascape/landscape character or visual amenity. The development

neither contributes to, nor detracts from, the landscape and visual resource and can be accommodated with neither beneficial or adverse effects, nor where the effects are so limited that the change is hardly noticeable. A change to the seascape, landscape and visual resource is not considered to be adverse simply because it constitutes an alteration to the existing situation.

- **Adverse effects -** are those that detract from the seascape/landscape character or quality of visual attributes experienced, through the introduction of elements that contrast, in a detrimental way, with the existing characteristics of the seascape, landscape and visual resource, or through the removal of elements that are key in its characterisation.

7.3.4 Frequency and likelihood of visual effects – weather conditions

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

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

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

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

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

164. Visibility data from sea-faring vessels has also been obtained from the Met Office, to supplement the Met Office visibility data from Walney Island. This is used to further inform the assessments of potential likelihood of the Project being visible from the coast.

7.4 Visual representations

7.4.1 Overview

165. 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), GLVIA3 and the LI Technical Guidance Note (TGN) on Visual Representation of Development Proposals (2019).

7.4.2 ZTV

166. The ZTVs in Figures 18.5 to Figure 18.14, in **Chapter 18 SLVIA**, have been calculated using computer software to generate a ZTV of the Project, to demonstrate the theoretical extent of visibility from any point in the study area.

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

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

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

170. The resulting ZTV plots have been overlaid on OS mapping, at an appropriate scale, and are presented as figures, using desktop publishing or graphic design software.

171. Cumulative ZTV plots, based on the intervisibility of the Project and other relevant developments within the study area, have also been produced.

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

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

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

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

176. There is a wide range of variation within the visibility shown on the ZTV, for example, an area shown on the blade tip ZTV as having visibility of 17-20 WTGs may gain views of the smallest extremity of blade tips, or of 20 full WTGs. This can make a considerable difference in the effects of the Project

on that area. The hub height ZTV has been used in conjunction with the blade tip ZTV, to provide an indication of the degree to which the WTGs are visible.

177. These limitations mean that, whilst the ZTV is used as a starting point in the assessment, providing an indication of where the Project will be theoretically visible, they tend to present a worst-case, or over-estimate, of the actual visibility. Therefore, the information drawn from the ZTV is checked by field survey observation.

178. The SLVIA also includes a Horizontal Angle ZTV, to show the horizontal FoV (in degrees) that may be affected by views of the WTGs.

7.4.3 Methodology for baseline photography

7.4.3.1 Overview

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

180. The following photographic information is recorded and provided:

- Date, time, weather conditions and visual range
- Global Positioning System (GPS) recorded 12 figure grid reference accurate to ~1-3m
- GPS recorded Above Ordnance Datum (AOD) height data
- Use of a fixed 50mm focal length lens is confirmed
- Horizontal FoV (in degrees)
- Bearing to Target Site

181. The photographs used to produce the photomontages were taken using Canon Electro-Optical System (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.

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

183. 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.

7.4.3.2 Weather conditions

184. GLVIA3 paragraph 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'.*

185. 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 Project may be most visible.

7.4.4 Methodology for production of visualisations

186. Photomontages have been produced in accordance with NatureScot Visual Representation of Windfarms Guidance (NatrueScot, 2017) and LI (2019) TGN 06/19 Visual Representation of Development Proposals.

187. A photomontage is a visualisation which superimposes an image of a Project 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.

188. 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.

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

190. The baseline photographs, and cumulative wireline visualisations shown for each viewpoint, cover a 90-degree FoV (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.

191. The photographs are also joined to create planar projection panoramas, using PTGui software. These are used in the creation of the 53.5-degree FoV photomontages.

192. Wireline representations that illustrate the Project, and set within a computer-generated image of the landform, are used in the assessment to predict the

theoretical appearance of the WTGs. These are produced with Resoft WindFarm software and are based on a terrain model with a 50m data grid (OS Panorama), with a more detailed area of terrain modelling (OS terrain 5) used for the coastal parts of the study area, which includes the majority of viewpoints used in the SLVIA. There are limitations in the accuracy of 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.

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

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

195. 'Panoramic photomontages' are produced in the SLVIA with a 53.5° Horizontal Field of View (HFoV), based on relevant guidance (NatureScot, 2017), due to their suitability to encompass the horizontal spread of the Project 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 Project.

196. The 53.5-degree FoV 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. Images viewed on a monitor screen should be viewed so that the image height of the 53.5-degree photomontage measures 26cm on the screen (as per the printed image height).

197. 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.

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

199. Rendering of the WTGs in the photomontages is as photorealistic as possible to the conditions shown in each viewpoint photograph. In order to address the

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

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

7.4.4.1 Night-time visualisations

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

202. The visual effect of the Project at night has been assessed in **Chapter 18 SLVIA**, informed by the night-time photomontage visualisations produced from three representative viewpoints:

- Viewpoint 8 - Fleetwood, Rossal Point (Figure 18.31h-m, **Chapter 18 SLVIA**)
- Viewpoint 9 - Blackpool (Figure 18.32h-m, **Chapter 18 SLVIA**)
- Viewpoint 10 - Lytham St Annes (Figure 18.33h-m, **Chapter 18 SLVIA**)

203. A worst-case approach is applied in the photomontages and assessment in **Chapter 18 SLVIA**, that considers the potential effects of medium intensity 2000cd lights in clear visibility, to support the assessment of the potential worst-case effect. The intensity of the other operational WTG aviation lights in the baseline photography is also used, as a guide to the likely intensity of the proposed aviation lighting shown in the photomontages.

204. Night-time visualisations have been produced using a combination of Resoft's WindFarm software's aviation module software, for positioning of the lights, 3D modelling software, which can simulate lighting conditions, referencing

existing lighting imagery/atmospheric conditions from the baseline photographs and professional judgement, using photoshop.

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

7.4.4.2 Information on limitations of visualisations

206. 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.

207. The photomontage visualisations of the Project (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 Project 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 Project 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, the viewer must 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 a screen. Images on a screen should be viewed using a normal PC screen,

with the image enlarged to the full screen height, to give a realistic impression

- 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

7.4.4.3 Technical methodology - visualisations

208. In accordance with the requirements of LI (2019) TGN 06/19, **Table 7.3** below sets out the technical information for the preparation of the photomontage visualisation figures.

Table 7.3 Technical methodology - visualisations

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

Category	Details
Markers for vertical alignment	Existing OWF WTGs and their known coordinates.
Rendering software	Resoft Windfarm v.5.2.5.3 (WTGs in wirelines and photomontages). Sketchup or AutoCAD Map 3D 2018 (OSPs, Met Mast and jacket foundations). Autodesk 3ds Max 2018. Visual Nature Studio V 3.10.
Limitations	
Terrain data	There may be local, small-scale landforms that are not reflected in the data, and subsequently the visualisation, but may alter the real visibility of the Project, either by screening theoretical visibility, or revealing parts of the Project that are not theoretically visible.
Movement	Static images are unable to capture the movement within the view or of the WTGs

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