BERWICK BANK WIND FARM

OFFSHORE ENVIRONMENTAL IMPACT ASSESSMENT

APPENDIX 15.1: TECHNICAL REPORT – SEASCAPE, LANDSCAPE AND VISUAL IMPACT ASSESSMENT METHODOLOGY

EOR0766
Environmental Impact Assessment – Appendix 15.1
FINAL

Document Status

Version	Purpose of Document	Authored by	Reviewed by	Approved by	Review Date
FINAL	Final	Optimised Environments	Simon Martin	Lynda Thomson	October 2022

Approval for Issue

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1. SLVIA METHODOLOGY

1.1. INTRODUCTION

1. This appendix of the Offshore Environmental Impact Assessment Report (EIA Report) presents the methodology used within the seascape, landscape and visual impact assessment (SLVIA) of the potential impacts of the Berwick Bank Wind Farm offshore infrastructure (hereafter referred to as "the Proposed Development") on seascape, landscape and visual receptors.

2. Specifically, this SLVIA chapter considers the potential impact of the Proposed Development seaward of Mean High Water Springs (MHWS) during the construction, operational and maintenance, and decommissioning phases. This chapter also considers the impact of offshore infrastructure on onshore receptors (landward of MHWS) within the SLVIA study area (Figure 15.2) during the construction, operational and maintenance, and decommissioning phases.

3. The Proposed Development Array Area is located 37.8 km east of the Scottish Borders coastline (St Abb's Head) at its closest point and located within the former Firth of Forth Zone (Figure 15.1). The Proposed Development Array Area comprises an area of approximately 1,010 km^2 overlapping the large-scale morphological banks 'Marr Bank' and 'Berwick Bank'. The maximum design scenario for the SLVIA comprises 179 offshore WTGs at a maximum blade tip height of 355 m and a maximum rotor diameter of 310 m.

4. This SLVIA methodology appendix is structured as follows:

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

1.2. OVERVIEW OF SLVIA METHODOLOGY

1.2.1. INTRODUCTION

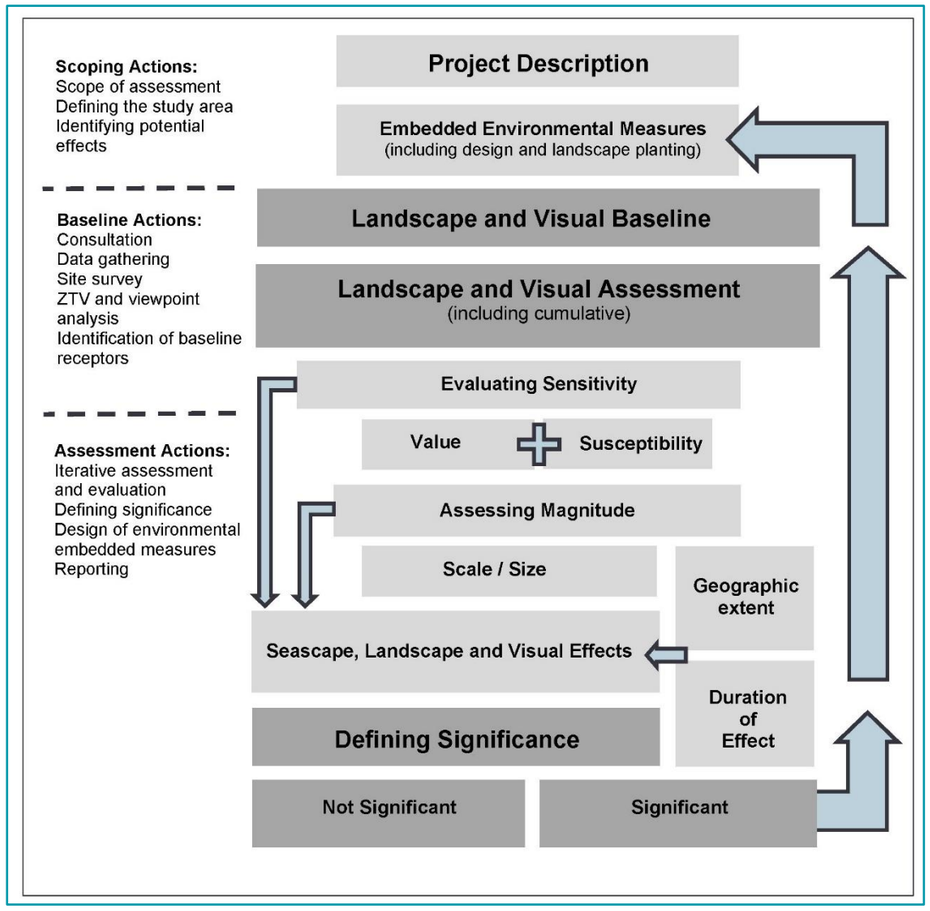
5. The assessment has been undertaken in accordance with the Landscape Institute and IEMA (2013) Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3), and other best practice guidance. An overview or summary of the SLVIA process is provided here and illustrated, diagrammatically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

6. The SLVIA assesses the likely effects that the construction and operation of the Proposed Development on the seascape, landscape and visual resource, encompassing effects on seascape/landscape character, designated landscapes, visual effects and cumulative effects.

7. The SLVIA is based on the Rochdale Envelope described in as described in Chapter 3: Project Description. In compliance with EIA regulations, the likely significant effects of a realistic 'worst case' scenario are assessed and illustrated in the SLVIA. This worst-case scenario is described in Chapter 15: Seascape, landscape and visual.

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

Table 1.1: Overview of Approach to the SLVIA



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

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

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

1.2.2. DEFINING THE STUDY AREA

12. The Proposed Development Array Area is located offshore in the Outer Forth and Firth of Tay area of the North Sea, approximately 37.8 km from the closest section of coastline at St. Abbs Head in the Scottish Borders, 44.8 km from the East Lothian coastline (Torness Point), 40.3km from the Angus coastline (Prail Castle) and 40.9 km from the Fife coastline (Fife Ness).

13. The SLVIA study area for the Proposed Development is proposed as covering a radius of 60 km from the Proposed Development Array Area, as illustrated in Figure 15.2.

14. Broadly, the SLVIA study area is defined by a large area of the seascape including parts of the Forth and Tay Estuaries and includes the coastal areas of Aberdeenshire, Angus, Fife, East Lothian, Scottish Borders and Northumberland.

15. The SLVIA will generally focus on locations from where it may be possible to see the Proposed Development, as defined by the blade tip Zone of Theoretical Visibility (ZTV), which is presented in Figure 15.5 (A3 scale).

16. Consideration of the blade tip ZTV indicates that theoretical visibility of the Proposed Development mainly occurs within 60 km and that beyond this distance, the geographic extent of visibility will become very restricted. At distances over 60 km, the lateral (or horizontal) spread of the Proposed Development will also occupy a small portion of available views and the apparent height (or 'vertical angle') of the wind turbines would also appear very small, therefore significant visual effects are unlikely to arise at greater than this distance, even if the wind turbines are theoretically visible.

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

18. The SLVIA study area is defined as the outer limit of the area where significant effects could occur, using professional judgement. Institute of Environmental Management and Assessment Guidance (IEMA, 2015 and 2017) recommends a proportionate EIA focused on the significant effects. An overly large SLVIA study area may be considered disproportionate if it makes the understanding of the key impacts of the Proposed Development more difficult.

19. This is supported by Landscape and Visual Impact Assessment (LVIA) Guidance produced by the Landscape Institute (GLVIA3) (Landscape Institute, 2013) (para 3.16). This guidance recommends that:

    'The level of detail provided should be that which is reasonably required to assess the likely significant effects'. Para 5.2 and p70 also states that 'The study area should include the site itself and the full extent of the wider landscape around it which the Proposed Development may influence in a significant manner'.

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

21. Other projects in the SLVIA study area, such as Inch Cape and Seagreen 1, defined a 50 km radius study area for the purposes of their SLVIA. A precautionary approach is taken in defining a 60 km radius study area for the Proposed Development due to the larger proposed maximum blade tip height of 355 m above LAT. Potential cumulative effect interactions with these other offshore wind farms (OWFs) have also influenced the definition of the SLVIA study area. Other offshore windfarms within the SLVIA study area are shown in Figure 15.16.

22. The variation of weather conditions influencing visibility off the coast has also informed the SLVIA study area. Based on understanding of Met Office data, visibility beyond 60 km is likely to be very infrequent.

23. In considering the SLVIA study area, the sensitivity of the receiving seascape, landscape and visual receptors has also been reviewed, taking particular account of the landscape designations shown in Figure 15.4 and other visual receptors. These include the nationally designated Northumberland Coast Area of Outstanding Natural Beauty (AONB), which is located approximately 47.9 km from the Proposed Development Array Area.

24. Seascape, landscape and visual effects as a result of the Proposed Development are proposed to be scoped out beyond 60 km. The study area will be reviewed and amended in response to such matters as refinement of the Proposed Development, the identification of additional impact pathways and in response, where appropriate, to feedback from consultation.

1.2.3. WIND ENERGY BASELINE

25. In accordance with NatureScot guidance and GLVIA3 (para 7.13), existing projects and those which are under construction (Chapter 15, Table 15.42) are included in the SLVIA baseline and described as part of the baseline conditions, 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 Proposed Development is undertaken in conjunction with a baseline that includes operational and under-construction projects as part of the main assessment in Chapter 15, Section 15.11.

26. Neart na Gaoithe offshore wind farm is under construction offshore as of August 2020 and is expected to be operational in 2023. SeaGreen 1 offshore wind farm (SeaGreen 1) is under construction offshore as of December 2020 and is also expected to be operational in 2023. As they are both currently under-construction and expected to be operational before the Proposed Development starts construction offshore, in accordance with GLVIA3, both Neart na Gaoithe and SeaGreen 1 are assumed to be part of the baseline i.e., they are assumed to be operational for the purposes of the SLVIA.

27. The baseline photographs shown in Figures 15.21 – 15.48 (Appendix 15.2) were taken prior to the completion of construction of Neart na Gaoithe and SeaGreen 1, therefore the Neart na Gaoithe and SeaGreen 1 wind turbines and their aviation lights have been added (i.e. photomontaged) into the baseline photographs to visually represent their appearance as part of the baseline. The theoretical extent of visibility of Neart na Gaoithe and SeaGreen 1 in the baseline is shown in the ZTVs in Figure 15.17 and Figure 15.18.

1.3. ITERATIVE ASSESSMENT AND DESIGN

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

1.3.1. POTENTIAL EFFECTS DURING CONSTRUCTION AND DECOMMISSIONING

29. Potential effects on the seascape, landscape and visual resource may occur during the construction and decommissioning phases of the Proposed Development, including:

- Seascape effects:
  - Effects on perceived seascape character, arising as a result of the construction and decommissioning activities (including laying new offshore export cables to shore) and structures located within the array area, which may alter the seascape character of the array area itself and the perceived character of the wider seascape through visibility of these changes.
- Landscape effects:
  - Effects on perceived landscape character, arising as a result of the construction and decommissioning activities and structures, including laying new offshore export cables to shore, which will be visible from the coast and may therefore affect the perceived character of the landscape.
  - Effects on the special landscape qualities and integrity of designated landscapes as a result of the above construction and decommissioning activities.
- Visual effects:
  - Effects on views and visual amenity experienced by people from principal visual receptors and representative viewpoints, arising as a result of the construction and decommissioning activities and structures, including laying new offshore export cables to shore, which will be visible from the coast.
- Whole Proposed Development effects:
  - Whole Proposed Development effects could occur as a result of multiple construction and decommissioning activities related to the onshore and/or the offshore elements of the Project affecting a seascape, landscape or visual receptor. Effects will be influenced by the construction phasing of the offshore and offshore elements of the Project, the geographic location of receptors an visibility of the onshore and offshore elements.

1.3.2. POTENTIAL EFFECTS DURING OPERATION AND MAINTENANCE

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

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

1.4. GUIDANCE, DATA SOURCES AND SITE SURVEYS

1.4.1. GUIDANCE ON METHODOLOGY

31. This assessment has been carried out in accordance with the principles contained within the following documents:

- Landscape Institute and IEMA (2013) - Guidelines for Landscape and Visual Impact Assessment: Third Edition (GLVIA3).
- Landscape Institute (2019). Visual Representation of Development Proposals.
- NatureScot (2012). Assessing the Cumulative Impact of Onshore Wind Energy Developments.
- NatureScot (2012). Offshore Renewables – Guidance on Assessing the Impact on Coastal Landscape and Seascape. Guidance for Scoping an Environmental Statement.
- NatureScot (2017). Visual Representation of Wind farms, Guidance (Version 2.2).
- NatureScot (2018). Guidance Note. Coastal Character Assessment (Version 1a).

32. 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.

33. 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.

34. 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.

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

36. These are not new diversions and follow practice established on other large scale offshore wind farm projects such as Moray East, East Anglia TWO, Norfolk Vanguard and Thanet Extension.

1.4.2. DATA SOURCES

37. The data sources that have been collected and used to inform this SLVIA are summarised in Table 1.2.

Table 1.2: Data Sources used to inform the SLVIA

Title	Source	Year	Author
Inch Cape Offshore Wind Farm Section 36 Consent Variation Application Supporting Report	available online: https://marine.gov.scot/sites/default/files/ic02-int-ec-ofl-003-rrp-app-002_s.36_variation_report_final.pdf	2021	Inch Cape
Aerial photography	N/A	2020	Google Earth Pro
Any specific visitor attractions / tourist destinations	available online: https://www.english-heritage.org.uk/visit/places	2020	English Heritage
Any specific visitor attractions / tourist destinations	available online: https://www.nationaltrust.org.uk/days-out	2020	National Trust
National Cycle Network (GIS dataset)	available online: https://www.sustrans.org.uk/	2020	Sustrans
Neart na Gaoithe Offshore Wind Farm Development Specification and Layout Plan June 2020	available online: (https://marine.gov.scot/sites/default/files/nng-nng-ecf-pln-0003_dev_specification_and_layout_plan_rev4.0_redacted.pdf	2020	Neart na Gaoithe
Northumberland Coast AONB Management Plan 2020-2024	available online: https://www.northumberlandcoastaonb.org/management-plan/	2020	Northumberland Coast AONB
Overview map for Long Distance Paths and Walks	available online: https://www.ldwa.org.uk/ldp/public/ldp_overview_map.php	2020	Long Distance Walkers Association
Registered Parks and Gardens / UNESCO World Heritage Sites	available online: https://historicengland.org.uk/listing/the-list/	2020	Historic England
Seagreen Offshore Wind Farm Development Specification and Layout Plan May 2020	available online: https://marine.gov.scot/sites/default/files/owf_dslp.pdf	2020	Seagreen 1
OS Terrain 50 Digital Terrain Model (DTM)	N/A	2019	Ordnance Survey
National Parks (GIS dataset)	available online: https://data.gov.uk/dataset/334e1b27-e193-4ef5-b14e-696b58bb7e95/national-parks-england	2019	Natural England
Areas of Outstanding Natural Beauty (AONB) (GIS dataset)	available online: https://data.gov.uk/dataset/8e3ae3b9-a827-47f1-b025-f08527a4e84e/areas-of-outstanding-natural-beauty-england	2019	Natural England
County Parks (GIS dataset)	available online: https://data.gov.uk/dataset/e729abb9-aa6c-42c5-baec-b6673e2b3a62/country-parks-england	2019	Natural England
Open Access Land (GIS dataset)	available online: https://data.gov.uk/dataset/05fa192a-06ba-4b2b-b98c-5b6bec5ff638/crow-act-2000-access-layer	2019	Natural England
Heritage Coasts (GIS dataset)	available online: https://data.gov.uk/dataset/79b3515f-b00e-419a-9c7e-1d31635555886/heritage-coasts	2019	Natural England
Marine and coastal mapping data, ferry routes (GIS dataset)	available online:	2019	Oceanwise
Public Rights of Way (GIS dataset)	N/A	2020	OPEN internal dataset
Development Specification and Layout Plan Kincardine Offshore Wind Farm, April 2019	available online: https://marine.gov.scot/sites/default/files/kowl-pl-0004-011_-_development_specification_and_layout_plan_rev_c3_redacted_0.pdf	2019	Kincardine Offshore Wind Farm
NatureScot Landscape Character Assessment 2019	available online: https://www.nature.scot	2019	NatureScot
Northumberland Local Development Plan 2019 Publication Draft	available online: https://www.northumberland.gov.uk	2019	Northumberland County Council
OS County Region, Local Unitary Authority, Railways, Road and Settlements	N/A	2019	Ordnance Survey Open Data
1:50,000 scale mapping	N/A	2019	Ordnance Survey
1:25,000 scale mapping	N/A	2019	Ordnance Survey
East Lothian Local Development Plan 2018 - East Lothian Special Landscape Areas	available online: https://www.eastlothian.gov.uk/	2018	East Lothian Council
Seascape Character Assessment for the North-East Inshore and Offshore Marine Plan Areas	available online: https://assets.publishing.service.gov.uk	2018	MMO
Aberdeenshire Local Development Plan 2017 – Special Landscape Areas	available online: https://www.aberdeenshire.gov.uk/	2017	Aberdeenshire Council
Fife Local Development Plan 2017 – Fife Local Landscape Areas.	available online: https://www.fife.gov.uk/	2017	Fife Council
Interactive maps of the UK's light pollution and dark skies as part of a national mapping project (LUC/CPRE, 2016). Open Source data used to understand and illustrate baseline lighting levels	available online: https://www.nightblight.cpre.org.uk/	2016	Campaign to Protect Rural England (CPRE)
Scottish Borders Local Development Plan 2016 - Special Landscape Areas	available online: https://www.scotborders.gov.uk/	2016	Scottish Borders Council
National Character Area profiles	available online: https://www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making/national-character-area-profiles	2014	Natural England

Title	Source	Year	Author
Northumberland Coast AONB Landscape Sensitivity and Capacity Study' (August 2013)	available online: https://www.northumberlandcoastaonb.org/where-to-go/	2013	Northumberland Coast AONB
Cruising routes for recreational yachting	TBC	2013	Royal Yachting Association (RYA)
Scottish Offshore Wind Farms – East Coast Regional Seascape Character Assessment Aberdeen to Holy Island	available online: http://marine.gov.scot/datafiles	2011	Forth and Tay Offshore Windfarm Developer Group
NatureScot National Coastal Character Map	available online: https://www.nature.scot/national-coastal-character-map	2010	NatureScot
Northumberland County Council Landscape Character Assessment (2010)	available online: https://www.northumberland.gov.uk	2010	Northumberland County Council
Met Office Visibility Data	Met Office Inverberive Weather Station. Visibility bands every 1km up to 30km, then every 5km up to 50km, then every 10km up to 70km, and >70km.	2012-2021	Met Office
Inventory of Gardens and Designed Landscapes	available online: https://www.historicenvironment.scot/advice-and-support/listing-scheduling-and-designations/gardens-and-designed-landscapes/	N/A	Historic Environment Scotland

1.4.3. APPROPRIATE LEVEL OF ASSESSMENT

38. The SLVIA methodology provides for an approach to identifying receptors that could be significantly affected by the Proposed Development that need to be 'scoped in' for further assessment in the SLVIA and receptors that could not be significantly affected and that can be 'scoped out' of the assessment.

39. The general principle is that receptors that could be significantly affected will be identified based on their sensitivity/importance/value and the spatial and temporal scope of the assessment. Consultation has also informed the selection of potential receptors that could be significantly affected by the Proposed Development.

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

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

- a 'preliminary assessment' approach for an environmental aspect/effect which may include secondary baseline data collection (for example desk-based information) and qualitative assessment methodologies. A preliminary assessment of all seascape, landscape and visual receptors within the ZTV is undertaken in Chapter 15, using desk-based information and ZTV analysis (Figure 15.9 – 15.12). The preliminary assessment identifies which seascape, landscape and visual receptors are unlikely to be significantly affected, which are subject to a preliminary assessment, and those receptors that are more likely to be significantly affected by the Proposed Development which require a 'detailed assessment'; and
- a 'detailed assessment' approach is undertaken for seascape, landscape and visual receptors/effects that are identified in the preliminary assessment as requiring detailed assessment. This detailed assessment may include primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies, and modelling such as ZTV analysis (Figure 15.9 – 15.12) and wireline/photomontage visualisations (Figure 15.21 – 15.48).

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

1.4.4. DESK-BASED AND SITE SURVEY WORK

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

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

45. For those receptors where a detailed assessment is required, primary data acquisition has been undertaken through a series of surveys. These surveys include field survey verification of the ZTV from terrestrial landscape character areas (LCAs), micro-siting of viewpoint locations, panoramic baseline photography and visual assessment survey from all representative viewpoints. These surveys were undertaken between October 2021 and January 2022 as described in Table 1.3. Field work over the duration of the assessment has been partly restricted due to the travel restrictions in place during the COVID-19 pandemic, including requirements for assessors to 'stay local/at home' during certain periods, restricted access to certain visitor locations due to closures and limited accommodation availability.

Table 1.3: Site Surveys Undertaken

Title	Extent of Survey	Overview of Survey	Date
Viewpoint photography and collection of baseline data on landscape character and visual amenity.	Coastal parts of Aberdeenshire, Angus, Fife, East Lothian, Scottish Borders, Northumberland and Northumberland Coast AONB.	Seascape, landscape and visual assessment surveys to undertake viewpoint photography and collect baseline data on landscape character and visual amenity associated with views of the offshore elements of Berwick Bank and in accordance with methodology such as in GLVIA3 (Landscape Institute, 2013) and TGN 06/19 (Landscape Institute, 2019).	October to December 2021
Viewpoint photography and night-time photography.	Coastal parts of Aberdeenshire, Angus, Fife, East Lothian, Scottish Borders, Northumberland and Northumberland Coast AONB.	Viewpoint photography in accordance with methodology such as in GLVIA3 (Landscape Institute, 2013) and TGN 06/19 (Landscape Institute, 2019).	December / January 2022

1.5. ASSESSING VISUAL EFFECTS

46. Visual effects are concerned wholly with the effect of the Proposed Development on views, and the general visual amenity and are defined by the Landscape Institute in GLVIA 3, paragraphs 6.1 as follows: *"An assessment of visual effects deals with the effects of change and development on views available to people and their visual amenity. The concern ... is with assessing how the surroundings of individuals or groups of people may be specifically affected by changes in the context and character of views."*

47. Visual effects are identified for different receptors (people) who will experience the view at their place of residence, within their community, during recreational activities, at work, or when travelling through the area. Visual effects may include changes to an existing static view, sequential views, or wider visual amenity as a result of development or the loss of particular landscape elements or features already present in the view.

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

1.5.1. ZONE OF THEORETICAL VISIBILITY (ZTV)

49. Plans mapping the Zone of Theoretical Visibility (ZTV) are used to analyse the extent of theoretical visibility of the Proposed Development, across the Study Area and to assist with viewpoint selection. The ZTV does not however, take account of the screening effects of buildings, localised landform and vegetation, unless specifically noted (see individual figures). As a result, there may be roads, tracks and footpaths within the study area which, although shown as falling within the ZTV, are screened or filtered by built form and vegetation, which will otherwise preclude visibility. The ZTV provides a starting point in the assessment process and accordingly tend towards giving a 'worst case' or greatest calculation of the theoretical visibility.

1.5.2. VIEWPOINT ANALYSIS

50. 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.

51. 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.

52. The SLVIA therefore includes viewpoint analysis prepared for each viewpoint and presented as supporting assessment in the SLVIA. The viewpoint analysis assists in defining the direction, elevation, geographical spread and nature of the potential visual effects and identify areas where significant effects are likely to occur. This approach seeks to provide clarity and confidence to consultees and decision makers by allowing the detailed judgements on the magnitude of visual change to be more readily scrutinised and understood. The viewpoint analysis is used to assist the visual assessment of visual receptors reported in the SLVIA.

1.5.3. EVALUATING VISUAL SENSITIVITY TO CHANGE

53. In accordance with paragraphs 6.31-6.37 of GLVIA3, the sensitivity of visual receptors has been determined by a combination of the value of the view and the susceptibility of the visual receptors to the change likely to result from the Proposed Development on the view and visual amenity.

Value of the view

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

- **Formal recognition** - The value of views can be formally recognised through their identification on OS or tourist maps as formal viewpoints, sign-posted and with facilities provided to add to the enjoyment of the viewpoint such as parking, seating and interpretation boards. Specific views may be afforded protection in local planning policy and recognised as valued views. Specific views can also be cited as being of importance in relation to landscape or heritage planning designations, for example the value of a view has been increased if it presents an important vista from a designed landscape or lies within or overlooks a designated area, which implies a greater value to the visible landscape.
- **Informal recognition** - Views that are well-known at a local level and/or have particular scenic qualities can have an increased value, even if there is no formal recognition or designation. Views or viewpoints are sometimes informally recognised through references in art or literature and this can also add to their value. A viewpoint that is visited or appreciated by a large number of people will generally have greater importance than one gained by very few people.

Susceptibility to change

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

- Nature of the viewer - The nature of the viewer is defined by the occupation or activity of the viewer at the viewpoint or series of viewpoints. The most common groups of viewers considered in the visual assessment include residents, motorists, and people taking part in recreational activity or working. Viewers, whose attention is focused on the landscape, or with static long-term views, are likely to have a higher sensitivity. Viewers travelling in cars or on trains will tend to have a lower sensitivity as their view is transient and moving. The least sensitive viewers are usually people at their place of work as they are generally less sensitive to changes in views.
- Experience of the viewer - The experience of the visual receptor relates to the extent to which the viewer's attention or interest may be focused on the view and the visual amenity they experience at a particular location. The susceptibility of the viewer to change arising from the offshore elements of the Proposed Development may be influenced by the viewer's attention or interest in the view, which may be focused in a particular direction, from a static or transitory position, over a long or short duration, and with high or low clarity. For example, if the principal outlook from a settlement is aligned directly towards the offshore elements of the Proposed Development, the experience of the visual receptor will be altered more notably than if the experience relates to a glimpsed view seen at an oblique angle from a car travelling at speed. The visual amenity experienced by the viewer varies depending on the presence and relationship of visible

elements, features or patterns experienced in the view and the degree to which the landscape in the view may accommodate the influence of the offshore elements of the Proposed Development.

Visual sensitivity rating

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

Table 1.4: Visual Sensitivity to Change Criteria

Sensitivity Factor	Higher	Lower
Value	Specific viewpoint identified in OS maps and / or tourist information and signage.	Viewpoint not identified in OS maps or tourist information and signage.
	Facilities provided at viewpoint to aid the enjoyment of the view.	No facilities provided at viewpoint to aid enjoyment of the view.
	View afforded protection in planning policy.	View is not afforded protection in planning policy.
	View is within or overlooks a designated landscape, which implies a higher value to the visible landscape.	View is not within, nor does it overlook, a designated landscape.
	View has informal recognition and well- known at a local level, as having particular scenic qualities.	View has no informal recognition and is not known as having particular scenic qualities.
	View or viewpoint is recognised through references in art or literature.	View or viewpoint is not recognised in references in art or literature.
	View has high scenic qualities relating to the content and composition of the visible landscape.	View has low scenic qualities relating to the content and composition of the visible landscape.
Susceptibility to change	Viewer who is likely or liable to be influenced by the Proposed Development.	Viewer who is unlikely or not liable to be influenced by the Proposed Development.
	Viewers such as walkers, or tourists, whose main attention and interest are on their surroundings.	Viewers whose main attention is not focused on their surroundings, such as people at work, or specific forms of recreation.
	Residents that gain static, long-term views of the Proposed Development in their principal outlook.	Viewers who are transient and dynamic, such as those travelling in cars or on trains, where the view is of short duration.
	Viewpoint is visited or used by a large number of people.	View is visited or gained by very few people.
	A view that is focused in a specific directional vista, with notable features of interest in a particular part of the view.	Open views with no specific point of interest, or specific directional vista away from direction of the Proposed Development.
	Viewers are focused on the experience of a high level of visual amenity at the location due to its overall pleasantness as an attractive visual setting or backdrop to activities.	The visual amenity experienced at the location by viewers is less pleasant or attractive than might otherwise be the case. Presence of existing built element features influence visual amenity experienced.
Sensitivity to change	High ◄——►	Medium ◄——► Low

1.5.4. VISUAL MAGNITUDE OF CHANGE

57. The magnitude of change on views is an expression of the scale of the change that will result from the Proposed Development and is dependent on a number of variables regarding the size or scale of the change. The consideration of the size or scale of the effect, its geographical extent and its duration and reversibility are kept separate, by basing the magnitude of change primarily on size or scale to determine where significant and non-significant effects occur, and then describing the geographical extents of these effects and their duration and reversibility separately.

Size or scale of change

58. An assessment has been made about the size or scale of change in the view that is likely to be experienced as a result of the Proposed Development, based on the following criteria:

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

- Nature of visibility: the nature of visibility is a further factor for consideration. The Proposed Development may be subject to various phases of development change and the way the Proposed Development may be viewed could be intermittent or continuous and / or seasonally, due to periodic management or leaf fall.

Geographical extent

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

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

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

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

Duration and reversibility

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

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

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

Visual magnitude of change rating

65. The 'magnitude' or 'degree of change' resulting from the Proposed Development is described as 'High', 'High-medium', 'Medium', 'Medium-low' 'Low' and 'Negligible' as defined in Table 1.5. The basis for the assessment of magnitude for each receptor has been made clear using evidence and professional judgement.

Table 1.5: Visual Magnitude of Change Ratings

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

66. Examples of criteria that tend towards higher or lower magnitude of change that can occur on views and visual receptors are set out in Table 1.6.

Table 1.6: Visual Magnitude of Change Criteria/Examples

Magnitude of change	Examples of criteria
High	The Proposed Development will be the prevailing feature, forming the major focus of visual attention due to its large vertical scale and lateral spread, filling a large proportion of the field of view, with contrasts in form, line, colour, texture, luminance or motion contributing to the prevailing influence. • 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. Typically experienced from representative viewpoints illustrating a visual effect likely to be experienced by larger numbers of people, relative to the activity, and may also be experienced from a specific viewpoint.
Medium	The Proposed Development will be plainly visible, so will not be missed by casual observers, but will not strongly attract visual attention or dominate the view because of its apparent size. The Proposed Development is obvious and will have sufficient size to contrast with other seascape/landscape

Magnitude of change	Examples of criteria
	elements, but with insufficient visual contrast to strongly attract visual attention and insufficient size to occupy most of an observer's field of 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. Typically experienced from representative viewpoints illustrating a visual effect likely to be experienced by a medium number of people, relative to the activity, and may also be experienced from a specific viewpoint.
Low	The Proposed Development will be visible when scanning in its general direction; otherwise it may be missed by casual observers. Small and/or faint, but when the observer is scanning the horizon or looking more closely at an area, can be detected and sometimes noticed by casual observers. • Size and Scale: A small, slightly apparent and/or perceptible change. • Number: Involving the loss/addition of a small number of features / elements. • Distance: Typically appearing in the background. • FoV: Affecting a small vertical angle and narrow horizontal FoV. • Nature of Visibility: Simple, single development, intermittently and infrequently visible. • Contrast: Some parity / 'fits' with surroundings and may benefit from screening. • Skyline: Partly visible on a developed skyline or not visible on the skyline. • Consistency of Image: Similar from other developments with visual rationale, appearing reasonably well accommodated within its surroundings. Typically experienced from illustrative viewpoints likely to be experienced by low numbers of people, relative to the activity and may also be experienced from a specific viewpoint.
Negligible	The Proposed Development will be visible only after extended viewing and is near the limit of visibility or is barely visible, such that it would not be seen by a person who was unaware of it in advance and therefore looking for it. Even under those circumstances, it may be seen only after looking at it closely for an extended period. • 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. Typically experienced from illustrative viewpoints likely to be experienced by low numbers of people, relative to the activity and may also be experienced from a specific viewpoint.

1.5.5. EVALUATING VISUAL EFFECTS AND SIGNIFICANCE

67. The level of visual effect is evaluated through the combination of visual sensitivity and magnitude of change. Once the level of effect has been assessed, a judgement is then made as to whether the level of effect is 'significant' or 'not significant' as required by the relevant EIA Regulations. This process is assisted by the matrix in Table 1.10 which is used to guide the assessment. The factors considered in the evaluation of the sensitivity and the magnitude of the change resulting from the Proposed Development and their conclusion, have been presented in a comprehensive, clear and transparent manner.

68. 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).

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

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

1.5.6. VISIBILITY

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

72. Assessments are based on a worst-case position of optimum ('very good' or 'excellent') visibility, in line with current guidance (Landscape Institute and IEMA, 2013), however within the visual assessment there is an assessment of the frequency or 'likelihood' of effect' for each viewpoint, based on the distance of the Proposed Development, Met Office visibility data and professional judgement based on experience of viewing offshore wind farms in different conditions and distances. Likely visibility frequency can therefore been taken into consideration, with visibility range from viewpoints located at very long distances over 40km (where 'excellent' visibility is required) occurring less frequently than viewpoints at closer range.

73. The photographs used in the photomontages shown in Figures 15.21 – 15.48 were captured between October 2021 to January 2022 in very good to excellent visibility conditions and show this maximum potential visibility of the Proposed Development. In reality the degree and extent of visual effects arising from the Proposed Development will be influenced by the prevailing weather and visibility conditions and such excellent visibility occurs relatively infrequently.

1.6. ASSESSING NIGHT-TIME VISUAL EFFECTS

1.6.1. INTRODUCTION

74. The assessment of night-time visual effects is based on the description of proposed WTG lighting set out in the project design envelope in Chapter 15 and the relevant ICAO/CAA regulations and standards, including Air Navigation Order 2016: Civil Aviation (CAA, 2016).

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

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

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

78. The study area for the visual assessment of WTG lighting is shown in Figure 15.2 and is coincident with the 60 km SLVIA Study Area however, is particularly focused on the closest areas of the coastline.

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

80. 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 2,000 candela medium intensity to be on during 'twilight', when landscape character may be discerned. The aviation and marine navigational lights may be seen for a short time during the twilight period when some recognition of landscape features/ profiles/ shapes and patterns may be possible. It is considered however, that level of recognition does not amount to an ability to appreciate in any detail landscape character differences and subtleties, nor does it provide sufficient natural light conditions to undertake a landscape character assessment.

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

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

83. To date the only formal recognition of this approach to assessment is the Scottish Ministers' Decision for the Crystal Rig IV PLI. The Reporters concluded in their report at paragraph 4.141: "*It can be seen from the summaries of evidence above that the parties differ as to whether the proposed aviation lighting would be a visual impact alone. We consider that without being able to see and fully appreciate the features of the landscape and the composition of views it is not possible to carry out a meaningful landscape character assessment. On this matter, we find that the proposed lighting is indeed a visual concern, as the applicant asserts.*"

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

85. Assessment of proposed wind turbine 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.

1.6.2. SIGNIFICANCE CRITERIA FOR NIGHT-TIME EFFECTS

86. 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.

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

88. 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.

89. 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 1.5.3 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.

90. In relation to the other key component in determining significance of effect, the magnitude of change, reference to 'loss of important features' and 'composition of the view' are not readily discernible or relevant at night and, on this basis, a distinct set of criteria to explain the magnitude of change at night, as a consequence of the appearance of aviation lights, is set out in Table 1.7 below.

Table 1.7: Magnitude of Change Criteria for Night-time Visual Effects

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

91. The significance of effects of aviation and marine navigation lighting is assessed through a combination of the sensitivity of the visual receptor and the magnitude of change that would result from the visible aviation lighting, taking into account the considerations described above, and informed by the matrix in Table 1.10, which gives an understanding of the threshold at which significant effects may arise.

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

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

1.7. ASSESSING SEASCAPE/LANDSCAPE EFFECTS

1.7.1. INTERFACE BETWEEN SLVIA AND ONSHORE LVIA

94. Together, the SLVIA and the onshore Landscape and Visual Impact Assessment (LVIA) provide a whole project assessment of the effects of the Project. The offshore elements of the Project (the Proposed Development) are assessed in the SLVIA and the onshore elements of the Project (the onshore substation, onshore cable corridor, and landfall location) are assessed in the LVIA. Both the SLVIA and the LVIA follow a broadly similar assessment methodology that uses the same glossary and terminology.

95. The SLVIA also provides an assessment of the cumulative effects likely to result from any areas where the construction, operation and decommissioning of the offshore and onshore elements combine to affect receptors within the SLVIA study area. An example could include effects on views where both offshore and onshore elements are visible, potentially resulting in cumulative landscape and visual effects as a result of the construction, operation and decommissioning of the offshore and onshore elements. These are assessed as part of the Tier 1 Cumulative Effects Assessment in Chapter 15 (Section 15.12).

96. The SLVIA study area includes the intertidal area and this area is also considered as part of the onshore LVIA study area. The intertidal area at the proposed landfall incorporates the rock platform and shingle beach west of Chapel Point. As trenchless technology (e.g. horizontal directional drilling (HDD)) will be employed to bring the offshore export cable ashore, no physical disturbance of the beach or intertidal area is predicted.

1.7.2. APPROACH TO ASSESSMENT OF SEASCAPE AND LANDSCAPE EFFECTS

97. The Marine Policy Statement (MPS) (UK Government, 2011) states *"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."*

98. In England, seascape characterisation includes both the sea surface and what lies below the waterline, however in Scotland, *'the focus is on the coast and its interaction with the sea and hinterland, relationships that are quite distinctive in the Scottish context'* (NatureScot, 2018).

99. Given the definition in the MPS and the NatureScot coastal character assessment guidance, the assessment of seascape character effects in this SLVIA focuses on areas of onshore landscape with views of the coast or seas/marine environment, in other words the 'coastal character', on the premise that the most important effect of offshore wind farms is on the perception of the character of the coast.

100. Coastal character is the *'distinct, recognisable and consistent pattern of elements on the coast, land and sea that makes one part of the coast different from another'* (NatureScot, 2018) and is made up of the margin of the coastal edge, its immediate hinterland and areas of sea.

101. The extent of the coast is principally influenced by the dominance of the sea in terms of physical characteristics, views and experience. The landward extent of the coast can be narrow where edged by cliffs or settlement; or broad where it includes raised beaches, dunes or more open coastal pasture or machair. The major determinant in defining the landward and seaward components of the coast is the sea - the key characteristic.

102. Regional Coastal Character Areas (CCAs) are appropriate for the assessment of effects on coastal character. The coastal character of the SLVIA study area within Scotland is defined at the regional level within the Regional Seascape Character Assessment Aberdeen to Holy Island Suffolk (Forth and Tay Offshore Windfarm Developer Group, 2011).

103. The Regional Seascape Character Areas defined in the FTOWDG Seascape Character Assessment are considered to equate to Regional CCAs as defined in the subsequent NatureScot Coastal Character Assessment Guidance (NatureScot, 2018) i.e. recognisable geographical areas with a consistent overall character at a strategic scale. Regional CCAs are shown as a simple colour line along the coast (Figure 15.3).

104. Due to its scale, distance from shore and extent of visibility, it is necessary to consider the effects of the Proposed Development on both coastal character and landscape character.

105. The effect of the Proposed Development on coastal (seascape) character is considered within the boundaries of defined coastal character areas (CCAs) and the immediately adjacent landscape character type (LCT) covering its hinterland, as defined in Figure 15.3, where there is a strong visual relationship with the sea/tidal waters and coastal landscapes such as dunes or cliffs.

106. The effect of the Proposed Development on landscape character is considered on LCTs outside and inland of these CCAs and coastal LCTs, where there may be some intervisibility of the Proposed Development,

but where the land is unlikely to have a strong visual relationship with the sea/tidal waters. These LCTs are identified in Figure 15.3. In general they are considered unlikely to experience significant character effects as a result of the Proposed Development because it is located in the sea, and these landscapes do not have a strong visual relationship with the sea and their character is fundamentally defined by other characteristics.

107. Where detailed assessment of CCAs is required, effects are assessed on the discrete aspects of coastal character as defined in the coastal character assessment guidance (NatureScot, 2018) follows:

- Maritime influences and experience from the sea,
- Character of the coastal edge and its immediate hinterland,
- Extent of human activity, and
- Views and visibility (visual assessment).

108. The assessment of effects on coastal character focuses upon the experiential characteristics that may be affected by the Proposed Development, rather than physical characteristics (which will not be affected by offshore development).

1.7.3. SEASCAPE / LANDSCAPE EFFECTS

109. In respect of the Proposed Development, the potential seascape/landscape effects, occurring during the construction, operation and decommissioning periods of the Proposed Development may therefore include, but are not restricted to the following:

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

110. Effects on coastal character and landscape character arising from the Proposed Development will be indirect effects, which will be perceived from the wider landscape, outside the Proposed Development array area.

Evaluating seascape/landscape sensitivity to change

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

112. 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.

Sensitivity of seascape/landscape receptor

113. The sensitivity of a seascape/landscape character receptor is an expression of the combination of the judgements made about the susceptibility of the receptor to the specific type of change or the development proposed, and the value related to that receptor.

Value of the seascape/landscape receptor

114. The value of a seascape/landscape character receptor is a reflection of the value that society attaches to that seascape/landscape. The assessment of the seascape/landscape value has been classified as high, medium-high, medium, medium-low or low and the basis for this assessment has been made clear using evidence and professional judgement, based on the following range of factors.

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

Seascape / landscape susceptibility to change

115. The susceptibility of a seascape/landscape character receptor to change is a reflection of its ability to accommodate the changes that will occur as a result of the addition of the Proposed Development without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies. Some landscape receptors are better able to accommodate development than others due to certain characteristics that are indicative of capacity to accommodate change. These characteristics may or not also be special landscape qualities that underpin designated landscapes.

116. The assessment of the susceptibility of the seascape/landscape receptor to change has been classified as high, medium-high, medium, medium-low or low and the basis for this assessment has been made clear using evidence and professional judgement. Indicators of landscape susceptibility to the type of development proposed (construction, operation and decommissioning of the Proposed Development) are based on the following criteria.

- Overall strength and robustness: Collectively the overall characteristics and qualities of a particular seascape/landscape result in a strong and robust landscape that is capable of reasonably accommodating the influence of the Proposed Development without undue adverse effects on the special landscape qualities (in the case of a designated landscape) or the key characteristics for which an area of seascape/landscape character or a particular element it is valued.
- Landscape scale and topography: The scale and topography are large enough to physically accommodate the influence of the Proposed Development. Topographical features such as more complex, distinctive or

small-scale coastal landforms are likely to be more susceptible than simple, broad and homogenous coastal landforms.

- Openness and enclosure: Openness in the seascape/landscape may increase susceptibility to change because it can result in wider visibility, however open seascape/landscape may also be larger scale and simple, which will decrease susceptibility. Conversely, enclosed seascape/landscapes can offer more screening potential, limiting visibility to a smaller area, however they may also be smaller scale and more complex which will increase susceptibility. In general, large scale, simple and open seascapes/coastlines are likely to be less susceptible to the Proposed Development than more enclosed, complex seascapes/coasts (such as indented bays, headlands etc).
- Skyline: Prominent and distinctive skylines and horizons with important landmark features that are identified in the landscape character assessment, are generally considered to be more susceptible to development in comparison to broad, simple skylines which lack landmark features or contain other infrastructure features.
- Relationship with other development and landmarks: Contemporary landscapes where there are existing similar developments (WTGs or energy developments) or other forms of development (industry, mineral extraction, masts, urban fringe/large settlement, major transport routes) that already have a characterising influence result in a lower susceptible to development in comparison to areas characterised by smaller scale, historic development and landmarks.
- Perceptual qualities: Notable landscapes that are acknowledged to be particularly scenic, wild or tranquil are generally considered to be more susceptible to development in comparison to ordinary, cultivated or farmed / developed landscapes where perceptions of 'wildness' and tranquillity are less tangible. Landscapes which are either remote or appear natural may vary in their susceptibility to development.
- Landscape context and association: the extent to which the Proposed Development will influence the character of seascape/landscape receptors across the study area relates to the associations that exist between the seascape/landscape receptor within which the Proposed Development are located and the seascape/landscape receptor from which the Proposed Development is being experienced. In some situations this association will be strong, i.e., where the seascapes/landscapes are directly related, and in other situations weak (where the landscape association is weak). The context and visual connection to areas of adjacent seascape/landscape character or designations has a bearing on the susceptibility to development.

Seascape/landscape sensitivity rating

117. An overall sensitivity assessment of the seascape/landscape receptor has been made by combining the assessment of the value of the seascape/landscape character receptor and its susceptibility to change. The evaluation of seascape/landscape sensitivity has been applied for each seascape/landscape receptor - high, medium-high, medium, medium-low and low - by combining individual assessments of the value of the receptor and its susceptibility to change. The basis for the assessments has been made clear using evidence and professional judgement in the evaluation of sensitivity for each receptor. Criteria that tend towards higher or lower sensitivity are set out in Table 1.8 below.

Table 1.8: Seascape/Landscape Sensitivity to Change

Sensitivity Factor	Higher	Lower
Value	Designation: Designated seascape/landscapes with national policy level protection or defined for their natural beauty.	Seascape/landscapes without formal designation.
	Despoiled or degraded seascape/landscape with little or no evidence of being valued by the community.	
	Quality: Higher quality seascape/landscapes with consistent, intact and well-defined, distinctive attributes.	Lower quality seascape/landscapes with indistinct elements or features that detract from its inherent attributes.
	Rarity: Rare or unique seascape/landscape character types, features or elements.	Widespread or 'common' seascape/landscape character types, features or elements.
	Aesthetic / scenic: Aesthetic / scenic or perceptual aspects of designated wildlife, ecological or cultural heritage features that contribute to seascape/landscape character.	Limited wildlife, ecological or cultural heritage features, or limited contribution to seascape/landscape character.
	Perceptual qualities: Seascape/landscape with perceptual qualities of wildness, remoteness or tranquillity.	Seascape/landscape where potential qualities of wildness, remoteness or tranquillity are no longer present or experienced, often as a result of existing development influences.
Susceptibility	Strength and robustness: Fragile seascape/landscape vulnerable and lacking the ability to accommodate change.	Robust landscape that is capable of reasonably accommodating change without undue adverse effects.
	Landscape scale: A smaller scale seascape/landscape, with complex, distinctive or small-scale coastal landforms.	A seascape/landscape of a suitably large enough scale to accommodate the development, with simple, broad and homogenous coastal landforms.
	Openness / enclosure: Openness may increase susceptibility if there is wider visibility, however open seascape/landscape may also be larger scale and simple which would decrease susceptibility.	Enclosed seascape/landscapes can offer more screening potential, limiting visibility to a smaller area, however they may also be smaller scale and more complex which would increase susceptibility
	Skyline: Distinctive undeveloped skylines with landmark features.	Developed, non-distinctive skylines without landmark features.
	Relationship with other development: Little association with other contemporary development, or strong associations occur with smaller scale or historic development.	Strong or direct association with other similar contemporary developments and seascape/landscape character influenced by development.
	Perceptual qualities: Perceptual qualities associated with particular scenic qualities, wildness or tranquillity.	Contemporary, cultivated / settled or developed landscapes with fewer perceptual qualities are likely to have a lower susceptibility.
	Seascape/landscape association: Adjacent seascape/landscape character context connected by associated character and views.	Host landscape character is separate from surrounding / adjacent seascape/landscape character with weak association.
Sensitivity to change	High ◄——► Medium ◄——► Low	

1.7.4. SEASCAPE/LANDSCAPE MAGNITUDE OF CHANGE

118. The magnitude of change on seascape/landscape receptors is an expression of the scale of the change that will result from the Proposed Development and is dependent on a number of variables regarding the size or scale of the change. The consideration of the size or scale of the effect, its geographical extent and its duration and reversibility are kept separate, by basing the magnitude of change primarily on size or scale to determine where significant and non-significant effects occur, and then describing the geographical extents of these effects and their duration and reversibility separately.

Size or scale of change

119. This criterion relates to the size or scale of change to the seascape/landscape that will arise as a result of the Proposed Development, based on the following factors.

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

Geographical extent

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

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

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

- Seascape/landscape character: The extent of the effects on seascape/landscape character will vary depending on the specific nature of the Proposed Development. This is not simply an expression of visibility or the extent of the ZTV, but also includes a specific assessment of the extent of landscape character that will be changed by the Proposed Development in terms of its character, key characteristics and elements.
- Landscape Designations: In the case of a designated landscape, this refers to the extent the special landscape qualities of the designation are affected and whether this can be defined in terms of area or linear measurements, or subjectively through professional judgement (with the support of an expert topic group and / or peer review) and whether the integrity of the designation is affected.

Duration and reversibility

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

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

1.7.5. SEASCAPE/LANDSCAPE MAGNITUDE OF CHANGE RATING

124. The 'magnitude' or 'degree of change' resulting from the Proposed Development is described as 'High', 'High-medium', 'Medium', 'Medium-low' 'Low' or 'Negligible'. In assessing magnitude of change, the assessment focuses on the size or scale of change. The geographic extent, duration and reversibility are stated separately in relation to the assessed effects (i.e., as short/medium / long-term and temporary/permanent). The basis for the assessment of magnitude for each receptor has been made clear using evidence and professional judgement. The levels of magnitude of change that can occur are defined in Table 1.9.

Table 1.9: Seascape/Landscape Magnitude of Change Ratings

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

1.7.6. EVALUATING SEASCAPE/LANDSCAPE EFFECTS AND SIGNIFICANCE

125. The level of seascape/landscape effect is evaluated through the combination of seascape/landscape sensitivity and magnitude of change. Once the level of effect has been assessed, a judgement is then made as to whether the level of effect is 'significant' or 'not significant' as required by the relevant EIA Regulations. This process is assisted by the matrix in Table 1.10 which is used to guide the assessment. The factors considered in the evaluation of the sensitivity and the magnitude of the change resulting from the Proposed Development and their conclusion, has been presented in a comprehensive, clear and transparent manner.

126. 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).

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

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

1.8. EVALUATION OF SIGNIFICANCE

129. The significance of the effect upon seascape, landscape and visual receptors is determined by correlating the magnitude of the impact and the sensitivity of the receptor, as presented in Table 1.10.

130. The significance of the effect on each seascape/landscape character and visual receptor is dependent on all of the factors considered in the sensitivity of the receptor and the magnitude of change resulting from the Proposed Development. Factors which influence levels of sensitivity and magnitude of change assessed in the SLVIA are set out in full in Volume 3 Technical Appendix 13.1: SLVIA Methodology. Judgements on sensitivity and magnitude of change are combined to arrive at an overall assessment as to whether the Proposed Development will have an effect that is significant or not significant on each seascape/ landscape and visual receptor.

131. The matrix in Table 1.10 is used as a guide to help inform the threshold of significance when combining sensitivity and magnitude to assess significance. On this basis potential impacts are assessed as of negligible, minor, moderate and major. In those instances where there would be no effect, the magnitude has been recorded as 'Zero' and the level of effect as 'None'.

132. For the purposes of this assessment, any effects with a significance level of major and major/moderate have been deemed significant in EIA terms (dark shaded boxed in Table 1.10). 'Moderate' levels of effect (indicated in mid-grey in Table 1.10) have the potential, subject to the assessor's professional judgement, to be considered as significant or not significant, depending on the sensitivity and magnitude of change factors evaluated. These assessments are explained as part of the assessment, where they occur.

133. Significance can therefore occur at a range of levels depending on the magnitude and sensitivity, however in all cases, a significant effect is considered more likely to occur where a combination of the variables results in the Proposed Development having a defining effect on the landscape/seascape character or view. Definitions are not provided for the individual categories of significance shown in the matrix and the reader should refer to the detailed definitions provided for the factors that combine to inform sensitivity and magnitude. Effects assessed as being either moderate/minor, minor, minor/negligible or negligible level are assessed as non-significant (light shaded boxes in Table 1.10).

134. In line with the emphasis placed in GLVIA3 upon the application of professional judgement, an overly mechanistic reliance upon a matrix is avoided through the provision of clear and accessible narrative explanations of the rationale underlying the assessment made for each landscape and visual receptor.

Table 1.10: Impact Significant Matrix

		Magnitude of Impact					
		Negligible	**Low**	**Medium-low**	**Medium**	**Medium-high**	**High**
Sensitivity of Receptor	**Low**	Negligible	Minor	Minor	Minor	Moderate/minor	Moderate
	Medium-low	Negligible	Minor	Minor	Moderate/minor	Moderate	Moderate
	Medium	Minor	Minor	Moderate/minor	Moderate	Moderate	Major/moderate
	Medium-high	Minor	Moderate/minor	Moderate	Moderate	Major/moderate	Major
	High	Minor	Moderate/minor	Moderate	Major/moderate	Major	Major

1.9. NATURE OF EFFECTS

1.9.1. OVERVIEW

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

136. 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'.

137. Cumulative effects have been described in Section 13.10, and 'short-term, medium-term and long-term, permanent and temporary' effects are described in Section 13.5 and 13.6 under the heading 'Duration of Effect'. Transboundary effects are relevant only to the SLVIA and concern the overlap of the SLVIA 50 km study area with EU maritime waters.

1.9.2. DIRECT AND INDIRECT EFFECTS

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

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

140. Visual effects are considered as direct effects, as the view itself may be directly altered by the Proposed Development.

1.9.3. POSITIVE AND NEGATIVE EFFECTS

141. 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.

142. In this assessment the nature of effects refers to whether the landscape and/or visual effect of the Proposed Development is positive or negative (herein referred to as 'beneficial'/'neutral' or 'adverse').

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

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

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

1.10. ASSESSING CUMULATIVE SEASCAPE, LANDSCAPE AND VISUAL EFFECTS

1.10.1. METHODOLOGY

Approach to Additional or Combined Cumulative Effects

145. The Cumulative Effects Assessment (CEA) takes into account the impact associated with the Proposed Development together with other relevant plans, projects and activities. Cumulative effects are therefore the additional or combined effect of the Proposed Development in combination with the effects from a number of different projects, on the same receptor or resource. Please see volume 1, chapter 6 for detail on CEA methodology.

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

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

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

occur when the observer has to move to another viewpoint to see different developments" (NatureScot, 2021, p11).

148. In line with NatureScot guidance and GLVIA3, cumulative effects are assessed in this SLVIA as the additional changes caused by the Proposed Development in conjunction with other similar developments (not the totality of the cumulative effect). The CEA assesses the cumulative effect of the proposed development with other projects (Table 15.42) against the baseline (Section 15.7), with the assessment of significance apportioning the amount of the effect that is attributable to the Proposed Development. The contribution of the proposed development to the cumulative effect upon the baseline character/view is assessed and information provided on *'how the effects of the applicant's proposal would combine and interact with the effects of other development'* (PINS, 2019). Adjacent developments may complement one another, or may be discordant with one another, and it is the increased or reduced level of significance of effects which arises as a result of this change that is assessed in the CEA, such as through design discordance or proliferation of multiple developments affecting characteristics or new geographic areas, and ultimately if character changes occur because of multiple developments becoming a prevailing characteristic of the seascape or view.

Tiered Approach to CEA

149. In accordance with NatureScot guidance and GLVIA3 (para 7.13), existing projects and those which are under construction are included in the SLVIA baseline and described as part of the baseline conditions, 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 Proposed Development is undertaken in conjunction with a baseline that includes operational and under-construction projects as part of the main assessment in Chapter 15, Section 15.11 Assessment of Significance. This includes assessment of the Proposed Development 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.

150. A further assessment of the additional cumulative seascape, landscape and visual effects of the Proposed Development with other potential future projects is undertaken in Chapter 15, Section 15.12 Cumulative Effects Assessment (CEA).

151. In undertaking this CEA for the Proposed Development, 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 Proposed Development. 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 Proposed Development CEA employs the following tiers:

- tier 1 assessment – Proposed Development (Berwick Bank Wind Farm offshore) with Berwick Bank Wind Farm onshore (whole project effect assessment);
- tier 2 assessment – All plans/projects assessed under Tier 1, plus projects with consent and submitted but not yet determined;
- tier 3 assessment – All plans/projects assessed under Tier 2, plus those projects with a Scoping Report; and
- tier 4 assessment – All plans/projects assessed under Tier 3, plus those projects likely to come forward where an Agreement for Lease (AfL) has been granted.

152. This tiered approach has been adopted to provide an explicit assessment of the Proposed Development as a whole.

153. The projects and plans selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise (see volume 3, appendix 6.3 of the Offshore EIA Report). 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 15.16), with potential for cumulative impact interactions. The specific projects scoped into the CEA for seascape, landscape and visual receptors, are set out in Chapter 15.

154. The range of potential cumulative effects that are identified and included in the CEA, is a subset of those considered for the Proposed Development alone assessment. This is because some of the potential impacts identified and assessed for the Proposed Development alone, are localised and temporary in nature. It is considered therefore, that these potential impacts have limited or no potential to interact with similar changes associated with other plans or projects. These have therefore been scoped out of the cumulative effects assessment.

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

1.10.2. TYPES OF CUMULATIVE EFFECT

Cumulative Visual Effects

156. Cumulative visual effects consist of combined and sequential effects:

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

Cumulative Seascape/ Landscape Effects

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

158. If the Proposed Development forms a separate isolated feature from other developments within the seascape/landscape, too infrequent and of insufficient significance to be perceived as a characteristic of the area, then the cumulative seascape/ landscape effect of the Proposed Development is unlikely to be significant.

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

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

1.10.3. ASSESSING CUMULATIVE SEASCAPE, LANDSCAPE AND VISUAL EFFECTS

Cumulative Sensitivity of Landscape and Visual Receptors

161. In evaluating cumulative sensitivity in the cumulative SLVIA (section 15.12 of Chapter 15), the sensitivity to change of seascape, landscape and visual receptors are retained from the main assessment in sections 15.10.

Cumulative Magnitude of Change

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

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

163. The magnitude of change of the Proposed Development as assessed in the project alone assessment: Where the Proposed Development is assessed to have a negligible or low magnitude of change on a view or seascape/landscape receptor, there is more likely to be a low cumulative effect.

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

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

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

Significance of Cumulative Effects

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

167. 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;

168. With the addition of further development, it can become a characteristic element of the landscape/ seascape, as they appear as elements or components that are repeated. Providing there was sufficient 'space' or undeveloped landscape/seascape between each development, or the overlapping of several developments is not too dense; they would appear as a series of developments within the landscape/seascape and would not necessarily become the dominant or defining characteristic of the seascape nor have significant cumulative effects; and

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

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

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

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

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

1.11. VISUAL REPRESENTATIONS

1.11.1. OVERVIEW

174. Zones of Theoretical Visibility (ZTVs) and visualisations (wirelines or wirelines and photomontages) are graphical images produced to assist and illustrate the SLVIA and the cumulative assessment. The methodology used for viewpoint photography and photomontages has been produced in accordance with the NatureScot guidance on Visual Representation of Wind Farms, Version 2.2 (2017), the Guidelines for Landscape and Visual Impact Assessment, Third Edition (GLVIA 3) (Landscape Institute and IEMA, 2013) and the Landscape Institute Technical Guidance Note on Visual Representation of Development Proposals (2019).

175. ZTVs and visual representations are produced on the assumption that the Proposed Development wind turbines are modelled relative to Lowest Astronomical Tide (LAT) sea level at their maximum blade tip height (355 m). The sea level for LAT is modelled at -2.27 m below Ordnance datum (OD), which is equivalent of LAT for the closest tidal station in Aberdeen. The height of LAT within the Proposed Development array area relative to mean sea level (MSL) is between -2.46 and -2.87 m.

Zone of Theoretical Visibility (ZTV)

176. The ZTVs in Figure 15.5 – 15.13 have been calculated using GIS software to generate a ZTV of the Proposed Development to demonstrate the theoretical extent of visibility from any point in the study area.

177. The ZTVs are based on Ordnance Survey Terrain 5 digital terrain model (DTM) data, to produce detailed ZTV plots to assess particular effects, such as along the coastline. The computer model will include the entire study area and takes account of atmospheric refraction and the Earth's curvature. The resulting ZTV plots have been overlaid on Ordnance Survey mapping at an appropriate scale and presented as figures using desktop publishing or graphic design software.

178. Cumulative ZTV plots based on the intervisibility of the Proposed Development and other relevant developments within the study area have also been produced.

179. There are limitations which should be considered in the interpretation and use of the ZTV as follows.

- Where the ZTV has been calculated using Ordnance Survey Terrain 5 DTM, this will not account for the screening effects of vegetation or built form unless added in the form of OS Vectormap data or digitally added and stated on the figure.
- The ZTVs are based on theoretical visibility from 2 m above ground level.
- The Blade Tip ZTV does not indicate the decrease in visibility that occurs with increased distance from the array area. The nature of what is visible from 3 km away will differ markedly from what is visible from 10 km away, although both are indicated on the Blade Tip ZTV as having the same level of visibility.
- There is a wide range of variation within the visibility shown on the ZTV, for example, an area shown on the blade tip ZTV as having visibility of seven WTGs may gain views of the smallest extremity of blade tips, or of seven full WTGs. This can make a considerable difference in the effects of the Proposed Development on that area.

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

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

1.11.2. BASELINE PHOTOGRAPHY

Overview

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

183. The following photographic information is recorded:

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

- GPS recorded Above Ordnance Datum (AOD) height data;
- use of a fixed 50 mm focal length lens is confirmed;
- horizontal field of view (in degrees); and
- bearing to Proposed Development.

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

185. 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.

- *Guidelines for LVIA (GLVIA3) para 8.22 state – 'In preparing photomontages, weather conditions shown in the photographs should (with justification provided for the choice) be either:*
- *representative of those generally prevailing in the area; or*
- *taken in good visibility, seeking to represent a maximum visibility scenario when the development may be highly visible'.*

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

1.11.3. VISUALISATIONS

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

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

189. 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.

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

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

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

193. Wireline representations that illustrate the Proposed Development and set within a computer-generated image of the landform are used in the assessment to predict theoretical appearance of the WTGs. These are produced with Resoft WindFarm software and are based on OS Terrain 5 DTM. There are limitations in the accuracy of digital terrain model (DTM) data so that landform may not be picked up precisely and may result in WTGs being more or less visible than is shown, however, the use of OS Terrain 5 minimises these limitations. Where descriptions within the assessment identify the numbers of WTGs visible this refers to the illustrations generated and therefore the reality may differ to a degree from these impressions.

194. Daytime visualisations and wirelines show a WTG model which represents the maximum development scenario of the Proposed Development in the array area and allow the potential proportions of the WTGs to be appreciated from the visualisations.

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

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

197. The 53.5 degree field of view wirelines and photomontages are prepared using a planar projected image and should also be viewed flat at a comfortable arm's length. These images are each printed on paper 841 x 297mm (half A1) which provides for a relatively large scale image.

198. 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.

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

1.11.4. NIGHT-TIME VISUALISATIONS

200. The visual effect of the Proposed Development at night has been assessed in Chapter 15, informed by the night-time photomontage visualisations produced from representative viewpoints, to visually represent aviation and marine navigation lighting at night. Photomontages showing aviation lighting at 2,000 cd are provided to support the assessment.

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

202. 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.

1.11.5. INFORMATION ON LIMITATIONS OF VISUALISATIONS

203. 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.

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

- a visualisation can never show exactly what the Proposed Development will look like in reality due to factors such as: different lighting, weather and seasonal conditions which vary through time and the resolution of the image;
- the images provided give a reasonable impression of the scale of the WTGs and the distance to the WTGs but can never be 100% accurate;
- a static image cannot convey turbine movement, or flicker or reflection from the sun on the turbine blades as they move;
- the viewpoints illustrated are representative of views in the area, but cannot represent visibility at all locations;
- to form the best impression of the impacts of the Proposed Development proposal these images are best viewed at the viewpoint location shown;
- the images must be printed and viewed at the correct size (260 mm by 820 mm);
- images should be held flat at a comfortable arm's length. If viewing these images on a wall or board at an exhibition, stand at arm's length from the image presented to gain the best impression;
- it is preferable to view printed images rather than view images on screen. Images on screen should be viewed using a normal PC screen with the image enlarged to the full screen height to give a realistic impression; and
- there are practical limitations to shooting viewpoint photographs only in very good or excellent visibility and at particular times of day. It is a limitation of the visual representations that photographs were not taken during summer months, when visibility conditions are typically better, however limitations have been minimised through the timing of surveys during the most favourable periods of very good or excellent visibility during surveys between October 2021 – January 2022. These limitations relating to winter viewpoint photography do not affect the assessments of likely significance assessed for relevant receptors, which assume optimum visibility using the wireline visualisations to inform assessments and are informed by professional judgement of the effects of offshore wind turbines at similar range gained from other projects that provide precedent for magnitude of change judgements.
- It is a limitation of the visual representations that baseline photography from the Isle of May and Bell Rock lighthouse has not been undertaken, with wireline visualisations provided from these locations.

1.11.6. TECHNICAL METHODOLOGY - VISUALISATIONS

205. In accordance with the requirements of Landscape Institute (2019) Technical Guidance Note 06/19 Table 1.11 sets out the technical information for the preparation of the visualisations contained in Annex 10.6.

Table 1.11: 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
Photography process	Camera used on fully manual settings. Photographs taken in RAW image format. Bracketed exposures are taken for each view and those depicting the clearest images are selected to prepare the panoramic image
Preparation of panoramic photographs	PTGUI v12.8 is used to join and cylindrically project the images. Adobe Photoshop 2021 used to correct tonal alterations and create an even range of exposure across the photographs so that the individual photographs are not apparent. Planar panoramic images are prepared using Resoft Windfarm software or Hugin Panorama Stitcher
3D Model/Visualisation	
Topographic height data	Ordnance Survey Terrain 5 (5m resolution). Ordnance Survey 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.
Markers for vertical alignment	Existing OWF WTGs and their known coordinates.
Rendering software	Resoft Windfarm v.5.2.5.3 (Wind turbines in wirelines and photomontages). Sketchup or AutoCAD Map 3D 2018 (OSPs, Met Mast and jacket foundations). Autodesk 3ds Max 2018. Visual Nature Studio V 3.10.
Limitations	
Terrain data	There may therefore be local, small-scale landform that is not reflected in the data and subsequently the visualisation but may alter the real visibility of the Proposed Development, either by screening theoretical visibility or revealing parts of the Proposed Development 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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