Contents

List of Tables

List of Figures

Glossary

Assessment (Landscape)	An umbrella term for description, classification and analysis of landscape.
Baseline	The landscape and visual character of the study area as it exists at the commencement of the assessment process – i.e. prior to the development proposal under consideration including the operational and consented wind farms within the study area identified to be taken account of in the assessment.
Blade Tip visibility	Term used when referring to analysis of Zones of Theoretical Visibility which are based on predicted visibility of any part of the proposed Wind Turbine Generators (WTGs) up to the full height of blade tip.
Country	The rural environment and its associated communities (including the coast).
Cumulative Effects	Effects arising from the additional changes to the landscape or visual character caused by a proposed development in conjunction with other developments (associated with it or separate to it).
Digital Terrain Model (DTM)	Computer generated three dimensional model based on aerial survey of ground surface (e.g. Ordnance Survey *Profile data*). Often utilised as a basis for visibility modelling over large areas.
Diversity	Where a variety of qualities or characteristics occur.
Effect	The result of an impact on a landscape or visual receptor.
Element	A component part of the landscape (e.g. roads, hedgerows, woods).
Field Pattern	The pattern of hedges and walls that define fields in farmed landscapes.
Future Cumulative	Application and scoping stage wind farms within the study area included in the assessment.
Horizontal Subtended Angle	The angle measured in degrees from the left most visible part to the right most visible part of any development.
Key Characteristics	The elements of the landscape and/or their inter relationship which form the defining components of the landscape.
Impact	The change arising for a landscape or visual receptor as a result of some form of alteration to the baseline.
Land Cover:	Combination of land use and vegetation that covers the land surface.
Landform	The topography of land or seabed, the extent to which the elevation changes and resulting features.
Landscape	Human perception of the land conditioned by knowledge and identity with a place (as defined in the *Guidelines for Landscape and Visual*

	Impact Assessment (GLVIA) (The Landscape Institute and the Institute of Environmental Management and Assessment (IEMA), 2002).
	An area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors (as defined in the *European Landscape Convention* (Council of Europe, 2000).
Landscape Capacity	The degree to which a particular landscape character type (LCT) or area is able to accommodate change without unacceptable negative effects on its character. Capacity is likely to vary according to the type and nature of the changes being proposed. The capacity of the landscape is derived from a combination of Landscape Character Sensitivity, Visual Sensitivity and Landscape Value.
Landscape Character	The distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape, and how this is perceived by people. It reflects particular combinations of geology, landform, soils, vegetation, land use and human settlement. It creates the particular sense of place in different areas of the landscape.
Landscape Character Area	These are single unique areas which are the discrete geographical areas of a particular landscape type.
Landscape Character Type (LCT)	A landscape type will have broadly similar patterns of geology, landform, soils, vegetation, land use, settlement and field pattern discernible in maps and field survey records.
Landscape Effect	The consequence of change in the elements, characteristics, qualities and overall character of the landscape as a result of any development. These effects can be positive, neutral or negative.
Landscape Feature	A prominent eye-catching element or landmark (e.g. church spire, wooded hilltop).
Landscape Impact	The change in the elements, characteristics, qualities and overall character of the landscape as a result of any development.
Landscape Quality (or Condition)	Based on judgments about the physical state of the landscape and about its intactness. Also relates to the state of repair of individual features and elements which make up character in any one place.
Landscape Resource	The combination of elements that contribute to landscape context, character and value.
Landscape Sensitivity	The sensitivity of a landscape is based on combining value and susceptibility of the resource to the change envisaged by a proposed development.
Landscape Susceptibility (to a specific type of change)	The extent to which a landscape can accept change of a particular type and scale and is assessed in relation to the following: • existing land use; • pattern and scale of the landscape and its elements/features; • simplicity/complexity of the landscape;

- landscape quality or condition including presence of any detracting features;
- the nature of skylines;
- visual enclosure/openness of views and distribution of visual receptors;
- value placed on the landscape – which may be expressed through designation or other identifiable form of recognition; and
- scope of mitigation, which will be in character with the existing landscape.

Land Use	The primary use of land, including both rural and urban activities.
Landscape Value	The relative value or importance attached to a landscape (often as a basis for designation or recognition), which expresses commonly held national or local perception of its quality, special qualities and/or scenic beauty, tranquillity or wildness and cultural associations.
Magnitude of Change	The magnitude of change arising from a proposed development is described as high, moderate, low or negligible based on the interpretation of a combination of parameters, as follows: • distance of the viewpoint from the development; • duration of the predicted impact; • extent of the development in the view (e.g. the horizontal angle subtended by it); • angle of view in relation to main receptor activity; • degree of contrast; • visual permeability of the development (i.e. extent to which views will be blocked or will be retained, albeit interrupted and altered); • background to the development; and • extent and nature of other built development visible.
Methodology	The specific approach and techniques used for a given study.
Mitigation Measures	Measures including any process, activity or design process to avoid, reduce, or remedy negative landscape and visual impacts of a development. Mitigation can also apply to the improvement of existing negative effects associated with existing developments/features in the landscape.
Policy Woodlands	A diverse and multi-purpose woodland, historically associated with plantings around country houses.
Perception (of Landscape)	The psychology of seeing and possibly attaching value or meaning to the landscape.
Receptor	Physical landscape resource, special interest or individual or group experiencing the view liable to change as a result of the proposed development.
Receptor Location	Location occupied by identified receptors.

Residual Effects	Effect of development after mitigation proposals are taken into account.
Scoping	The process of identifying likely significant effects of a development on the environment – which may be carried out in a formal or informal way.
Seascape	An area of sea, coastline and land, as perceived by people, whose character results from the actions and interactions of land with sea, by natural and/or human factors (definition from *An Approach to Seascape Character Assessment*, Natural England, 2012).
Seascape Character	Seascape character is a distinct and recognisable pattern of elements in the seascape that makes one seascape different from another, rather than better or worse (definition from *An Approach to Seascape Character Assessment*, Natural England, 2012).
Seascape Sensitivity	The sensitivity of a seascape is based on combining value and susceptibility of the resource to the change envisaged by a proposed development.
Seascape Susceptibility (to a specific type of change)	The ability of a seascape to respond to and accommodate change. It reflects seascape character, the nature of change and the way both are perceived and experienced by people (definition from *An Approach to Seascape Character Assessment*, Natural England, 2012).
Significant Effect	An effect which is considered by the assessor to be "significant" in terms of the Environmental Impact Assessment Regulations (85/337/EEC) which require the identification of significant effects.
The Development/ Development	Refers to WTGs, inter-array cables, OSPs and the Offshore Export Cable and any other associated works (all elements associated with this application)
Visual Amenity	Particular composition of landscape elements that contribute to a view, or views. The value of a particular area or view in terms of what is seen (as defined in the GLVIA (Landscape Institute and Institute of Environmental Management and Assessment, December 2013).
Visibility Analysis	The process of identifying theoretical (based on digital modelling) and/or actual predicted areas from where any given development may be seen.
Visual Effect	The consequence of change in the appearance of the landscape as a result of a development, which may be positive or negative.
Visual Impact	The change in the appearance of the landscape and nature of views which may be negative or positive.
Viewpoint Sensitivity	Based on combining value and susceptibility of the view or visual amenity to the change envisaged by a proposed development. Taking into account the following:

- location and context of the viewpoint;
- land use or main activity at the viewpoint;
- frequency and duration of use;
- seascape or landscape character and quality of the intervening seascape or landscape; and
- importance of the view (which may be determined with respect to its popularity or number of affected people, its appearance in guidebooks, on tourist maps and the facilities provided for its enjoyment and references to it in literature and/or art).

Zone of Theoretical Visibility	The area predicted to have views of a proposed development on the basis of a digital terrain model or digital surface model, which may/may not take account of land cover features.

Abbreviations and Acronyms

AGLV	Area of Great Landscape Value
AOD	Above Ordnance Datum
FTOWDG	Forth and Tay Offshore Wind Developers Group
GDL	Garden and Designed Landscape
GLVIA	Guidelines for Landscape and Visual Impact Assessment
HSA	Horizontal Subtended Angle
LAT	Lowest Astronomical Tide
LCA	Landscape Character Assessment
LCT	Landscape Character Type
LLA	Local Landscape Area
MOD	Ministry of Defence
MS	Marine Scotland
NCN	National Cycle Network
OfTW	Offshore Transmission Works
OnTW	Onshore Transmission Works
OS	Ordnance Survey
OSP	Offshore Substation Platform
SA	Regional Seascape Character Area
SCA	Seascape Character Assessment
SLV	Seascape, Landscape and Visual
SLVIA	Seascape, Landscape and Visual Impact Assessment
SNH	Scottish Natural Heritage
WTG	Wind Turbine Generator
ZTV	Zone of Theoretical Visibility

12 Seascape, Landscape and Visual Impacts

12.1 Introduction

1 This chapter presents the assessment of potential Seascape, Landscape and Visual (SLV) impacts predicted to arise from the Inch Cape Wind Farm and associated Offshore Transmission Works (OfTW) within the Firths of Forth and Tay.

2 The Seascape, Landscape and Visual Impact Assessment (SLVIA) considers potential effects including cumulative effects on:

- Seascape character caused by changes in the key characteristics and qualities of the seascape as a result of the Inch Cape Wind Turbine Generators (WTGs) and Offshore Substation Platforms (OSPs);
- Landscape character and designated landscapes caused by changes in the key characteristics and qualities of the landscape as a result of the Inch Cape WTGs and OSPs;
- Visual amenity caused by changes in the appearance of the seascape and/or landscape as a result of the Inch Cape WTGs and OSPs; and
- Potential SLV amenity effects resulting from the construction of the Offshore Export Cable.

3 The following appendices and chapters should be read in conjunction with this chapter and the introductory chapters:

- *Appendix 12A: Seascape, Landscape and Visual Impact Baseline;*
- *Appendix 12B: Zones of Theoretical Visibility Analysis;*
- *Appendix 12C: Viewpoint Assessment;*
- *Appendix 12D: Regional Seascape Assessment;*
- *Appendix 12E: Seascape, Landscape and Visual Figures (*Figures 12.1-12.34*);*
- *Appendix 12F: Seascape and Landscape Visualisations (*Figures 12.35 – 12.60*);*
- *Appendix 12G: Additional Wirelines for Information;*
- *Appendix 12H: The Likely Observability of Offshore Wind Turbine Lighting;*
- *Appendix 6A Design Considerations;*
- *Chapter 13: Cultural Heritage and Marine Archaeology;*
- *Chapter 15: Shipping and Navigation;*
- *Appendix 15A: Marine Traffic Validation Study;*
- *Appendix 15C.1: Navigational Risk Assessment; and*
- *Chapter 16: Socioeconomics.*

4 Where figures are referenced in this chapter they are contained in either *Appendix 12E, 12F* or *Appendix 12G*.

5 As the seascape and landscape surrounding the area in which the Development is located already accommodates both operational and consented wind farms (both onshore and offshore), and other vertical, tall structures (the oil rig maintenance structures in Dundee), this SLVIA has been carried out on the basis of the addition of the Inch Cape WTGs and OSPs to this existing baseline. As the Inch Cape WTGs and OSPs will likely only be viewed with these schemes, this approach has been agreed with consultees during the consultation process as being acceptable. Therefore, the baseline referred to throughout this assessment includes both the relevant operational and consented wind farms (and the oil rig maintenance structures in Dundee where relevant). An assessment of the effects of the Development with the relevant operational and consented schemes: (the baseline) and application or scoping stage wind energy developments has also been carried out (the future cumulative scenario).

12.2 Consultation

6 A scoping report for the Development was issued by ICOL in April 2017. ICOL held a stakeholder meeting on the 22nd May 2017 to clarify the proposed methodology and approach and to address questions from stakeholders in order to help them formulate their Scoping response. Details of the Pre-Scoping Opinion Stakeholder meeting are provided in Table 12.1 below.

7 Marine Scotland (MS-LOT) acting as consenting authority to the Scottish Ministers responded with a Scoping Opinion in July 2017. Issues relating to the SLVIA are listed in Table 12.2, where these have been addressed in this Environmental Impact Assessment (EIA) Report this has been identified.

8 Key consultees who responded to the Scoping Opinion on the matter of SLVIA were:

- SNH;
- East Lothian Council (ELC);
- Angus Council; and
- Aberdeenshire Council (responded at a later date)

9 Dundee City Council, Scottish Borders Council and Fife Council had no comments specific to the SLVIA.

10 In addition to the responses provided in the formal Scoping Opinion (Table 12.2 and Table 12.3), further consultation has been undertaken in relation to clarifying the scope of the assessment, relevant details of which are included in the consultation Table 12.4 below.

11 The information received through the Scoping Opinion, along with the additional consultations and recognised best practice, has informed the methodology and scope for the assessment of the impacts presented in this chapter.

12 In addition to this, the SLVIA utilises the approach established by the Forth and Tay Offshore Wind Developers Group (FTOWDG) [1] initiative, where relevant and as agreed by SNH and detailed within the assessment.

Table 12.1: Pre-Scoping Opinion Stakeholder Meeting (22nd May 2017)

Consultees	Issue and ICOL response
SNH, ELC, MS-LOT	ICOL met with SNH, ECL and MS_LOT at a stakeholder meeting on 22 May 2017 to discuss in more detail the proposed approach to the SLVIA. ICOL agreed to include North Berwick Law as a specific viewpoint. ICOL provided wirelines from Berwick Law, Tantallon Castle, Ravenshaugh Sands and Yellow Craig and an additional note in relation to the proposed study area for Seascape, Landscape Visual Impact Assessment ("SLVIA"). ICOL has agreed that these will be included in an appendix of the EIA Report (see *Appendix 12G*). ELC subsequently requested one further wireframe for a view towards Bass Rock and an assessment of the effect of night time lighting on this viewpoint. ICOL maintain a 50km study area is sufficient and proportionate to assess the potential significant effects from the Revised Development (see *Section 12.6.1*).

Table 12.2: Scoping Opinion

Consultees	Issue and ICOL response
Scottish Ministers (Scoping Opinion)	Study Area and Viewpoints • As the turbine height in the Revised Development are larger than any that have been considered previously the Scottish Ministers consider that using a 50km radius study area with the addition of potentially sensitive visual receptors located outside this will ensure that areas where there could be a significant effect will be taken into account. • The additional potentially sensitive visual receptors should be as agreed with the relevant local authorities. The Scottish Ministers agree with the provision of wirelines from Berwick Law, Tantallon Castle, Ravenshaugh Sands and Yellow Craig for information and recommend that the additional viewpoint towards Bass Rock as suggested by ELC is included. • That ICOL discuss with Angus Council the inclusion of viewpoints for Cat Law, Dreish and Airlie Monument. • That ICOL retake photographs where stakeholders have recommended that this should be done to represent clearer views or to adhere to SNH's new guidelines.

[1] FTOWDG was formed in 2009 and was chaired by The Crown Estate and representatives from the offshore wind farms in the outer Firth of Tay: Inch Cape; Neart na Gaoithe (NNG); and the Firth of Forth Round 3 Zone (Seagreen) (see Figure 12.19 which identifies the location of NNG and Seagreen).

Scottish Ministers (Scoping Opinion)	Design The Scottish Ministers • Agree with the summary of potential effects and whether they should be scoped in or out as listed in Table 9-5 and 9-6 but note that the assessment should include additional viewpoints (see above). • Advise ICOL provide a clear explanation of the approach being taken to the wind farm design and the choice of layout taking into account advice from SNH and comments received previously from Angus Council. • Advise ICOL that where the design and layout differ from SNH guidance reasons for this must be given.
Scottish Ministers (Scoping Opinion)	Assessment Methodology and Approach The Scottish Ministers • Agree that the proposed development should be considered in relation to the consented development rather than the original "worst case". • Agree that the baseline coastal character assessment previously undertaken by the Forth and Tay offshore wind developer's group can be used, see *Appendix 12D: Regional Seascape Assessment.* • Agree with the suggestion by SNH that a comparison of the model outputs of the increase in turbine size in appropriate increments (either as individual or composite ZTVs) with the ZTV for the 2014 consented scheme is provided to give more detailed information on the amount and range of visibility of the larger turbines.
Scottish Ministers (Scoping Opinion)	Assessment Methodology and Approach – Cumulative Impacts The Scottish Ministers advise that the following developments should be considered in the cumulative impact assessment for SLVIA: • Worst case scenario of Neart na Gaoithe (2014 as consented) or Neart na Gaoithe (2017 scoping report) • Worst case scenario of Seagreen Alpha and Bravo (2014 as consented) or Seagreen (2017 scoping report) • Kincardine Offshore Windfarm • Forthwind Offshore Windfarm (2016 consent) • Forthwind Offshore Wind Demonstration Project • Onshore wind farms as advised by Local Authorities

Table 12.3: Scoping responses and actions

Consultees	Scoping Response	ICOL Response
SNH	Design: SNH raised concerns over the Wind Farm design and that it is contrary to SNH guidance. Request that there is a clear statement of the design rationale, including any technical constraints which have influenced the turbine layout.	The design rationale and approach were discussed with SNH and MS-LOT at September 2017 consultation meeting when the key design factors from all environmental and technical considerations were identified. This information and the design rationale is provided in *Appendix 6A Design Considerations*.
	Design: Suggestion of reviewing the embedded design mitigation and reworking the previous design sensitivity analysis.	This was discussed with MS-LOT and SNH at the September 2017 consultation meeting when it was agreed that the key findings of the design sensitivity analysis remain valid, namely that a grid or offset grid layout of turbines corresponds to the most consistently visually balanced appearance to the proposed WTGs.
	Study Area: SNH broadly accept the 50 km study area but noted there may be sensitive visual receptors on the border or just beyond that would need consideration.	As confirmed by MS-LOT the study area has been retained at 50 km radius with the addition of one viewpoint at North Berwick Law and illustrative wirelines from more distant locations requested by consultees.
	Baseline: SNH advise that the coastal character assessment previously undertaken by the FTOWDG can be used for this EIA Report.	Noted and applied, see *Section 12.6.5*, paragraph 95, Table 12.9 and *Appendix 12D*.
	ZTV: SNH request that it would be useful to explore the changes in visibility between the 215m high turbines to the larger turbines proposed using an incremental ZTV.	Discussed at subsequent meetings when limited changes in ZTV for Scoping stage layout at 301m to blade tip and the consented Inch Cape development at 215m were noted. A further comparative blade tip ZTV for the proposed Inch Cape Wind Farm (291m to blade tip) with the consented Inch Cape development was provided to SNH during consultation. Horizontal angle subtended ZTVs have been provided in *Appendix 12E.*
	Viewpoints: SNH are content with the proposed viewpoint selection, taking into consideration any sensitive locations on the borderline of the 50km study area.	Noted. An additional viewpoint at North Berwick Law (Viewpoint 26) was agreed following discussions with ELC, due to its elevated location providing panoramic views for many visitors and walkers. Further illustrative wirelines from Airlie Monument in Angus, Tantallon Castle,

Consultees	Scoping Response	ICOL Response
		Ravenshaugh Sands, Yellow Craig, and a coastal route view towards Bass Rock in East Lothian have been provided in *Appendix 12G*. The additional wirelines are provided for information only and have not formed part of the SLVIA.
	Photography: General acceptance to retaining original photography but new photographs will be needed where baseline has substantially changed.	New photography was taken for 12 of the 25 Inch Cape 2013 EIA Photographs following a review of baseline changes.
	Wirelines: SNH request the exploration of the changes in turbine height from the Original Development to the proposed through the use of wirelines and comparative distances.	Comparative wirelines were tabled at the August 2017 consultation meeting, and a further set of comparative wirelines provided during subsequent consultation.
	Photomontages: SNH advise that the photomontages should provide accurate turbine tower widths and blade widths for the taller turbine.	Noted. The photomontages use a model based on the expected worst-case dimensions of the turbine models to be shown in the assessment. As WTGs of the proposed worst case do not currently exist, dimensions have been extrapolated to ensure they remain proportionate relative to the proposed height. Dimensions used in the photomontages comprise: 291m blade tip height, 166m hub height; tower 10m diameter at base and 7.5m diameter at top; hub 15m diameter; nacelle 26m x 9.5m x 9.5m; maximum blade width 9.5m. Should the largest turbine be constructed these dimensions may vary slightly but are unlikely to materially alter the appearance of the turbines from those shown in the visualisations.
	Cumulative Impact Assessment (CIA): Acknowledgment that the cumulative effects with NNG and Seagreen will intensify and that a rigorous design process is likely to reduce the potential for significant effects.	Noted. The consented (2014) NNG and Seagreen Wind Farms, as agreed, have been used in the CIA. The design criteria developed through the FTODWG Sensitivity Design Analysis will continue to be applied, within the context of other hard constraints. See *Section 12.5,* and *Appendix 6A*

Consultees	Scoping Response	ICOL Response
	CIA: SNH request that Kincardine Floating Wind Project is included with regard to sequential cumulative impacts on coastal transport routes.	Kincardine Floating Wind Project is considered in the cumulative assessment.
ELC	Data: ELC make reference to their *Local Landscape Designation Review* (2016) published as Technical Note 9 and Appendices I to IV.	ELC's Landscape Designation Review (2016) and Technical Note 9, Appendices 1 to VI were consulted during preparation of the SLVIA. It is noted that it is not adopted guidance at the time of preparing this assessment.
	Viewpoints: ELC have concerns that visuals from East Lothian would be scoped out.	Viewpoint 25 at Dunbar and a new viewpoint at North Berwick Law (Viewpoint 26) are included in the SLVIA along with additional illustrative wirelines from the ELC coast provided in *Appendix 12G*. The illustrative wirelines will not undergo any assessment.
	Onshore Works: Consideration of Landscape and Visual impacts of the onshore works within scope of SLVIA.	The SLVIA considers the construction and installation of the landfall connection up to high water. The onshore application submitted to ELC in March 2018 assesses all other onshore works. Reference will be made to the EIA submitted as part of this application, and an overall assessment has been included in this EIA Report.
	CIA: ELC considers there are wind turbines outwith the 50 km ZTV that will add to the cumulative impact upon views from East Lothian. They request that Earls Seat, Crystal Rig and Aikengall should be included as a minimum.	The cumulative search area extended to 65 km from the outer Inch Cape turbines and those sites mentioned within ELC are considered. It is noted from subsequent discussions with ELC that other wind farms in the view from North Berwick will be referenced but not included within the full cumulative assessment.
	Lighting: ELC request that the effects on night lighting on East Lothian are assessed and including cumulative sites.	ICOL commissioned the University of Edinburgh's Institute of Astronomy to carry out an assessment on the potential observability of lighting from an offshore wind farm, see *Appendix 12H: The Likely Observability of Offshore Wind Turbine Lighting.* This report assessed the likely detectability of lighting required at the Wind Farm, taking into account the properties of the human eye. For example, a 2000 candela light would be

Consultees	Scoping Response	ICOL Response
		potentially visible (on a moonless night, in clear conditions away from street lighting) to a distance of approximately 37 km for a red light (see Figure 4: The illuminance of a single red light as a function of distance). Therefore, it is unlikely that the 2000 red candela (the highest intensity light currently required to be installed on the WTGs) will be visible from East Lothian Coast (the closest locations being Bass Rock at approximately 46.9 km, or St Baldred's Boat near Tantallon Castle at 48.6 km). In the unlikely scenario that the WTG lights are observed together due to a particular alignment of WTGs (creating the illusion of a higher intensity light on the human eye) it is considered that the impacts would not result in a significant effect.
	Photographs: ELC request that a new photograph is taken from Dunbar due to cloud shadows at location of proposed development.	It is noted that the photography at Dunbar used for the Inch Cape 2014 Consent SLVIA demonstrates a relatively clear horizon line. However, as new photography at Berwick Law is required, the photography will be retaken at Dunbar.
	Study Area: Concerns that a 50 km Radius would not be appropriate and recommend a 60 km radius.	In agreement with MS-LOT the study area has been retained at 50 km radius with the addition of illustrative wirelines from more distant locations requested by consultees. This was discussed at the pre-submission meeting where it was explained that the detailed study area was retained at 50 km, but this was supplemented by one additional viewpoint (North Berwick Law at 52.47 km) that is at an elevated position providing panoramic views to many visitors and walkers, and as such has also been assessed.
	Viewpoints: Request for North Berwick Law as a specific viewpoint. In addition, views towards Bass Rock from locations along the East Lothian Coast are important to assess.	North Berwick Law has been included as a specific viewpoint due to its elevated location on a popular hill walking summit where panoramic views are obtained. Illustrative wirelines from Tantallon Castle, Ravenshaugh Sands, Yellow Craig, and a coastal route view

Consultees	Scoping Response	ICOL Response
		towards Bass Rock have been provided in *Appendix 12G*.
	Weather effects (climatic factors): ELC requested that consideration should be given to the effects of wind farms on local weather and the subsequent impacts on landscape/ seascape. ELC provided a series of citations.	ICOL reviewed the information provided by ELC, further information is provided in table 12.4 below. Whilst ICOL appreciate that on very rare occasions the creation of weather effects may occur, it is unlikely to lead to a significant effect and therefore has not been assessed in the EIA.
Angus Council	Study Area: Should be increased to 60km radius.	In agreement with MS-LOT and SNH the study area has been retained at 50 km radius with the addition of illustrative wirelines from more distant locations requested by consultees.
	Lighting: lighting scenarios required comparing the brightness of lighting on the telecommunications mast at Sidlaws.	There are technical difficulties in making comparisons of perceived lighting brightness due to the onshore and offshore locations, changes of perceived brightness over distance as well as environmental factors. Therefore, a meaningful comparison is not possible and thus not been included in the assessment. The assessment includes four night time visualisations showing the lighting requirements for the Inch Cape Offshore Wind Farm. This was agreed by MS-LOT and SNH as an appropriate means of assessing the impacts from turbine lighting.
	ZTV: Angus Council require a detailed 50km basemap to determine any additional VPs. Hub and tip height comparative needed.	A detailed ZTV was issued to Angus Council.
	The Council noted that additional VPs may be required from Braes of Angus, including Cat Law, Dreish and Airlie Monument. Later correspondence on review of ZTV, Angus requested an additional viewpoint at Airlie Monument.	Working wirelines were provided to the Council and it was agreed that illustrative wirelines from Cat Law and the Airlie Monument would be provided for information only and are included within *Appendix 12G*.
	Photography: advised they were happy with photography reuse, noting new photography would be needed at any new VPs and any VPs where baseline has changed.	New photography was taken for 12 of the 25 Inch Cape 2013 EIA Photographs following a review of baseline changes.

Consultees	Scoping Response	ICOL Response
	CIA: need to included large turbine developments in Eastern Perthshire and Glen Dye in Aberdeenshire. CIA to be agreed with Angus ahead of assessment. Development update can be requested from the council. Dusty Drum, East Skichen and Nether Kelly can be scoped out.	All known operational, consented and proposed wind farms within a 65 km radius of the Development were included in an initial site search and those with which the addition of the Development could have potential for significant effects have been taken forward to the assessment.
	ICOL to provide their Intentions on the existing consents. Angus suggested the narrowing of envelope and creating greater consistency between the other offshore developments.	The development envelope is detailed in *Chapter 4: Process and Methodology* and the worst case scenario and cumulative scenarios considered are explained in *Section 12.5.2* of this SLVIA and further detail in respect of the layout design is provided in *Section 12.5.4* as well as *Chapter 6: Site Selection and Alternatives* and *Appendix 6A*.
Aberdeenshire Council	General agreement to the SLVIA approach and endorse SNH's scoping response. Consider that four VPs proposed to be assessed in Aberdeenshire are appropriate, but request updated photography where required.	Noted. New photography taken for VPs 2, 3 and 4 in Aberdeenshire.
	Reference to Fetteresso Onshore Wind Farm and other cumulative sites to be considered, and request inclusion of Kincardine Offshore Wind Farm in the cumulative assessment.	The cumulative assessment has reviewed all wind energy developments within the study area and included those with which the addition of the Development would be most likely to result in significant effects. Due to the potentially evolving nature of baseline data collection a 'cut off' date for projects to be considered is required. Data for the projects to be considered cumulatively were required by 1st November 2017. No turbine dimensions or locations were available for Fetteresso at the time that cumulative data was collected for the SLVIA, for which a Scoping Report was submitted in February 2018. Accordingly, as no data was available, Fetteresso is not included. Kincardine Offshore Wind Farm is included in the assessment.

13 During the compilation of the EIA Report, further consultations were carried out in relation to SLVIA. A summary of the key points has been provided below (Table 12.4).

Table 12.4: Key points from consultations carried out to clarify the Scope of the EIA

Consultee and Meeting	Summary
SNH Conference Call (17/08/2017)	ICOL provided an overview of the Development and clarification that the layout presented in the Scoping Report was indicative to provide consultees with some indication of the scale of the change from the consented Development and to confirm the SLVIA study area. SNH confirmed that they understood this and that the layout presented in the EIA would be illustrative. ICOL explained that the design envelope being considered at Scoping stage was 48 turbines of up to 301m to blade tip (the lowest number of turbines likely at the tallest height) and 72 turbines of 215m to tip (the greatest number of turbines at the lowest height considered). SNH agreed that on initial review of the preliminary wirelines for both scenarios sent to SNH, it was likely that the worst case scenario for Inch Cape would be the tallest turbines as this created the greatest visual presence and result in a greater difference between Inch Cape and NNG and Seagreen. The maximum blade tip height was reduced from 301m at scoping to 291m in the application. Accordingly, the SLVIA has taken account of the tallest proposed turbines (291m) with the consented NNG and Seagreen offshore wind farms. SNH requested that comparative wirelines for the design viewpoints be provided in order for SNH to confirm the worst case scenario. These have been provided to SNH. In respect of the cumulative assessment it was agreed that this should be carried out based on the consented NNG and Seagreen schemes. SNH noted that consultation should be carried out with the LPAs to ensure that consideration is given to the all the relevant projects within the cumulative assessment. ICOL explained the process that SLR would undertake to scope the cumulative assessment from projects identified within 65km radius to those taken forward in the detailed assessment, which comprised collection of data, preparation of ZTVs and review of these in relation to the Inch Cape ZTV and location of landscape and visual receptors including sequential routes through the landscape. ICOL undertook to circulate the list of projects to be considered in the cumulative assessment for agreement with SNH and the LPAs. ICOL explained the appearance of the indicative layout being considered derived from various constraints. SNH requested that further information on the layout evolution be provided in the EIA Report. This is set out in *Sections 12.5 2 – 12.5.4* as well as *Appendix 6A*. ICOL noted that because the application will be considered as a Multi Stage Regulatory Consent, whilst the EIA would commit to specific design principles, ICOL is mindful that the layout should present some irregularities to ensure that the assessment carried out in the EIA is considered realistic worst case. SNH noted that whilst they appreciate this, the new application would need to be consentable.

Consultee and Meeting	Summary
	There was discussion on the extent to which comparative wirelines and/or ZTVs could be produced to explore the impact of increased turbine height. SLR subsequently provided comparative ZTV and wirelines to SNH. SNH advised that any additional SLVIA Viewpoints would need to be agreed with the LPAs. It was agreed that, following the request from ELC, Berwick Law would be included as an additional viewpoint, (Viewpoint 26) in the assessment, and wirelines for illustrative purposes only would be provided for the additional Viewpoints requested by Angus Council and ELC, (see *Appendix 12G: Additional Wirelines for Information*). SLR advised that after completion of a review of the Viewpoint photography used for the consented development, a list of the viewpoints for which photography was to be retained, and for which new photography would be taken would be circulated to MS and SNH for approval.
SNH (Design Meeting 29/09/2017)	ICOL confirmed that the 'worst case scenario' to be used for the purposes of the SLVIA will consist of the tallest proposed turbines at 291m to blade tip (c.f. 301m at scoping stage). SNH agreed that the worst case scenario in respect of NNG and Seagreen should show the tallest proposed turbines at Inch Cape with the consented NNG and Seagreen wind farms as this would demonstrate the greatest difference in appearance of the turbines (tallest turbines with greater spacing at Inch Cape with smaller, more closely spaced turbines at the other offshore wind farms).
	ICOL explained some of the economic and engineering factors which influence the design of the wind farm including; • CFD- highly competitive auction process • Installation challenges – variable sea depths • Logic behind a 48-location grid and a 90-location grid Known environmental considerations to avoid (such as archaeology) ICOL confirmed that the same criteria will be followed during design of the final layout. ICOL provided a demonstration of the Virtual Reality Model showing both 40 and 72 turbines layouts.
SNH (Pre-submission meeting) (07/03/2018)	SNH noted that the assessment should identify the design parameters (and WTG layout) used for NNG and Seagreen (i.e. the 2014 consented parameters that have been used for the purposes of the Inch Cape SLVIA) see Table 12.20. ICOL confirmed that the SLVIA would reiterate the validity of the previous design sensitivity analysis, noting its application in the final design would be subject to considerations identified at the previous meeting (29/09/17). Further information is provided in *Appendix 6A*. SNH acknowledged the technical challenges of producing representative night time visualisations having reviewed working examples tabled at the meeting and discussed the range of parameters involved in their preparation and presentation options. SNH requested that ICOL advise what the councils' views were on submission of night time visualisations. SNH requested that the two proposed OSPs should be labelled in the visualisations.

Consultee and Meeting	Summary
	ICOL confirmed that the assessment has been carried out on the basis of the addition of the Development to the baseline of operational and consented wind farms, as well as the future cumulative context taking account of the application and scoping stage wind farms. ICOL also provided an overview of the assessment findings noting that a key change since the SLVIA for the consented development was completed relates to the cumulative context which now consists of several more operational and consented developments (which are considered as part of the baseline assessment) and only one application and one scoping stage wind farm. SNH requested that an additional copy of the ES SLVIA should be sent to their Aberdeen office.
Aberdeenshire Council (Pre-submission meeting) (08/03/2018)	ICOL noted that Aberdeenshire Council had requested inclusion of the Fetteresso wind farm in the cumulative assessment. ICOL explained that this development had been considered in the initial stages of scoping the cumulative SLVIA, as no layout data was available for Fetteresso at the time the cumulative context (which was fixed at 1st November 2017), it has not been included in the CIA. Aberdeenshire Council requested clear explanation of reasoning behind inclusion of NNG and Seagreen as consented in the cumulative SLVIA. Information on the projects selected in the CIA are included in *Section 12.8* and listed in Table 12.20. Aberdeenshire Council stated they are content to be guided by response from other councils in respect of whether night time visualisations should be presented. Aberdeenshire Council indicated that they would like an electronic version of the EIA Report, and one hard copy of the 4 Aberdeenshire visualisations.
Angus Council (Pre-submission meeting) (08/03/2018)	Angus Council queried the worst case scenario approach being taken in respect of using the tallest turbines rather than the greatest number of turbines, particularly in the context of the cumulative assessment with NNG and Seagreen. ICOL noted that it was agreed with SNH that where there was a greatest difference in height with other the two other offshore projects this would be likely to result in the greatest magnitude of change and consequent effects on seascape, landscape and visual receptors. Angus Council requested further information on distances at which lighting of the WTGs would be seen. ICOL noted that it was the intention to provide greater clarity on this matter and that the available information would be provided in the EIA report. Angus Council requested a copy of SNH's email response in respect of night time lighting visualisations. Subsequently provided to the council.
East Lothian Council (Pre-submission meeting) (13/03/2018)	SLVIA ELC asked how the offshore development would be assessed in relation to the onshore components. ICOL explained that in the new offshore application, ICOL will include a summary of the new onshore application impacts where relevant, so that the new onshore and new offshore elements will be considered together in this application.

Consultee and Meeting	Summary
	ELC noted the approach to terminology for the SLVIA, but had some concern over the assessment criteria descriptions. ICOL noted that they would review the 'magnitude of change' definition used within the assessment, but that the language used in the definitions (e.g. partial loss) inevitably required an element of subjective assessment in their application. ICOL further noted that the assessment was carried out utilising expert opinion and guidance. In respect of ELC's query with regards to night time lighting of the Development, ICOL noted that it was not anticipated that the lighting would be visible due to the intervening distance, and that there would be commentary within the EIA on lighting and distances to which the proposed lighting would be visible. ELC queried whether the SLVIA Viewpoints in East Lothian would be illustrated by photomontages. ICOL stated that was not intended as photomontages were being provided for Viewpoints up to a distance of approximately 30km from the nearest proposed turbine, and that photomontages for distances greater than that were not intended. ELC advised that they would confirm whether they specifically require the additional Viewpoint at North Berwick Law to be illustrated by a photomontage. (Post meeting note – ELC confirmed that they required a photomontage to be prepared for the Berwick Law viewpoint). Weather effects (climatic factors): ICOL noted that there was no intention to assess the impacts on sea fog and climatic consequences in ELC, and that it was unlikely to lead to significant effect. ELC noted that it required some consideration. ICOL noted that they would review the links provided by ELC (in their scoping response) to the information relating to formation of sea fog and local weather conditions at offshore wind farms, but reiterated that it was unlikely to be assessed in the EIA. In addition to the references provided by ELC, ICOL also reviewed other published information on the matter. Through this, the following was noted: *'due to the necessary requirements for formation (existence of two layers with considerably different temperature with the separation line between the two layers close to the hub height of the turbines and very high relative humidity in both layers), it can be assumed that the formation of such wake clouds is a rather rare event. The most likely area for such phenomena is a stripe on both sides of a coast line with the sea and land having considerably different surface temperatures and winds crossing the coastline.'*[2] Therefore ICOL's position is that as it is such a rare event, requiring very specific climatic requirements, any assessment would not lead to a significant effect and thus it is not included within this EIA Report. Discussions with MS-LOT have confirmed its exclusion from the formal Scoping Opinion requirements.

12.3 Scope of Assessment

14 As part of this application Inch Cape Offshore Limited (ICOL) has drawn on the detail presented in the Scoping Report, the Scoping Opinion from MS-LOT and relevant subsequent consultations to agree on those impacts that may lead to a significant effect.

[2] Available at: https://www.dewi.de/dewi/fileadmin/pdf/publications/Magazin_37/07.pdf [Accessed 01/05/18]

Therefore, this chapter focusses on those impacts on SLV Amenity that have been agreed throughout this process as being necessary to be assessed. These are presented in Table 12.5.

15 For clarity, those impacts that have been agreed to be scoped out of the EIA are included in Table 12.6. For further information reference should be made to the Scoping Report and the Scoping Opinion which can be found on Marine Scotland's (MS's) website[3]:

Table 12.5: Scope of assessment covered in this Chapter

Potential Impact	Scope of Assessment	Reason
Construction (& Decommissioning) Phase		
Presence of installation vessels and related works for Export Cable Corridor, and trenching of cable at landfall location.	Assessment of effects upon seascape and/or landscape character, landscape designations and visual amenity.	Construction activities in close proximity to visual receptors and physical impacts upon the seascape and landscape which have the potential for significant, albeit temporary effects.
Operation & Maintenance Phase		
Physical presence of WTGs and OSPs	Assessment of effects upon seascape and/or landscape character, landscape designations and visual amenity.	Physical and perceptual impacts of the wind farm have the potential to create significant effects upon the SLV receptors.
Night time lighting of the WTGs and OSPs.	Assessment of effects upon seascape and/or landscape character, landscape designations and visual amenity.	Visibility of lighting has potential to create significant effects upon the SLV receptors.

[3] Available at: http://www.gov.scot/Topics/marine/Licensing/marine/scoping/ICOLRevised-2017[Accessed 02/05/18]

Table 12.6: Impacts Scoped out of this Chapter

Potential Impact	Justification for Scoping out of the EIA
Construction (& Decommissioning) Phase	
Construction (& Decommissioning) activities in the Development Area may temporarily affect key characteristics of seascape and/ or landscape character, landscape designations and visual amenity.	The impact is temporary and unlikely to lead to a long-term significant effect. Therefore, in line with EIA Regulations does not require assessment. Agreed by MS-LOT in their Scoping Opinion that EIA not required.
Operation & Maintenance Phase	
Routine maintenance activities may affect seascape character area, designated landscape and visual amenity.	Temporary in duration and are unlikely to give rise to any significant effects greater than those associated with the operation of the WTG and construction phase of the Export Cable Corridor and landfall. Agreed by MS-LOT in their Scoping Opinion that EIA not required.

12.4 Regulation and Guidance

16 This section contains a summary of the guidance documents relevant to the SLVIA and a brief review of regulation and planning policy specifically related to SLV assessment issues.

12.4.1 Guidance

17 The SLVIA has considered the relevant guidance provided in the following documents:

- An assessment of the sensitivity and capacity of the Scottish seascape in relation to offshore windfarms (SNH, 2005a).
- Assessing the Cumulative Impacts of Onshore Wind Energy Developments (SNH, 2012a).
- Guidance on the Assessment of the Impact of Offshore Wind Farms: Seascape and Visual Impact Report (Department for Trade and Industry, 2005).
- Guidance on Landscape/Seascape Capacity for Aquaculture (SNH, 2008).
- *Guide to Best Practice in Seascape Assessment* (Countryside Council for Wales (CCW), Brady Shipman Martin, University College Dublin, 2001).
- *Guidelines for Landscape and Visual Impact Assessment* (The Landscape Institute and the Institute of Environmental Management and Assessment (IEMA), 3rd Edition 2013).
- Landscape Character Assessment Guidance of England and Scotland (The Countryside Agency and SNH, 2002).

- Offshore Renewables – guidance on assessing the impact on coastal landscape and seascape (SNH, 2012b).
- Siting and Designing windfarms in the landscape - Version 3 (SNH, 2017a).
- Visual Representation of Windfarms - Good Practice Guidance (SNH, Version 2.2, 2017b).

12.4.2 National Regulation

Marine Policy Statement

18 The *UK Marine Policy Statement* was jointly published in March 2011 by all UK Administrations as part of a new system of marine planning being introduced across UK seas. The Policy Statement recognises that activities and development in marine and coastal areas may give rise to seascape effects, and recommends that marine plan authorities should consider potential impacts at a strategic level, liaising with terrestrial planning authorities where necessary, and utilising appropriate tools such as seascape and landscape character assessment (LCA). It also recommends that the authorities should have particular regard to development within or close to any nationally designated areas.

National Marine Plan

19 Scotland's National Marine Plan (NMP) was published in March 2015 in accordance with the Marine (Scotland) Act 2019 and the Marine and Coastal Access Act 2009 (the Marine Acts). The NMP is described as 'A Single Framework for Managing Our Seas' and sets out policies for the sustainable development of Scotland's inshore and offshore waters. The Marine Acts require that planning decisions will be determined in accordance with the NMP unless relevant considerations indicate otherwise. In relation to seascape/landscape, policy 'GEN 7 Landscape/seascape' states that 'marine planners and decisions makers should ensure that development and use of the marine environment take SLV impacts into account'. The policy recommends that development in the marine environment should, in general, take into account the existing character and quality of the seascape, how highly it is valued and its capacity to accommodate change, with a particular focus on minimising negative impacts on landscape designations.

Scottish Planning Policy

20 National planning policy for land use planning is contained within *Scottish Planning Policy* (SPP) June 2014. In relation to offshore wind development, SPP contains little specific guidance except to say that:

"Plans should promote the developed coast as the focus of developments requiring a coastal location or which contribute to the economic regeneration or well-being of communities whose livelihood is dependent on marine or coastal activities. They should provide for the development requirements of uses requiring a coastal location, including ports and harbours, tourism and recreation, fish farming, land-based development associated with offshore energy projects and specific defence establishments" (Paragraph 90).

SNH Policy and Guidance

21 SNH does not have a specific policy relating to offshore wind energy. Offshore wind development is covered by an overarching Position Statement 'Renewable Energy and the Natural Heritage' (revised 2014).

22 Guidance on assessing the impact of offshore renewables on coastal landscape and seascape was published in March 2012 (SNH, 2012b) and SNH also offers advice and guidance on a case by case basis as referenced in *Section 12.3* in the case of Inch Cape.

12.4.3 Regional and Local Planning Policy

23 The SLVIA study area incorporates six different local authority administrative areas: Aberdeenshire, Angus, Dundee City, Perth and Kinross, Fife and East Lothian.

24 The part of the SLVIA study area falling into Perth and Kinross is relatively small and distant from the Inch Cape WTGs and OSPs and therefore has not been included in this consideration of policy. For the purposes of this assessment, relevant development plans for Aberdeenshire, Angus, Dundee City, Fife, and East Lothian have been considered. These are identified below in Table 12.7, together with landscape (or wind energy related) policies contained within. Local authorities will act as consultees on the application for consents for the Wind Farm and OfTW and are likely to use relevant parts of these policies to guide their consultation responses.

Table 12.7: Regional and Local Development Plan policies relevant to the SLVIA

Local Authority	Regional Plan	Regional Policy	Local Plan	Local Policy
Aberdeenshire	Aberdeen City and Shire Structure Plan 2014	No policies relating specifically to landscape or wind energy	Aberdeenshire Local Development Plan 2017	Policy C2: Renewable Energy Policy E2: Landscape Policy HE1: Protecting historic buildings, sites and monuments Policy HE2: Protecting Historic and Cultural Areas
Policy C2 Renewable Energy: states that Aberdeenshire Council support wind developments which are in appropriate sites and of the right design. The policy also refers to detailed supplementary guidance 'Strategic Landscape Capacity Assessment for Wind Turbines' as a relevant consideration. Policy E2 Landscape: provides guidance on the approach to development and the landscape. It is supported by supplementary guidance 'Special Landscape Areas' which defines areas of particular valued landscapes within the county and sets out guidance to ensure protection.				

Policy HE1 Protecting Historic buildings, sites and monuments: This policy sets out the protection of all listed buildings, archaeological sites and scheduled monuments with regard to their character, integrity and setting.

Policy HE2 Protecting Historic and Cultural Areas: This policy states that development has to consider the preservation and enhancement of conservation areas, both within and outwith where there is potential to affect the setting.

Local Authority	Regional Plan	Regional Policy	Local Plan	Local Policy
Angus	TAYplan - Strategic Development Plan (SDP) 2012 2016-2036 adopted October 2017	TAYplan Policy: Energy Waste and Resources	Angus Local Development Plan 2016	Policy PV6: Development in the Landscape Policy PV8: Built and Cultural Heritage Policy PV9: Renewable and Low Carbon Energy Development

TAYplan Policy 7: This policy is largely related to the management of energy and waste related resources and focuses on onshore renewable proposals, but relevant to this assessment it states that proposals need to consider the sensitivity of the landscape, cumulative sites, and impacts of strategically significant energy proposals. Map 7a Strategic Energy Opportunities identifies the Strategic Offshore Wind Sites of Inch Cape, NNG and Seagreen developments.

Angus LDP: Policy PV6 Development in the Landscape: This policy sets out to protect and enhance the quality of the landscape in Angus, including '*its distinctive local characteristics, and its important views and landmarks*' which would be relevant to offshore development.

Angus LDP Policy PV8 Built and Cultural Heritage: sets out to protect and enhance areas designated for their built and cultural heritage value. It is relevant in so far as acknowledging the settings of built and cultural heritage assets and the potential for the development to affect these. This would be also covered by *Chapter 11.*

Policy PV9 Renewable and Low Carbon Energy Development: This policy ensures that proposals for renewable and low carbon energy developments meet specific criteria, such as minimising impact on amenity, landscape and environment. The policy further stipulates that there should "*be no unacceptable adverse impact individually or cumulatively with other existing or proposed development on: -landscape character, setting within the immediate and wider landscape (including cross boundary or regional features and landscapes), sensitive viewpoints and public access routes".*

Local Authority	Regional Plan	Regional Policy	Local Plan	Local Policy
Dundee City	TAYplan - Strategic Development Plan (SDP) 2012 2016-2036 adopted October 2017	See above	Dundee Local Development Plan 2013	Policy 31: Wind Turbines Policy 47: Environmental Protection Policy 51: Scheduled Ancient Monuments

				and Archaeological Sites Policy 52: Gardens and Designed Landscapes

Policy 31: Wind Turbines: This policy relates to onshore wind turbines, but relevant in the reference to considering '*no unacceptable negative effects in relation to number, height, visual impact, landscape impact…"*

Policy 47: Environmental Protection: This policy is relevant to the SLVIA with regards to potential lighting effects. It states that "All new development or an extension to an existing development that would generate noise, vibration or light pollution will be required to demonstrate that it can be accommodated without an unsatisfactory level of disturbance on the surrounding area."

Policy 51: Scheduled Ancient Monuments and Archaeological Sites: This policy sets out protection to these heritage sites and their settings. It is more directly relevant to *Chapter 11* but has been included with regard to the heritage sites and their contribution to informing the character of a landscape.

Policy 52: Gardens and Designed Landscapes: This policy sets out protection to Gardens and Designed Landscapes and their setting including views to and from them which is relevant to the SLVIA.

Local Authority	Regional Plan	Regional Policy	Local Plan	Local Policy
Fife	TAYplan - Strategic Development Plan (SDP) 2012 2016-2036 adopted October 2017 SESplan June 2013 (Edinburgh, East Lothian, Midlothian, Fife, Scottish Borders, West Lothian) SES plan 2 submitted for examination on 26th June 2017.	See above for TAYplan policies which are relevant SES – No specific policies relating to this development.	FIFEPlan Local Development Plan (due to be adopted shortly)	Policy 11: Low Carbon Policy 13: Natural Environment and Access Policy 14: Built and Historic Environment

SES plan June 2013: Paragraph 125 relates directly to onshore development but states that landscape and environmental quality should be considered for any development as well as cumulative impacts with other sites.

FIFEPlan: Policy 11 – Low Carbon: This policy relates directly to onshore development but considers the landscape and visual, and cumulative aspects that require to be considered for any development.

FIFEPlan: Policy 13 - Natural Environment and Access: This policy sets out conditions for development in relation to the natural environment. Relevant to the SLVIA it includes landscape character and views as a key consideration. FIFEPlan: Policy 14 - Built and Historic Environment: This policy sets out protection to heritage sites, including Gardens and Designed Landscapes, and their settings. It is more directly relevant to *Chapter 11* but has been included with regard to the heritage sites and their contribution to informing the character of a landscape.				
Local Authority	**Regional Plan**	**Regional Policy**	**Local Plan**	**Local Policy**
East Lothian	SESplan June 2013 (Edinburgh, East Lothian, Midlothian, Fife, Scottish Borders, West Lothian) SES plan 2 submitted for examination on 26th June 2017.	SES – No specific policies relating to this development.	Adopted East Lothian Local Plan 2008 Proposed Local Development Plan 2016 due to be adopted mid-2018.	2008 LP: Policy NRG3: Wind Turbines 2016 LP: Policy WD3: All Wind Turbines PROP EGT3: Forth Coast Area of Coordinated Action
ELC LP 2008, Policy NRG3: Wind Turbines sets out that proposals for wind turbines should not have an unacceptable visual impact upon landscape, townscape including impact upon distinctive public views landmark buildings or natural features or routes. ELC Proposed LDP 2016, Policy WD3: All Wind Turbines considers the same relevant factors as the 2008 policy with regards to landscape and visual impacts, and considers cumulative issues with other developments. PROP EGT3: Forth Coast Area of Coordinated Action: This policy relates to electricity grid connections on the Forth Coast from Cockenzie to Torness and whilst the policy does not specifically state any SLVIA constraints the description text infers that all natural and cultural heritage assets must be appropriately taken into account in any development.				

12.4.4 Supplementary Planning Guidance and other Guidance Documents

25 Most local authorities have prepared supplementary planning guidance (SPG) and other guidance documents relating to wind energy, as it has been a requirement for local plans and local development plans to include spatial frameworks for wind farms over 20 megawatts. However, these relate primarily to onshore developments but are useful to reference in gaining an understanding of the potential cumulative sites. A list of relevant SPGs and other guidance documents is shown in Table 12.8 below.

Table 12.8: Local authority SPGs and other guidance documents

Local Authority	Document
Aberdeenshire	*LDP Supplementary Guidance 9: Aberdeenshire Special Landscape Areas,* (April 2017) *Strategic Landscape Capacity for Wind Energy in Aberdeenshire* (March 2014) *Use of Wind Energy in Aberdeenshire Part One – Guidance for Developers* (August 2005a). *Use of Wind Energy in Aberdeenshire Part Two – Guidance for Assessing Wind Energy Developments* (August 2005b).
Angus	*Strategic Landscape Capacity Assessment for Wind Energy in Angus* (March 2014). *Renewable and Low Carbon Energy Development Supplementary Guidance Consultation Draft* - Approved for consultation on 27 October 2016. Consultation period ended on 5 January 2017.
Dundee City	No SPGs relating specifically to WTGs in the landscape.
Fife	*Fife Wind Energy Supplementary Planning Guidance* (SPG) (June 2013). *Review of Onshore Wind Energy in Fife – Strategic Cumulative Landscape and Visual Impact Assessment* (May 2013)
East Lothian	*Guidance for Wind Farms of 12MW and Over* (December 2013) *Planning Guidance for Lowland Wind Turbines* (June 2013) *Landscape Capacity Study for Wind Turbine Development in East Lothian* (2005). *East Lothian Supplementary Landscape Capacity Study for Smaller Wind Turbines* (December 2011). *Local Landscape Designation Review (2016) published as Technical Note 9 and Appendices I to VI (TO BE ADOPTED AS PART OF PROPOSED 2016 LDP)*

26 Of these guidance documents, only the *Fife Wind Energy SPG* specifically refers to offshore wind farms. The guidance recognises that ultimately the Scottish Government will be responsible for determining consents under Section 36 of the *Electricity Act 1989* and for reviewing environmental statements (now EIA Reports) for offshore wind proposals. However, Fife Council will be a key consultee in all proposals brought forward.

27 Policy R3 – Offshore Activities (*Fife Wind Energy SPG*, 2013), states that:

"Fife Council will support offshore renewable energy development provided that it does not have a significant adverse effect on local maritime activities, including shipping, fishing, leisure sailing, diving, on the natural environment including marine habitats and birds, on pipelines, on research activities and on the historic marine environment."

12.5 Design Envelope and Embedded Mitigation

12.5.1 Design Sensitivity Analysis

28 A design sensitivity analysis may be carried out to understand the sensitivity of various aspects of a design concept, with respect to changes in design parameters and how these would alter the appearance of any proposed development. In respect of the Inch Cape Wind Farm, the design sensitivity analysis compared a range of generic design concepts which could be adopted for the three FTOWDG offshore wind farms, in order to identify the most preferable design when the proposed developments are viewed individually and in-combination.

29 A design sensitivity analysis was carried out in 2011 by FTOWDG in respect of three different design concepts for the three offshore wind farm developments comprising the Inch Cape, NNG and Seagreen wind farms. Seagreen has submitted a Scoping Report detailing the intention to submit a new application and NNG submitted a new application in March 2018.

30 A review of the design sensitivity analysis has been carried out as part of this application in light of the change in WTG parameters proposed. This review has determined that the principals established during this process are still relevant. As such, a summary is provided below of the findings of the original analysis.

31 For each of the three developments, three different WTG dimension scenarios were provided by the respective developers, as follows:

- maximum height of WTGs, with related maximum spacing requirements;
- intermediate height of WTGs, with intermediate spacing requirement; and
- minimum height of WTGs, with minimum spacing requirements.

32 Layouts were generated on the basis of these WTG dimension scenarios based on three different generic design concepts for the placement of WTGs, as follows:

- regular grid;
- offset grid; and
- series of arcs.

33 All three WTG dimension scenarios were modelled with ReSoft's Windfarm software for the respective wind farms and then wirelines produced from the three "design" viewpoints agreed through consultation with FTOWDG of:

- Arbroath – grid reference: 365910, 741080;
- Fife Ness - grid reference: 363842, 709766; and
- St Abb's Head – grid reference: 391235, 669167.

34 These three locations were chosen on the basis of providing a reasonable "spread" of viewpoint locations across the amalgamated cumulative study areas for the three offshore wind farms.

35 The wirelines were then reviewed by landscape consultants representing each of the three developers. Each landscape architect recorded independently their ranking of the layouts as predicted to be seen in the wirelines from each viewpoint. Ranking was assessed in relation to the extent to which the layouts demonstrated the most balance, coherence and greatest degree of "legibility". The ranking was not unanimous for each viewpoint; however, there was a preference firstly for the least "busy" layouts which derived from the maximum height WTG scenarios which resulted in greater spacing between WTGs, as well as a slight visual preference for the offset grid layout.

36 The FTOWDG design sensitivity analysis was discussed at the consultation meeting held with SNH and MS-LOT on 29th September 2017. The key design principles and considerations that have informed the proposed development are discussed in *Section 12.5.3 Design Considerations* below. These considerations will be taken into account in the final layout post consent, further information is provided in *Appendix 6A*.

37 As the Inch Cape Wind Farm application is for fewer larger turbines, and both Seagreen and NNG in their scoping report and revised application respectively, are also proposing fewer larger turbines, the findings of the design sensitivity analysis remain valid.

12.5.2 Design Envelope

38 The potential development parameters and scenarios are defined as a design envelope and presented in *Chapter 7: Description of Development*. The assessment of potential impacts on SLV amenity is based upon the worst case scenario as identified from this design envelope, and is specific to the potential impacts assessed in this chapter.

39 On the basis of the Design Sensitivity Analysis of the Inch Cape 2013 EIA described in *Section 12.5.1* above, this SLVIA has assessed what is assumed to be the realistic worst case scenario, with the tallest WTGs (291 m to blade tip) on a layout based on a regular grid layout, although it also has areas of irregular spacing due to both seabed constraints and technical considerations (further detail on these can be found in *Chapter 6* and *Appendix 6A*). For the purposes of this assessment an indicative layout of 40 WTGs at the maximum WTG tip height of 291 m tall spread throughout the Development Area has been considered. The indicative number of 291 m tall WTGs would likely result in up to 40 WTGs spread throughout the Development Area. It is noted that there would likely be a maximum of 72 WTGs for the smallest turbine size but the tallest turbine (291 m to blade tip) was considered to be the worst case over the maximum turbine number as agreed with SNH.

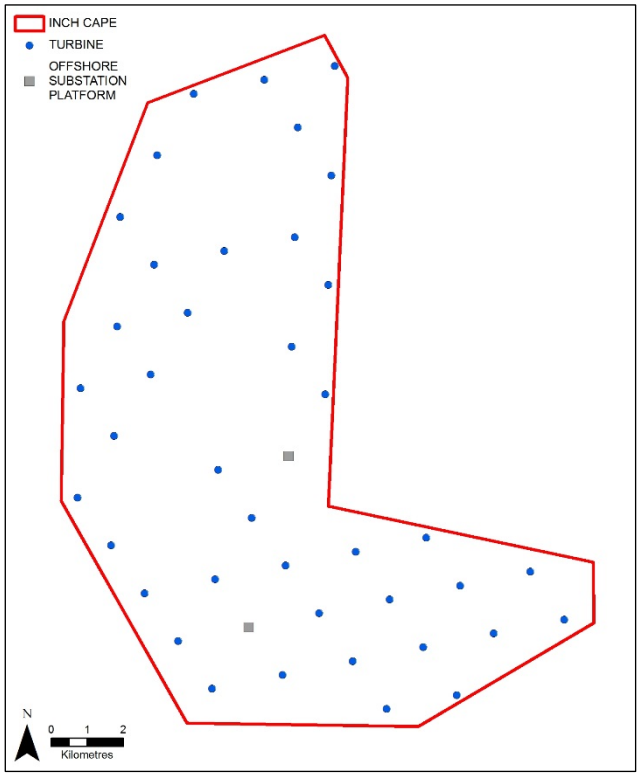
40 The WTGs will be laid out within the Development Area in a configuration which optimises performance and takes account of environmental and technical constraints. The orientation of the grid across the Development Area is a product of the direction of

the prevailing wind at this location and is therefore designed to optimise the generating capacity of the Wind Farm.

41 Fieldwork surveys undertaken in relation to existing offshore wind farms located off the Cumbria coastline (Barrow, Walney 1 & 2, and Ormonde Offshore Wind Farms) suggests that jacket substructures (as used at Ormonde) tend to increase the visual contrast of the WTGs, although they will not lead to an increase in the overall extent of visibility of the Inch Cape WTGs and OSPs. However, it is recognised that Ormonde Offshore Wind Farm is closer to the adjacent coastline (approximately 9.5 km) than is the case with the Development Area (approximately 15 km). Due to technical constraints in the modelling software it has not been possible to include jacket foundation structures within the visualisations.

42 The Development requires a maximum of two OSPs. The visible part of the platforms will consist of a substructure similar to that used for the WTGs and a "topside", which is a structure housing the transmission equipment. In order to account for various additional elements which may be attached to the topside, for example loading platforms at the sides and a crane and helideck on top, an overall maximum dimension of 100 m x 100 m x 70 m is assumed. Therefore 70 m is the maximum height of the OSPs (Lowest Astronomical Tide (LAT)). Indicative positions are shown in Chart 12.i. This is an indicative layout and illustrates what is considered to be the worst case locations. A ZTV plan indicating theoretical visibility of the Inch Cape OSPs is shown in Figure 12.5 and the locations of the OSPs are indicated on the visualisations. An illustration of a typical OSP is shown in *Chapter 7*, Figure 7.22.

Chart 12.i: WTG layout showing indicative locations of OSPs



43 There are no additional anemometry (met) masts required as part of the Development. A met mast for the Development was applied for separately and consented in September 2014. It remains in situ.

Lighting

44 Throughout the operation of the Wind Farm and OfTW, navigation lighting for both maritime traffic and aviation will be provided on the WTGs and other offshore structures in accordance with relevant guidance and legislation. More detail on this can be found in *Chapter 15: Shipping and Navigation*, and *Appendix 17.1: Aviation Lighting Plan*; however, in summary this lighting is likely to comprise the following elements.

45 For maritime lighting, Significant Peripheral Structures (SPS) – which are the "corners" or other significant points on the periphery of Inch Cape Wind Farm – will be fitted with synchronised flashing yellow lights visible from all directions in the horizontal plane, with a range of not less than five nautical miles (9.26 km). In the case of a large or extended wind farm, the distance between these lights should not normally exceed three nautical miles (5.56 km). Selected intermediate structures on the periphery other than SPSs will also be marked with flashing yellow lights visible from all directions in the horizontal plane (Intermediate Periphery Structures (IPS)). The flash character and range of these intermediate lights will be different from those described above, with a range of not less than two nautical miles (3.70 km). Both types of light will be mounted towards the lower end of the tower, approximately half way between highest astronomical tide (HAT) and 15 m above the WTG support structure's equipment deck.

46 In respect of aviation lighting, the periphery Inch Cape WTGs will be fitted with medium intensity red light (2,000 Candela, visible at 360 degrees) as close as is reasonably practicable at the top of the fixed structure (i.e. the nacelle). There may be a requirement for these lights to flash 'W' Morse code simultaneously and repeatedly, however, at the time of writing, the requirement is for steady red lights.

47 ICOL has commissioned Edinburgh University's Astronomy Department to carry out an assessment of the likely observability of these lighting requirements, full details are provided in *Appendix 12H*. This report considers the observability of lighting placed upon the WTGs, as a function of their power and the distance that they are observed from and the effects of attenuation of light as it passes through the atmosphere are taken into account, for atmospheric conditions typical of coastal UK locations. The report should be read in conjunction with the assessment.

48 It should be noted that the distances at which navigational and aviation lighting is predicted to be visible, vary depending on the atmospheric conditions. As shown in the met data in *Graph 12.i*, visibility varies considerably throughout the average year which will affect the extent to which the lighting at the Development Area will be visible.

Worst Case Scenario

49 For the purposes of the SLVIA it has been agreed with SNH that the worst case scenario would assess WTGs at the greatest height and diameter being proposed. As per the design envelope this will be a 250 m diameter rotor of which there would be a likely maximum of 40 WTGs and a maximum height to tip of 291 m (a reduction from the original scoping report figure of 301 m). An indicative hub height of 166 m has also been used in the assessment. A summary of all key parameters used in the assessment is provided in Tables 12.9 and 12.10 below.

50 As ICOL's understanding of the site conditions, WTG technology and evolution of environmental considerations will continue to improve post EIA, the final layout is likely to differ from the indicative layout used for the EIA. The layout assessed is considered to represent a realistic worst-case scenario.

Table 12.9: Worst case scenario definition - Development Area

Potential Impact	Design Envelope Scenario Assessed
Operational Phase	
Physical presence of WTGs and OSPs may affect seascape and/or landscape character, landscape designations and visual amenity.	40 WTGs 291 m to blade tip and 166 m to hub height Nominal Minimum down-wind spacing – 1,278 m Nominal Minimum cross-wind spacing – 1,278 m Jacket WTG foundations with sea level dimensions of 30 m x 30 m Up to two OSPs 100 m x 100 m and up to 70 m height Indicative layout is shown in *Chart 12.i*
Night time lighting of development area may affect seascape and/or landscape character and visual amenity.	For the indicative layout (as shown in *Chart 12.i*) all periphery turbines lit with 2000 candela light at nacelle (aviation lighting). For periphery turbines all will be lit with maritime lighting (either visible to 5 nm or 2 nm, depending on whether they are classed as SPS or IPS).

Table 12.10: Worst Case Scenario Definition - Offshore Export Cable Corridor

Potential Impact	Design Envelope Scenario Assessed
Installation Phase	
Presence of installation vessels and related works, and trenching of cable at landfall location may affect seascape character area, designated landscape and visual amenity.	Longest installation period and trenching across landfall by the chosen installation method, which may either be through a single method or a combination of the following: burial Ploughs, jetting trenchers, mechanical cutters, open trenching or horizontal directional drilling.

12.5.3 Embedded Mitigation

51 A range of embedded mitigation measures to minimise environmental effects are captured within the Design Envelope (see *Section 4.5.2*). The assessment of effects has taken account of the following embedded mitigation measures:

- WTGs will all be of similar dimensions regarding hub height and blade tip subject to WTG and substructure design and installation specification; and
- WTGs will all be pale grey in colour with a semi-matt finish. This tends to reduce the distance over which the WTGs are visible, especially in dull or overcast conditions, which often occur. As offshore WTGs are often viewed against the sky, pale grey is the most appropriate colour as it is closest to that of the lower part of the sky under the most frequent UK weather conditions.

12.5.4 Additional Design Considerations

52 Further to the embedded mitigation identified above, ICOL has identified a series of design principles and considerations have been taken into account in the layout assessed in this chapter, and which will be taken into account in the final layout. These design considerations been identified to give reassurance to stakeholders that the final layout will take into account both health and safety requirements and environmental considerations required. For SLV purposes the following design principles are:

- Aim to achieve a coherent and reasonably balanced and consistent pattern of WTGs across the array;
- Grid or Offset Grid pattern to be the preferred starting point (based on FTOWDG 2011 design sensitivity analysis) for layout evolution;
- Avoid continuous gaps larger than the grid spacing on the perimeter WTGs which create channels and appear to separate the wind farm into groups;
- Avoid single outlier WTGs (there will always be corner turbines); and
- OSP positions to be within the main area of WTGs and not on the western peripheral edge of the Development Area.

12.5.5 Consent Conditions

53 As well as the embedded mitigation measures, ICOL proposes to commit to the purpose of the relevant consent conditions granted for the Inch Cape 2014 Consent, as they are still relevant to this application. This will provide reassurance to stakeholders that the relevant issues will be addressed and secured by way of appropriate conditions.

54 ICOL recognises that the wording and detail of the consent conditions will be at the discretion of the Scottish Ministers. For SLVIA interests, ICOL propose that the consent conditions address matters surrounding, but not limited to, the following;

- Development Specification and Layout Plan; and

- Production of a Design Statement.

12.6 Baseline Environment

12.6.1 Study Area

55 The baseline environment for the SLVIA is considered within a defined study area. The study area was agreed during consultation with SNH and the Local Planning Authorities and covers a 50 km radius from the edge of the Development Area as shown on Figure 12.1 and subsequent figures. In addition to the study area, it was agreed through consultation that the assessment of potential effects upon North Berwick Law which lies just beyond 50 km would be included in the assessment.

56 The 50 km radius extent of the SLVIA study area was proposed in the Scoping Report and agreed through consultation, because this was considered to define the maximum area within which significant effects from the Inch Cape Wind Farm could occur. Turbines of 291m to blade tip and with tower bases of 10m diameter will be visible beyond 50 km, but it is not considered that they could give rise to significant effects at this distance. This judgement was based on consideration of several factors including the maximum proposed dimensions of the Inch Cape WTGs and review of preliminary ZTVs and wirelines based on these dimensions; as well as being informed by professional judgement. The selection of a 50 km radius study area also takes account of the curvature of the earth, atmospheric visibility and prevailing weather conditions, as well as acuity of the human eye, all of which are described further in *section 12.6.4*.

57 The Offshore Export Cable Corridor runs from the Development Area to the landfall near the site of the former Cockenzie Power Station on the East Lothian coast, east of Preston Links and can be seen in *Chapter 1: Introduction,* Figure 1.2.

12.6.2 Data Sources and Field Work

58 A review of existing SLV context within the study area has been undertaken with reference to existing character assessment, SNH guidance, planning policies and mapping information. The following sources were consulted in order to compile the baseline information:

- Scottish Planning Policy (Scottish Government, 2014);
- SNH Landscape Character Assessments;
- An assessment of the sensitivity and capacity of the Scottish seascape in relation to offshore windfarms (SNH, 2005a);
- Historic Environment Scotland's (2016) The Inventory of Gardens and Designed Landscapes in Scotland;
- Ordnance Survey (OS) Maps;
- Aerial photography; and

- Consultation with SNH, and other consultees as listed in *Section 12.3*.

59 In addition, the SLVIA study area was visited during August and October in 2017 and January 2018 in periods of reasonably fine and clear weather, to verify SLV receptors and related effects.

12.6.3 Overview of baseline

Regional Context

60 As noted in *Section 12.4.3*, the landward component of the SLVIA study area covers the administrative areas of six local authorities (Aberdeenshire, Angus, Fife, Dundee, East Lothian and Perthshire). Within the SLVIA study area, the coastline extends from Newtonhill (south of Aberdeen) through Stonehaven to Dundee, across the Firth of Tay before continuing around the coastal edge of East Fife to Largo where it extends across the Firth of Forth to North Berwick and Dunbar. The SLVIA study area is shown on Figure 12.1.

61 The SLVIA study area can therefore be broadly divided into two main areas:

- The North East Coast, encompassing Aberdeenshire, Angus and Dundee; and
- East Fife, incorporating the Firth of Tay.

62 Additionally, there is a third area, with a much smaller landward component:

- East Lothian, incorporating the Firth of Forth.

63 The first area covers much of the Aberdeenshire coastline to the south of Aberdeen itself, incorporating the local centres of Stonehaven and Inverbervie as well as important tourism and recreational sites such as Dunnottar Castle, and St Cyrus National Nature Reserve. Inland is rural, centred on the major transport corridor of the A90. Between the coast and the A90 the land is broadly rolling with many low-lying hills of volcanic origin, including Bruxie Hill (216 m Above Ordnance Datum (AOD)). These hills physically contain the Howe of the Mearns, which forms a hill girt basin at the north-eastern end of the wide valley of Strathmore, beyond Brechin. To the north, the Howe is overlooked by Strathfinella Hill (414 m AOD) and its main town is Laurencekirk.

64 The Angus coastline lies in closest proximity to the Development Area. It runs from Montrose Bay in the north to the outskirts of Dundee, including local centres at Montrose, Arbroath and Carnoustie. It also includes a number of tourism and recreation destinations such as Montrose Bay, Lunan Bay and Carnoustie Golf Course, together with important sites for nature conservation such as Montrose Basin and Barry Links. The A92 runs adjacent to the coast for much of its length, behind which is a largely agricultural and rolling hinterland continuing into the broad valley of Strathmore through which the A90 runs, connecting the local centres of Forfar and Brechin. To the west of Strathmore the ground rises in the area of the five Angus Glens, where the main land use is hill-farming, extending towards the distant summits of the Grampian Mountains.

65 Dundee, the fourth largest city in Scotland, lies on the north bank of the Firth of Tay and is a regional employment and education centre for this part of the country. The Port of Dundee is used primarily in the provision of support services to the offshore oil and gas industries. The city is bisected by a line of hills stretching from Balgay Hill, through Dundee Law, to Gallow Hill.

66 The Firth of Tay extends eastward from Perth opening into the North Sea beyond Buddon Ness in Angus and Tentsmuir Point in Fife. It contains several important nature conservation sites including the Firth of Tay and Eden Estuary Special Area of Conservation (SAC).

67 Within East Fife, the coastline runs west to east from the Inner Firth of Tay past the Tay Bridge and Tayport, before rounding Tentsmuir Point and continuing south across the Eden Estuary, through St Andrews and along the rocky coastline to Fife Ness. Inland areas are largely rural, with low hills achieving a visual prominence which belies their height due to the general low-lying and undulating character of the land. Most larger settlements are located along the coastline, including St Andrews, with its famous university and golf courses.

68 The Firth of Forth is the largest estuary on the east coast of Scotland. A number of large towns and settlements line its shores, many of them connected with heavy industry, manufacturing and shipping. The SLVIA study area however only encompasses parts of the Outer Firth between Fife Ness and Dunbar. The northern coastline, in Fife, contains a number of small villages and towns, some with harbours and small scale fishing industry. Within the Firth itself are a number of small islands including the Isle of May and Bass Rock.

69 Within East Lothian, the SLVIA study area covers a small part of the town of Dunbar and the adjacent Barns Ness. Further to the west it also incorporates land on the coastal edge of the broad peninsula which projects north into the Firth of Forth, from the headland of St Baldred's Cradle, past Tantallon Castle, to the outskirts of North Berwick.

Local Context and Shipping Movements

70 Data showing shipping movements in and around the Development Area and within the SLVIA study area is described in *Chapter 15* and in more detail in *Appendix 15A: Navigational Risk Assessment Development Area*. These show that the area of sea around the Development Area is well-used by a variety of vessels. During the period surveyed, the majority of vessel types crossing within a 10 nm (approximately 18.52 km) buffer zone around the Development Area were cargo vessels (29 per cent) and fishing vessels (27 per cent). Tankers and "other" vessels made up 15 per cent and 14 per cent of the traffic recorded respectively. The passenger vessels in the vicinity of the Development Area (which comprised four per cent of all survey traffic) were all cruise vessels, the majority of which were headed in and out of the Firth of Forth. Recreational vessels, also comprising four per cent of the recorded total, are also active around the Development Area, along the Angus and Fife coastlines, and within both the Firths Tay and Forth. In

terms of facilities, the nearest club is the Arbroath Sailing & Boating club, 10 nm (18.52 km) to the west of the Development Area, with Montrose Sailing Club a similar distance to the north-west. The nearest marina to the Development Area is also at Arbroath.

Landform and Hydrology

71 Patterns of landform and watershed drainage within the SLVIA study area are clearly illustrated in Figure 12.1. The north-east coast section comprises a generally rocky coastline with low cliffs, interspersed with wide sandy bays, that backs onto an undulating agricultural hinterland of low rolling hills and depressions, with notable high points in the north around Bruxie Hill (217 m AOD) and the Hill of Garvock (277 m AOD). To the south it includes the easternmost summits of the Sidlaw Hills, such as Craigowl Hill (455 m AOD) and Balkello Hill (397 m AOD), which overlook Dundee and the Firth of Tay.

72 To the west of this rolling landscape is the broad valley of Strathmore running from north-east to south-west between the Grampian Mountains and the Sidlaws. Within the southern half of Strathmore minor burns and streams drain into the River Isla which itself is a tributary of the River Tay. In its northern extents the main watercourses are the rivers North Esk and South Esk, which both drain into Montrose Bay, the latter via Montrose Basin which occupies an extensive area of low-lying land to the west of Montrose. Other notable watercourses include Bervie Water, which flows into the North Sea at Inverbervie, and Lunan Water which does likewise at Lunan Bay.

73 North-west of Strathmore, the Grampian Mountains rise through two of the five “Glens of Angus”, Glen Esk and Glen Lethnot. The foothills of the Grampians feature prominently in long-distance views westwards across the SLVIA study area, as they rise relatively abruptly from Strathmore. Notable summits include the Hill of Wirren (678 m AOD), with the Cairn o’ Mount being a popular elevated viewpoint (454 m AOD) adjacent to the B974.

74 The Firth of Tay and Firth of Forth are the major hydrological features within the SLVIA study area. The former comprises the relatively narrow Inner Firth which runs east from Perth towards the Tay Bridge where it is pinched between Tayport and Broughty Castle. The inner Tay has extensive sediment flats together with the most extensive continuous stands of reed swamp in Britain. The outer Firth lies seaward of Broughty Ferry but includes large areas of sand flats off Tentsmuir Point as well as at St Andrews.

75 The Firth of Forth is also divided approximately into an inner and outer section. The Inner Forth extends between the Kincardine and Forth Bridges but lies outwith the SLVIA study area. Further downstream the Forth widens out and the shores become sandy and rocky interspersed with fishing villages. Golf courses have traditionally been created on the sandy grassy links in Fife and East Lothian. Similar to the Tay, the Firth of Forth is an important area for both people and wildlife.

76 Between the Tay and Forth lies the Eden Estuary which, apart from the main river channel, is exposed at low water and is an important site for nature conservation with its

landscape of mudflats, sandbanks and saltmarshes providing habitats for various flora and fauna.

77 The coastline of East Fife displays very different characters to the north and south of the Eden Estuary. Northwards, it is low-lying and sandy with extensive areas of forest at Tentsmuir. The hinterland here rises gently merging into a rolling landscape of low summits and depressions including Lucklaw Hill (190 m AOD).

78 South of the Eden the sandy coastline continues east to the famous links at St Andrews beyond which the coastline becomes rocky with low cliffs backing onto shallow sloping and relatively sparsely populated agricultural land. Further inland the ground rises somewhat including the notable hills of Largo Law (290 m AOD) and Drumcarrow Craig (217 m AOD). The northern coast of the Outer Firth of Forth remains rocky but is interspersed with small sandy beaches and coves, with only limited areas of low cliff-edge.

Land Cover and Land Use

79 Land cover refers to the physical material at the surface of the land in question for example grass, tarmac, trees, bare ground, water. Land use is a description of how people actually utilise the land. This could include agricultural land use, urban land use, etc. The two terms, although clearly closely related, are distinct.

80 Land use in the SLVIA study area is predominantly agricultural. It includes some of the most productive farmland in Scotland such as Strathmore, where soft fruits, potatoes and cereals predominate. It also includes large areas of pasture – both beef and dairy farming are important on the rich pastures along the highland foothills. On higher ground with more marginal land, particularly within the Grampian Mountains, hill farming prevails.

81 Within this matrix of agricultural land there are also many large scale commercial forests and plantations which form prominent features in the local landscape, particularly in the hills above Stonehaven (Fetteresso Forest, Drumtochty Forest), south of Brechin (Montreathmont Forest) and at Tentsmuir.

82 There are also large areas of urban development connected by an extensive highway network. Outside of the major regional and local centres, patterns of settlement are more scattered and settlement sizes smaller; nevertheless, with the exception of the upland areas, this is a well-settled landscape. Associated with the bigger towns and cities are more large-scale industrial and commercial areas including both ports at Dundee and Montrose.

83 Finally, there are several operational and consented wind farms in the study area, both onshore and offshore. As these developments are (or will be) part of the baseline, they have been taken into account in the assessment. The process by which the projects included in the detailed assessment have been identified is noted in Tables 12.1 and 12.2 and described in *Section 12.8*.

12.6.4 Visibility within the Study Area

84 In order to identify the parts of the SLVIA study area which may be affected by the Inch Cape WTGs; tip height, hub height and substructure height, Zone of Theoretical Visibility (ZTV) plans were produced to identify the theoretical extent of visibility of the Inch Cape WTGs within the SLVIA study area. A ZTV was also produced for the OSPs modelled at platform level of 70 m height above Highest Astronomical Tide (HAT). These ZTVs are shown in Figures 12.4, 12.4a-d, and in Figure 12.5. They are supplemented with a horizontal angle ZTV which indicates the proportion of the horizontal view theoretically occupied by the Inch Cape WTGs and OSPs at any given location. These are shown in Figure 12.6, 12.6 a-d.

85 An assessment of the predicted visibility of the Inch Cape WTGs and OSPs from each of the landscape and visual receptors in the SLVIA study area has been carried out by analysis of the ZTVs and field verification from key sensitive receptors (*Appendix 12B*). The visibility assessment has concentrated on publicly accessible areas and key receptors including residential and outdoor recreational areas, as well as road and rail routes and public footpath networks.

Additional Considerations

86 A number of additional factors have been considered in relation to visibility and the prediction of the likely significant landscape, seascape and visual effects within the SLVIA study area. These are:

- Curvature of the earth;
- State of tide;
- Atmospheric visibility; and
- Acuity of the eye.

Curvature of the Earth

87 When the WTGs and OSPs are viewed from locations near sea level, WTGs at distances greater than 50 km will begin to disappear over the horizon. These distances could theoretically be exceeded for land based receptors, where the viewing height is above sea level. The presence of hill and upland areas within the SLVIA study area provides elevated viewing locations for sensitive receptors. The angle of view gained by receptors at greater elevations above sea level will, to some degree, counteract the curvature of the earth, extending the potential availability of views. Modelled ZTVs and photomontages consequently take account of the curvature of the earth.

State of the Tide

88 The apparent height of WTGs will vary between Lowest and Highest Astronomical Tide (LAT/ HAT) by around 5.4 m. It is considered that this difference is unlikely to be

discernible over the distances between the Development Area and the various viewpoints included in the assessment.

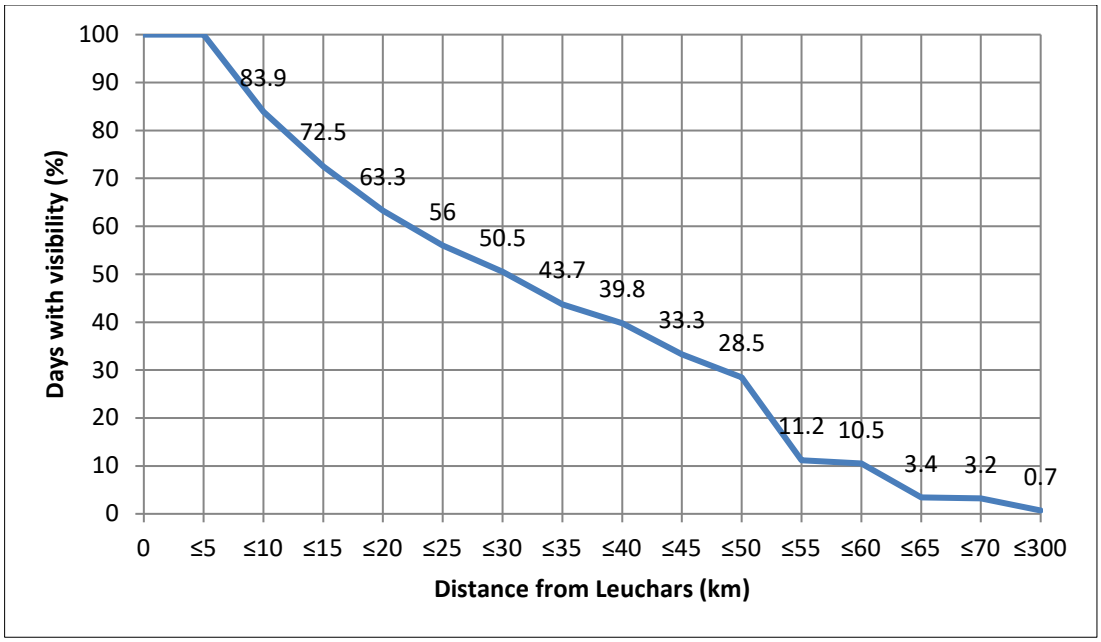
Atmospheric Visibility

89 It is usual when assessing visibility of WTGs to consider atmospheric visibility by examining meteorological data for the area. Such examination can only be approximate, as visibility varies from year to year, according to season, and will vary across the SLVIA study area, both laterally, and with height above sea level. Ten year averages have been used to indicate approximate percentages of time within each viewing range.

90 Atmospheric visibility data collected at the Leuchars weather station for a 10 year period from November 2007 to October 2017 was analysed for the purposes of this assessment, and is summarised in *Graph 12*.i below.

91 From Leuchars, the closest Inch Cape WTG will be located east north-east at a distance of approximately 40 km. The furthest WTG will be located approximately 50 km distant. The data shows that visibility between these distances (indicating from this location the Inch Cape WTGs and OSPs) will be visible between approximately 40% of the time at 40 km reducing to 28% up to 50 km distant.

Graph 12.i: Visibility from Leuchars



Acuity of the Eye

92 The *Guide to Best Practice in Seascape Assessment* (CCW *et al*, 2001) discusses the limitations of the acuity of the human eye. The guidance states that:

"At a distance of 1 kilometre in conditions of good visibility a pole of 100 mm diameter will become difficult to see, and at 2 kilometres a pole of 200 mm diameter will similarly be difficult to see. In other words, there will be a point where an object, whilst still theoretically

visible, will become too small for the human eye to resolve. Mist, haze or other atmospheric conditions may significantly exacerbate that difficulty."

93 Consequently, when visible in favourable conditions, a slim object, approximately three metres in width will be at the limit of perception by the human eye at a distance of 30 km. An object would need to be greater than five metres wide to be visible at or beyond 50 km.

94 A combination of curvature of the earth and acuity of the eye would limit the potential for seascape, landscape and visual effects especially beyond 50 km distance. The assessment has been carried out on the basis of clear visibility and maximum anticipated brightness.

12.6.5 Receptors

95 Within the SLVIA study area, there is a range of SLV amenity receptors. A baseline survey has been carried out to identify these receptors, involving desk study and field work and taking account of consultation.

96 Seascape receptors are defined as all regional seascape character areas (SAs) in the SLVIA study area from where the Inch Cape WTGs and OSPs are predicted to be visible. Seascape character areas within the SLVIA study area are shown in Figure 12.2, and an overlay with the ZTV is shown in Figure 12.2b.

97 Landscape receptors are defined as all landscape character types (LCTs) and associated areas in the SLVIA study area from where the Inch Cape WTGs and OSPs are predicted to be visible. Landscape character types and associated areas within the SLVIA study area are shown in Figures 12.2 and 12.2a, and an overlay with the ZTV is shown in Figure 12.2b. Figure 12.2a has been prepared at a smaller scale to show the more complex pattern of small scale landscape character areas identified in the Fife LCA (SNH, 1999a).

98 Designated landscapes within the SLVIA study area from where the Inch Cape WTGs and OSPs may be seen are also included as landscape receptors and are shown in Figure 12.3, and an overlay with the ZTV is shown in Figure 12.3a.

99 Visual amenity receptors are defined as individuals or groups of people within the SLVIA study area who are predicted to have views of the Inch Cape WTGs and OSPs. The main groups of visual receptors are defined as follows:

- residents;
- walkers and climbers;
- tourists, visitors or users of recreational facilities;
- road and rail users; and
- marine based receptors including people taking part in water-based recreational activities, and commercial and cruise ships.

100 It is acknowledged that these groups of visual amenity receptors may be sub-divided and that there may be more categories of receptors, but for the purposes of this assessment it is considered that the above categories cover the main groups of landscape and visual receptors in the SLVIA study area.

Seascape Character Areas

101 The baseline seascape character is described in detail in the Seascape Character Assessment (SCA): Aberdeen to Holy Island, included as *Appendix 12D*. This identifies and describes 21 SAs of which 13 are located within the SLVIA study area as summarised in Table 12.11 below and shown in Figure 12.2. This Regional SCA was prepared in 2011 to define a common seascape character baseline for the impact assessments of the three offshore wind farms in the outer Firths of Tay and Forth: Inch Cape, NNG and Seagreen. It was agreed through consultation in respect of the current proposed Inch Cape Wind Farm that the 2011 Regional SCA contained in *Appendix 12D* should be used to define the baseline seascape context.

102 The key characteristics of each of the seascape character areas (SAs) in the study area together with the sensitive landscape and visual receptors within them, are set out in *Appendix 12A*. The night time context within each SA is also set out in *Appendix 12A*. In accordance with GLVIA3, the value and susceptibility of seascape character areas have been assessed and are also identified in *Appendix 12A*.

103 Following the characterisation process, a sensitivity rating of high, moderate or low was assigned to each SA. The assessment of sensitivity considers the ability of each character area to accept change of the type proposed (i.e. offshore wind farm development), without detriment to its key characteristics. As such it is a judgement of sensitivity to a specific type of change, rather than overall or inherent sensitivity.

Table 12.11: Regional seascape character areas

Character Area	Key Characteristics	Sensitivity
SA3 – Cove Bay to Milton Ness	Long, generally linear and rocky coastline interspersed with small coves and beaches and settlements including Stonehaven and Inverbervie.	Moderate
SA4 – Montrose Bay	Wide, sandy beach backed by line of dunes and grassland with cliffs at the National Nature Reserve (NNR) at St Cyrus. Port and town of Montrose at south end of Montrose Bay.	High
SA5 – Long Craig	A low-lying headland with a rocky foreshore and sparsely settled agricultural hinterland.	Moderate
SA6 – Lunan Bay	Wide, sandy beach with rocky headlands to the north and south, backed by dunes with woodland and shelter belts around Lunan.	High

Character Area	Key Characteristics	Sensitivity
SA7 – Lang Craig to the Deil's Heid	Rocky coastline including cliffs, sea stacks, blowholes, caves, wave cut platforms and arches, contrasting with agricultural hinterland.	High
SA8 – Arbroath to Monifieth	Low lying coastal edge with extensive wave-cut platforms interspersed with sections of sandy beach, which are backed by areas of dunes in places; the coastline is extensively settled.	Moderate
SA9 – Dundee	Settled coastal fringe centred on the urban developments in and around the City of Dundee.	Low
SA10 – Inner Firth of Tay	Extensive intertidal mudflats and sandbanks with narrow coastal strip on south side and extensive low-lying agricultural land with the Carse of Gowrie to the north.	Low
SA11 – St Andrews Bay	Long stretch of sandy coastline with expansive intertidal areas backed by extensive areas of dunes and forestry, includes links and town at St Andrews.	High
SA12 – St Andrews to Fife Ness	Diverse coastal edge comprising small sandy bays, extensive wave-cut rock platforms, low cliffs and narrow, wooded dens, backed by gently undulating agricultural landscape.	High
SA13 – East Neuk of Fife	A generally low lying, rocky coastline with distinctive red sandstone cliffs and soils, shingle beaches and attractive fishing villages centred on busy harbours.	High
SA14 – Kirkcaldy to Largo Bay	Generally low lying coast with views to sea framed by headlands and large coastal settlements.	Moderate
SA17 – Eyebroughy to Torness Point	Generally low-lying coast, with an alternation of rocky headlands and sandy pocket bays, backed by relatively intact agricultural land and towns.	Moderate

Landscape Character Types and Associated Areas

104 The landscape baseline for the SLVIA study area has been assessed and classified taking account of the following SNH LCAs:

- SNH (1998) No. 102 South and Central Aberdeenshire (Environmental Resources Management);
- SNH (1999a) No. 113 Fife (David Tyldesley and Associates); and
- SNH (1999b) No. 122 Tayside (Land Use Consultants).

105 LCTs and their associated areas are shown in Figures 12.2 and 12.2a. The key characteristics of each of the landscape character areas (LCAs) in the study area together

with the sensitive landscape and visual receptors within them, are set out in *Appendix 12A*. The night time context within each LCA is also set out in *Appendix 12A*.

106 A sensitivity rating has been assigned to each LCT, which occurs in locations within the SLVIA study area and has theoretical visibility of the Inch Cape WTGs and OSPs as described in Table 12.12 and set out in detail in *Appendix 12A*. The assessment of sensitivity considers the ability of each LCT and associated area(s) to accept change of the type proposed (i.e. offshore wind farm development), without detriment to key characteristics. As such it is a judgement of sensitivity to a specific type of change, rather than overall or inherent sensitivity.

Table 12.12: Landscape character types

Character Area	Key Characteristics	Sensitivity
ABS2 – Agricultural Farmlands	Medium to large scale agricultural landscape varying from the almost uniformly flat Howe of the Mearns to the undulating ridges of Hill of Garvock and Kincardine Plateau.	Moderate
ABS4 – Moorland Plateaux	Large scale, open landscape featuring smooth rolling landform and rounded summits, extensive areas of heather moorland and grasses, and large areas of coniferous forest.	Moderate
TAY1 – Highland Glens	Medium to small scale, sparsely settled and enclosed landscape which is dominated by the scale and proximity of surrounding mountains.	High
TAY3 – Highland Summits and Plateaux	Large scale, open and exposed landscape with panoramic views to surrounding areas, with predominantly simple patterns of land cover and land use.	Moderate
TAY5 – Highland Foothills	Overall medium scale landscape of steep whale-backed hills and valleys with scattered settlement and agriculture on lower ground.	Moderate
TAY8 – Igneous Hills	Medium scale landscape of rounded hills dominated by grass moorland, with scattered settlement and agriculture on lower ground.	Moderate
TAY10 – Broad Valley Lowlands	Overall medium scale, predominantly open and expansive landscape of rectilinear fields with scattered large farmsteads contrasting with neighbouring upland areas.	Moderate
TAY12 – Low Moorland Hills	Medium scale landscape comprising a series of low-lying hills and ridges with extensive areas of coniferous plantation and scattered settlement.	Moderate
TAY13 – Dipslope Farmland	Medium to large scale mostly open landscape with few settlements of any size, dominated by productive agricultural land with low woodland cover.	Moderate

Character Area	Key Characteristics	Sensitivity
TAY15 – Lowland Basins	Medium scale open landscape comprising large, rounded estuarine basin surrounded by low-lying drained farmland with settlement concentrated in Montrose.	Moderate
FFE3 – Upland Foothills	Medium to large scale transitional landscape forming distinctive backdrop to lowlands and having extensive views across other landscape types.	Moderate
FFE4 – Pronounced Volcanic Hills and Craigs	Medium to large-scale, open landscape of distinctive hills rising above surrounding lowlands, with contrast between rugged hills and more intensively used lower slopes.	Moderate
FFE5 – Lowland Hills and Valleys	Medium scale landscape of low hills and valleys comprising open farmland with extensive areas of woodland and regular pattern of farmsteads and larger settlements and towns.	Moderate
FFE6 – Lowland Open Sloping Farmland	Large scale, open and exposed landscape with generally simple form and pattern of predominantly large-scale, open, sloping arable fields, with extensive seaward views in places.	Moderate
FFE7 – Lowland Dens	Narrow and steeply sloping valleys with often semi-natural woodlands on the banks and valley sides; the tops of the Dens slope more gently to the surrounding farmland.	Moderate
FFE8 – Lowland Glacial Meltwater Valleys	Medium to large-scale, open landscape of U-shaped valleys with intensive arable cultivation on valley floors contrasting with the mixed farming or grazing land on the rising slopes.	Moderate
FFE11 – Coastal Hills	Medium to large scale landscape of undulating hills, influenced by proximity to the coast and comprising generally simple patterns of land use and land cover.	Moderate
FFE12 – Coastal Terraces	Medium to large scale and mostly flat or gently sloping landscape with extensive views of the coast, comprising agricultural land interspersed with urban development.	Moderate
FFE15 – Coastal Flats	Large-scale low-lying and exposed coastal landscape comprising mix of predominantly agricultural land and coniferous forestry with extensive seaward views.	Moderate

Landscape Designations

107 The landscape baseline for the SLVIA study area also includes areas with theoretical visibility of the Inch Cape WTGs and OSPs, which are designated for the quality of their landscapes. This includes Garden and Designed Landscapes (GDLs), AGLV and LLA. These

are shown in Figure 12.3 with an overlay with the ZTV shown on Figure 12.3a and described briefly in Table 12.13.

Table 12.13: Landscape designations

Character Area	Key Characteristics	Sensitivity
Gardens and Designed Landscapes (GDL)		
Fasque House	Situated to the north of Fettercairn, there are views from the house of Strathmore with the policy woodland and parkland contributing to the surrounding scenery.	High
The Burn	Located at the foot of Glenesk with scenic value attributed largely to the surrounding woodlands and gate lodges.	High
House of Dun	Situated between Montrose and Brechin, there are extensive views south from the house and grounds across Montrose Basin.	High
Dunninald	Situated on the coastline between Lunan Bay and Montrose, the policy woodlands provide scenic value but screen views from within the grounds to the surrounding landscape.	High
Guthrie Castle	Located between Forfar and the coast, the grounds have some scenic value in the local landscape but long-distance views largely screened by woodland.	High
House of Pitmuies	Located next to Guthrie Castle on the north-eastern edge of the Sidlaw Hills, areas of policy woodland in the grounds adds scenic value but screen views to the surrounding landscape.	High
The Guynd	Located inland to the west of Arbroath, views of the North Sea may be obtained from the top of the house but the policy woodland restricts views from elsewhere in the grounds.	High
Camperdown House	Situated on the outskirts of Dundee, there are extensive views from the house across the Firth of Tay and towards the Carse of Gowrie.	High
Baxter Park	Located in the centre of Dundee, long-distance views are largely screened by trees and vegetation within the park and the urban fabric beyond.	High
Balgay Park	Also located close to the centre of Dundee, there are extensive views from the park across the city to the Firth of Tay and beyond.	High

Character Area	Key Characteristics	Sensitivity
Earlshall	Located on the outskirts of Leuchars village views from within the grounds to the surrounding landscape are screened by the policy woodland.	High
St Andrews Links	The Links are situated to the north-west of St Andrews and have uninterrupted views eastwards across St Andrews Bay.	High
Craigtoun	Located to the west of St Andrews, there are views from within the grounds to the surrounding landscape including the coastline and St Andrews Bay beyond.	High
Hill of Tarvit (Wemyss Hall)	Situated just south of Cupar, views to the surrounding landscape from within the grounds, with the exception of higher land on the Hill of Tarvit, are mostly screened by woodland.	High
Charleton House	Located in the East Neuk, the policy woodlands contribute to the scenic value of the local landscape but also screen views from within the grounds, except from more elevated areas.	High
Cambo	Cambo is located on the north-east Fife coastline, to the north of Crail. There are coastal views from the wider estate, although within the garden these are largely screened.	High
Tyninghame	Located to the north-west of Dunbar, views may be obtained from within the grounds to the adjacent coastline and beyond.	High
Area of Great Landscape Value (AGLV)		
North Berwick to Dunbar Coastal	Includes the rocky coastline to the east of North Berwick, Tantallon Castle, the GDL at Tyninghame and the extensive beach at Belhaven Bay at the mouth of the River Tyne.	High
Local Landscape Area (LLA)		
Craigtoun	Includes the Kinness, Claremont, Lumbo and Cairns Dens which extend from the south-west of St Andrews and provides a link from the surrounding countryside towards St Andrews contributing to the setting of the town.	High
Dura Den	Incorporates the incised valley of Dura Den, the northern slopes of Kemback Hill and the policy influenced valley of the River Eden around Dairsie. Wooded valley has intimate character and feeling of naturalness.	Moderate

Character Area	Key Characteristics	Sensitivity
East Neuk	Extends along the coastal edge from Crail to Earlsferry and Kingcraig Hill, and incorporating the inland areas of Balcaskie and Kilconquhar. Extensive seaward views combine with open character of farmland landscape and contrast with intimate coastal villages.	High
Forth Islands	Comprises the three Forth islands of Inchcolm, Inchkeith and the Isle of May, although only the latter is within the SLVIA study area, having a distinctive long, low profile with steep cliffs on the eastern shore and a central lighthouse.	High
Largo	Encompasses the rising slopes and low summits which surround Largo Law and to the north it extends along the summit of Flagstaff Hill.	Moderate
St Andrews to Fife Ness	Coastal edge extending from St Andrews around Fife Ness to Crail incorporating Boarhills, Kingsbarns and Cambo incorporating an extensive area of largely undeveloped coast with expansive seaward views from an open landscape.	High
St Andrews Links	Low lying coastal landscape defined by close association with Eden Estuary and the coastal sands, extending from the northern edge of St Andrews and the A91 across the golf courses and dune system to the Eden Estuary.	High
Tarvit and Ceres	A scenically diverse and balanced landscape comprising the valley of the Ceres and Craigrothie Burns and the softly rolling hills which contain it.	Moderate
Tay Coast	The Firth of Tay provides the setting for a richly, diverse landscape of steep, wooded coastal braes, gently sloping farmland, deeply incised wooded dens and policies backed by a long band of low rounded hills.	Moderate
Tentsmuir Coast	Comprises the coastal dunes and long sandy beach of Tentsmuir Sands extending from the River Eden estuary to Tayport, possessing a high degree of naturalness and sense of remoteness.	High

Visual Amenity Receptors

108 It is recognised that a wide variety of people will have potential views of the Inch Cape WTGs and OSPs. However, for the purposes of this assessment a representative range of visual amenity receptors has been assessed as follows:

- residents in selected settlements;

- people travelling through the seascape/landscape on major roads and railways. These may be tourists and other visitors or local people;
- users of other recreational facilities including cycle routes, long-distance footpaths, Core Paths, golf courses, caravan parks, country parks, nature reserves and popular tourist destinations; and
- marine based receptors including people taking part in water-based recreational activities, and commercial and cruise ships.

109 The range of receptors subject to detailed assessment is summarised in Table 12.14. It is important to recognise that the high sensitivity rating in this case relates to those residential receptors who have views of the open sea from their properties. As such, it is not a general assessment of the sensitivity of the whole settlement, but rather a worst case which may apply only to relatively few residents, particularly in larger urban settlements and those located away from the coastline. Visual amenity sensitivity for other types of receptor, including non-residential receptors, is also described in Table 12.13.

Table 12.14: Visual amenity receptors

Receptor	Name (and distance to nearest WTG)	Sensitivity
Settlements		
Aberdeenshire	Stonehaven (42.7 km), Inverbervie (29.5 km), Gourdon (27.5 km), Johnshaven (25.2 km) and St Cyrus (24.2 km).	High
Angus	Montrose (20.4 km), Lunan (19.3 km), Auchmithie (17.1 km), Arbroath (19.5 km), Carnoustie (26.3 km) and Monifieth (33.3 km).	High
Dundee	Dundee (46.3 km) and Broughty Ferry (36.3 km).	High
Fife	Tayport (37.4 km), Guardbridge (39.3 km), St Andrews (34.8 km), Crail (31.5 km), Anstruther Easter (37.1 km), Pittenweem (40.1 km), Balmullo (41.8 km), Boarhills (31.5 km), Kingsbarns (30.2 km), Leuchars (38.7 km), Strathkinness (39.4 km) and Dairsie (43.7 km).	High
East Lothian	Dunbar (51.7 km) and North Berwick (51.5 km).	High
Routes (as shown in Figure 12.7a)		
Roads	A92, A937, A935, A933, A914, A919, A91, A915, A917.	Moderate
Railways	Edinburgh to Aberdeen railway line.	Moderate
National Cycle Network (NCN) Routes	NCN Route 1a and 1b.	High
Long Distance Footpaths	Fife Coastal Path.	High

110 Other recreational facilities with theoretical visibility of the Inch Cape WTGs and OSPs include numerous golf clubs, caravan parks and campsites, nature reserves, hotels and other tourist destinations such as country parks.

12.6.6 Viewpoints

111 The viewpoints used for the Inch Cape 2013 EIA have been agreed as the basis for the viewpoints for this SLVIA given the Development Area has not changed. These were originally agreed during discussions with consultees in relation to establishing the seascape character baseline through FTOWDG and were endorsed through the Scoping process in respect of the current SLVIA. Consultation for the Development and consideration of the larger turbines and additional sites has resulted in an additional viewpoint at Berwick Law within East Lothian. In addition, several other locations within East Lothian and a point within Angus have been included as illustrative wireline viewpoints within *Appendix 12G.* No detailed assessment of effects on these locations has been carried out. The final viewpoint list used in this SLVIA is provided in Table 12.15. Viewpoint locations are illustrated on all ZTV plans (see *Appendix 12E*).

112 An assessment of effects on seascape and landscape character as well as visual amenity during hours of darkness has also been carried out. As agreed through consultation, this has been based on completing night time viewpoint assessments for four selected locations, (Viewpoint 6 Braehead of Lunan; Viewpoint 10 Clifftop Path north of Victoria Park, Arbroath; Viewpoint 12 A92 East of Muirdrum; and Viewpoint 14 Carnoustie), which are identified in Table 12.15. The night time viewpoint assessment is set out in *Appendix 12C* with night time visualisations presented in Figures 12.40f and 12.40g; Figures 12.44g and 12.44h; Figures 12.46g and 12.46h; and Figures 12.48g and 12.48h.

113 There is no guidance on the preparation of night time visualisations or the assessment of night time effects on SLV receptors. The preparation of night time visualisations present technical challenges, as discussed through consultation with SNH, MS-LOT and the Local Authorities (see Table 12.3 and 12.4). As directed by consultees, the assessment of effects on seascape and landscape character as well as visual amenity has drawn on the findings of the night time viewpoint assessment for the four viewpoints as set out in *Appendix 12C*. Night time visits have only been carried out to the night time assessment viewpoints and therefore the interpretation of baseline conditions at all other locations in the study area has been made on the basis of the findings set out in *Appendix 12D*, as well as general familiarisation with the study area. Likewise, the interpretation of predicted effects on landscape and visual receptors in the study area has drawn on the findings of the four night time assessment viewpoint locations as well as *Appendix 12H*.

Table 12.15: Representative Viewpoints including in Assessment

VP No.	Viewpoint Location (distance to nearest Inch Cape WTG)	Reasons for inclusion
1.	Garron Point (43.72 km)	Extensive view from scenic golf course out to North Sea and south along coast past Stonehaven to Dunnottar Castle and beyond.
2.	A92, North of Inverbervie (30.17 km)	Views of the Inch Cape WTGs and OSPs with cluster of existing and proposed wind farms located on Hill of Garvock.
3.	Beach Road, Kirkton, St Cyrus (24.12 km)	Extensive view over Montrose Bay from well-used car park adjacent to coastal footpath.
4.	Cairn o' Mount (42.87 km)	Recognised scenic viewpoint on B974 between the Howe of the Mearns and Deeside with expansive view over surrounding areas.
5.	Montrose (19.99 km)	Popular tourist and recreational destination on the beach front; views encompassing Montrose Bay and Scurdie Ness Lighthouse.
6.	Braehead of Lunan (19.55 km)	Extensive views across Lunan Bay to Red Head; located on NCN Route 1. Also selected for night time viewpoint assessment due to being in area with low level of background lighting, with open seaward views.
7.	Brechin (31.70 km)	Representative of views of the Inch Cape WTGs and OSPs which might be obtained from the outskirts of this important settlement.
8.	White Caterthun Hill Fort (38.80 km)	Important cultural heritage site in upland foothills popular with walkers having extensive views over surrounding landscape.
9.	Minor Road South of Cairnconon Hill (27.01 km)	Representative of inland views from this agricultural landscape within which the sea is visible.
10.	Clifftop Path North of Victoria Park (18.58 km)	Popular clifftop path included to show more coastal context in a view of the Inch Cape WTGs and OSPs from Arbroath. Also selected for night time viewpoint assessment due to being one of the closest viewpoints to the proposed development, close to a settlement, on a popular clifftop path where people may walk in the evening or during hours of darkness.
11.	Arbroath Signal Tower (19.68 km)	Listed building with historic connection to the Bell Rock, now a museum. Public access to roof top platform not currently possible.

VP No.	Viewpoint Location (distance to nearest Inch Cape WTG)	Reasons for inclusion
12.	A92 East of Muirdrum (25.16 km)	Representative of inland views from this agricultural landscape within which the sea is visible. Located on NCN Route 1. Also selected for night time viewpoint assessment due to being an inland location with seaward views, on road with no street lighting and on cycle route.
13.	Dodd Hill (37.97 km)	Popular with hill-walkers having extensive view over surrounding landscape.
14.	Carnoustie (26.70 km)	Popular destination for tourists, day-trippers and local residents, adjacent to golf course and beach. Also selected for night time viewpoint assessment due to being a popular coastal location with promenade providing opportunity for walkers to enjoy views in hours of darkness.
15.	Dundee Law (43.71 km)	Recognised scenic viewpoint in centre of Dundee with extensive views over the surrounding landscape.
16.	Tentsmuir (33.43 km)	Well-visited beach adjacent to Tentsmuir Forest. Located close to NCN Route 1 and Fife Coastal Path.
17.	Strathkinness (39.42 km)	Representative of inland views from this agricultural landscape within which the sea is visible. Located on NCN Route 1.
18.	St Andrews, East Scores (34.81 km)	Representative of views from seafront of St Andrews. Popular with tourists and local residents. Located on Fife Coastal Path.
19.	Largo Law (48.36 km)	Popular with hill-walkers having extensive view over surrounding landscape.
20.	B9131 South of Dunino (36.18 km)	Representative of inland views from this agricultural landscape within which the sea is visible.
21.	Kingsbarns (30.55 km)	Representative of inland views from this agricultural landscape within which the sea is visible.
22.	Anstruther Easter (36.43 km)	Representative of views from the coastal villages of the East Neuk. On Fife Coastal Path and popular with tourists and day-trippers.
23.	Fife Ness, Lochaber Rock (28.32 km)	Easternmost point in Fife. Located on Fife Coastal Path and popular with tourists and other visitors. Small settlement nearby.

VP No.	Viewpoint Location (distance to nearest Inch Cape WTG)	Reasons for inclusion
24.	Isle of May (34.40 km)	A National Nature Reserve (NNR) and tourist destination popular with day-trippers, which provides a proxy for seaborne views.
25.	Dunbar (51.10 km)	Representative viewpoint on East Lothian coastline. Located on John Muir Way. Visited by residents and recreational users.
26.	North Berwick Law (52.47km)	A prominent conical hill near the East Lothian coast, a recognised viewpoint popular with locals and visitors, it also has geological, archaeological, and cultural heritage value.

114 The selected viewpoints are considered to be representative of the main sensitive receptors or receptor groups in the SLVIA study area. The viewpoints have also been checked against the ZTVs for existing/consented and application scoping stage wind farms within the SLVIA study area in order to ensure that they provide representative coverage of potential visibility and related effects.

115 Analysis of the potential effect on seascape or landscape character and visual amenity at each of the viewpoints, arising from the Inch Cape WTGs and OSPs has been carried out. This analysis has involved the production of computer generated wirelines and in some cases photomontages, to predict the views of the WTGs from each of the agreed viewpoints. The existing and predicted views from each of these viewpoints have been analysed to identify the magnitude of change and the residual effect on seascape and landscape character and visual amenity based on field work as well as desk based assessment. The assessment has been carried out on the basis of the addition of the Inch Cape WTGs and OSPs to the existing operational and consented wind farms (*see* Table 12.22).

116 An assessment of the future cumulative scenario comprising the addition of Inch Cape WTGs and OSPs with baseline of operational and consented wind farms as well as the application or scoping stage wind energy developments (of which there are only two sites at the time of collecting the cumulative data in November 2017) has also been carried out (see Table 12.22).

117 Finally, an assessment of the significance of the residual effects has been carried out to determine the predicted impact of the Inch Cape WTGs and OSPs in this locality in relation to seascape and landscape character and visual amenity. The significance of a seascape, landscape or visual effect is a function of the sensitivity of the affected seascape, landscape or visual receptor, and the magnitude of change that will occur as a result of the Inch Cape WTGs and OSPs.

12.6.7 Baseline without Development

118 In the case that the Development is not progressed, baseline seascape and landscape conditions within the SLVIA study area will still be subject to future change. This issue has been addressed with specific reference to the regional seascape character areas in the "Forces for Change" sections of the seascape character assessment, which is included as *Appendix 12D.* The main forces for change identified relate to anticipated future development in and around coastal settlements, and the continuing development of onshore wind farms, with anticipated future development associated with recreational and agricultural land uses being a secondary issue. The Scottish Government publication, *Scotland's Offshore Wind Route Map - Developing Scotland's Offshore Wind Industry to 2020 and Beyond* (2010b), suggests that within the marine environment the development of large scale offshore wind energy facilities will remain an official objective for some time to come, and it is likely that at least some of this activity will be focused on the SLVIA study area given the allocation of Round 3 zone in the Outer Firth of Forth.

12.7 Assessment Methodology

119 The aim of the SLVIA is to identify, predict and evaluate potential impacts arising from the Inch Cape WTGs and OSPs and the installation of the OfTW. This section highlights how the SLVIA methodology uses the framework outlined in *Section 4.4* and builds upon the principles to undertake the SLVIA assessments.

120 Wherever possible, identified impacts are quantified, but the nature of SLV assessment also requires interpretation by professional judgement.

121 In order to provide a level of consistency to the assessment, seascape/landscape sensitivity and the prediction of magnitude of change, are based on pre-defined criteria as outlined in this section. These criteria are derived from the *Guidelines for Landscape and Visual Impact Assessment* (Landscape Institute and IEMA, 2013), as refined for the purposes of offshore wind farm assessment, and also taking account of SNH guidance detailed in *Section 12.4.1*.

122 The assessment of significance (sensitivity and magnitude) involved site specific field work to consider the potential impacts on all of the identified receptors included in the assessment. This field work was supplemented by reference to a range of illustrative material including photography, ZTVs, and electronically generated wireline representations of the predicted views at each of the 26 viewpoint locations included in the assessment. The nine viewpoint locations closest to the Inch Cape WTGs and OSPs are illustrated with a photomontage in addition to wireline visualisations. The viewpoint visualisations are presented in Figures 12.35 – 12.60 presented in *Appendix 12F*.

123 The potential landscape and visual impacts arising during the operational phase of the Inch Cape WTGs and OSPs have been assessed in two ways:

- Analysis of the ZTVs to provide a general overview of the predicted visibility of the Inch Cape WTGs and OSPs from the different distances within the SLVIA study area. This analysis is contained within *Appendix 12B*; and
- Assessment of the potential landscape and visual effects at 26 selected viewpoints. Descriptions of the existing and predicted view at each viewpoint together within a description of the predicted effects are contained in *Appendix 12C.*

12.7.1 Sensitivity of Receptor

124 The sensitivity of the seascape and landscape will be defined as high, moderate or low based on combining value and susceptibility of the resource to the change envisaged from the Development.

125 Firstly, the value of the seascape or landscape resource has been assessed taking account of whether or not any designation applies, and if not, based on consideration of seascape or landscape quality or condition; scenic quality; rarity; representativeness; conservation interests; recreational value; perceptual aspects such as wildness or tranquility; and cultural associations.

126 The susceptibility of seascape to change has been judged according to a series of criteria originally identified in "*An assessment of the sensitivity and capacity of the Scottish seascape in relation to offshore wind farms* (SNH, 2005) and, as subsequently modified for the SLVIA of the Inch Cape 2013 EIA to include aspects of seascape covered in "*Guidance on Landscape/Seascape Capacity for Aquaculture"* (SNH, 2008). Susceptibility is defined as high, moderate or low based on professional interpretation of a combination of parameters including:

- scale and openness of the seascape;
- form, whether complex and intricate or simple;
- degree of settlement;
- pattern and number/character of focal points;
- lighting, whether dark or well-lit;
- degree and perception of movement in the seascape;
- aspect, for example whether coastal views are aligned towards the open sea or inner firths;
- experiential qualities of the seascape such as seclusion, busyness, strong maritime connections, etc.;
- degree of exposure;
- process and dynamics;
- quality and condition; and

- what development or other pressures are present.

127 The susceptibility of the landscape to change is defined as high, moderate or low based on professional interpretation of a combination of parameters including:

- the value placed on the landscape as defined by designation or other identifiable form of recognition;
- the scale and pattern of the landscape and its elements/features;
- the simplicity or complexity of the landscape;
- the nature of skylines;
- landscape quality or condition, including presence of any detracting features;
- existing land-use;
- visual enclosure/openness of views and distribution of visual receptors; and
- the scope for mitigation, which would be in character with the existing landscape.

128 This assessment considers landscape and seascape sensitivity in relation to indirect effects arising from development outwith the particular landscape or seascape character area in question. Overall sensitivity of the seascape and landscape resource will be assessed as high, moderate or low in accordance with Table 12.16.

Table 12.16: Criteria for classifying sensitivity of seascape or landscape receptor

Sensitivity	Definition
High	A seascape or landscape of particularly distinctive character, which may be nationally designated for its scenic quality or where its key characteristics have limited resilience to accommodate change without being fundamentally altered.
Moderate	A seascape or landscape of notable character or where its key characteristics have some/medium resilience to accommodate change.
Low	A seascape or landscape which is of low/poor scenic quality or where its key characteristics are such that they are resilient to change.

129 It should be noted that the seascape or landscape sensitivity assessed at each of the representative viewpoints is not necessarily the same as that identified as the overall sensitivity for the seascape or landscape character area within which the viewpoint is located. Thus, if the key characteristics of the seascape or landscape at, and seen from, a viewpoint location is different from the key characteristics of the overall seascape or landscape character area, it may be assessed as being of a different sensitivity at the particular viewpoint location.

12.7.2 Viewpoint Sensitivity

130 Viewpoint sensitivity is defined as high, moderate or low based on combining value and susceptibility of the view or visual amenity to the change envisaged from the Development.

131 The value of views is assessed as high, moderate or low. The value attached to publicly accessible views is judged as high, moderate or low according to a range of criteria as set out in Table 12.17.

Table 12.17: Value attached to publicly accessible views

Value	Criteria
High	Views from nationally (or internationally) known viewpoints, which: • have some form of planning designation; • are associated with internationally or nationally designated landscapes or important heritage assets; • are promoted in sources such as maps and tourist literature; • are linked with important and popular visitor attractions where the view forms a recognised part of the visitor experience; or • have important cultural associations. Also may include views judged by the assessors to be of particularly high value.
Moderate	Views from viewpoints of some importance at regional or local levels, which: • have some form of local planning designation associated with locally designated landscapes or areas of equivalent landscape quality; • are promoted in local sources; • is linked with locally important and popular visitor attractions where the view forms a recognised part of the visitor experience; or • have important local cultural associations. Also, may include views judged by the assessors to be of value at the local authority level.
Low	Views from viewpoints which, although they may have value to local people: • have no formal planning status; • are not associated with designated or otherwise high quality landscapes; • are not linked with popular visitor attractions; or • have no known cultural associations. Also, may include views judged by the assessors to be of value to local communities.

132 All views from residential properties will be considered of high value, as the views that people obtain from their home are generally highly valued.

133 The susceptibility of views to change arising from the Development will be considered in relation to the following parameters:

- location and context of the viewpoint;
- land use or main activity at the viewpoint;
- frequency and duration of use; and
- seascape or landscape character and quality of the intervening seascape or landscape.

134 Overall visual sensitivity will be assessed as high, moderate or low as defined in Table 12.18.

Table 12.18: Visual sensitivity in relation to main activity at viewpoint

Sensitivity of Receptor	Visual Resource of Amenity
High	Locations frequented by viewers with proprietary interest and prolonged viewing opportunities such as at residential properties or at popular recreational destinations, including views obtained by recreational cyclists on recognised national cycle routes.
Moderate	Locations frequented by viewers with a moderate interest in their environment; people travelling through the landscape in a motorised vehicle or at recreational facilities where the main focus of activity is not on the surroundings.
Low	Locations frequented by viewers with a passing interest in their surroundings and whose interest is not specifically focused on the scenery, e.g. at working premises.

12.7.3 Magnitude of Change

135 The magnitude change arising from the Development for any particular receptor is described as high, moderate, low or negligible, based on professional interpretation of a combination of parameters, including size and scale of the predicted change; geographic extent; as well as its duration and reversibility. The size and scale of the change arising from the Development will be considered in relation to the distance of the receptor from the Development; the extent of the Development in the view (e.g. the horizontal angle subtended by the main elements of the Development); the angle of view in relation to main receptor activity; and the degree of contrast of the Development compared to its surrounding context. The geographical extent of the change will be considered for each group of receptors; for example, people using a particular route or public amenity, drawing on the viewpoint assessments, plus information about the distribution of that particular group of people in the SLVIA study area. Duration will be considered as long term where effects will occur for 25 years or longer; medium term where effects will occur for between 2 years and 25 years and relatively short term or temporary where effects will occur over a 2 year period.

136 Due to the existing baseline in which the Wind Farm will be located, with existing and consented wind farms forming part of the baseline, the magnitude of cumulative change (*Section 12.7.6*) will also be taken into consideration.

137 Magnitude of change will be assessed as high, moderate, low or negligible, as defined in Table 12.19.

Table 12.19: Classification of magnitude of change

Magnitude of change	Definition
High	Total loss or considerable alteration to key elements, features or characteristics of the seascape/landscape character or view, resulting in a substantial change to the baseline condition.
Moderate	Partial loss or alteration to one or more key elements, features or characteristics of the seascape/landscape character or view. Change perceived as a partial or localised change within a broader, unaltered context.
Low	Limited loss or small alteration to one or more key elements/features/characteristics of the existing seascape/landscape character or view. Change is discernible but underlying landscape character or view composition will be similar to baseline.
Negligible	Very limited or imperceptible loss or alteration to one or more key elements/characteristics of the baseline. Change may be barely distinguishable.

12.7.4 Cumulative Effects on Seascape and Landscape Character

138 As identified in *Section 12.6.3*, the baseline includes several operational and consented wind farms both offshore and onshore, as well as some vertical tall structures (the oil rig maintenance structures in Dundee). The Inch Cape Wind Farm will not be seen on its own, but will be seen in the context of these developments.

139 Cumulative effects on seascape and landscape character arise from two or more wind farm developments introducing new features into the seascape or landscape. For the purposes of this assessment, and as agreed in consultation, those wind farms that are already existing or consented within the SLVIA study area are considered within the baseline assessment, as the addition of Inch Cape Wind Farm will add to this already existing, or likely to exist baseline. Where relevant, an assessment has also been carried out for the future cumulative scenario, comprising Inch Cape with the baseline and those wind farms that are at scoping or application stage.

12.7.5 Cumulative Effects on Visual Amenity

140 Cumulative effects on visual amenity consist of combined and sequential visibility of wind farms in the SLVIA study area.

141 Combined visibility occurs where it is possible to see two or more developments from a single location. Combined visibility may either be in combination (where several wind farms are within a single arc of vision i.e. approximately 90°) or in succession (where wind farms occur in several arcs of vision at the same location). Sequential effects occur where there is visibility of one or more wind farms from any route through the landscape: for example, from roads or footpaths. These definitions are based on SNH guidelines *Assessing the Cumulative Impact of Onshore Wind Energy Developments* (March 2012a).

12.7.6 Magnitude of Cumulative Change

142 As the Inch Cape Wind Farm will be seen in the context of other operational or consented wind farms included in the cumulative scenarios (see Table 12.22), in addition to the criteria set out in *Section 12.7.3* above, the following criteria also are considered in order to determine impacts:

- the number of existing and consented and/or proposed wind farms visible;
- the distance to each of the existing, consented, and/or proposed wind farms from receptor locations;
- the direction of each wind farm in relation to other wind farm developments and the viewpoint;
- the horizontal subtended angle (HSA) of the view occupied by each wind farm (i.e. the angle between the left hand visible WTG and right hand visible WTG in each wind farm;
- the frequency and duration of cumulative visibility; and
- in the case of seascape and landscape character areas, landscape designations and transportation/recreational routes, the proportion of the area or route subject to cumulative views.

143 The additional criteria utilised in ascribing magnitude of cumulative change throughout this assessment are defined in Table 12.20 below.

Table 12.20: Magnitude of cumulative change

Magnitude of Cumulative Change	Definition
High	The Inch Cape WTGs and OSPs would represent a considerable increase in the proportion of the seascape/landscape or view affected by wind farm developments.
Moderate	The Inch Cape WTGs and OSPs would represent a notable increase in the proportion of the seascape/landscape or view affected by wind farm developments. Moderate cumulative change equates to a localised change within an otherwise unaltered context.

Magnitude of Cumulative Change	Definition
Low	The Inch Cape WTGs and OSPs would represent a minor addition to the proportion of the seascape/landscape or view affected by wind farm developments. The change would be discernible, but the original baseline conditions would be largely unaltered.
Negligible	The Inch Cape WTGs and OSPs would represent a barely discernible addition to the proportion of the seascape/landscape or view affected by wind farm developments. The baseline condition of the seascape/landscape or view would, for all intents and purposes, be unaffected.

144 In carrying out the cumulative assessment, consideration has been given to cumulative effects arising from combined and/or consecutive (concurrent) visibility (where the observer would be able to see two or more wind farm developments from one viewpoint location), and sequential effects (where a number of wind farm developments would be visible individually or simultaneously over a sequence of connected viewpoints, such as would be found along a road or footpath).

12.7.7 Method for Assigning Significance of Effect

145 For the purposes of the SLVIA of the Development and in terms of the *Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017*, significant seascape, landscape or visual effects, are Major or Moderate/Major (denoted in bold in Table 12.21).

146 Significance of effects is determined by the sensitivity of receptors and the predicted magnitude of change. For the purposes of this assessment seascape, landscape or visual effects which are Major or Moderate/Major are considered significant.

Table 12.21: Seascape, landscape and visual effects

Magnitude of change	Sensitivity of resource/receptor		
	High	**Moderate**	**Low**
High	**Major**	**Moderate/Major**	Moderate
Moderate	**Moderate/Major**	Moderate	Moderate/Minor
Low	Moderate	Moderate/Minor	Minor
Negligible	Moderate/Minor	Minor	Minor/Negligible

147 The matrix is not used as a prescriptive tool and the methodology and analysis of potential effects at any particular location will all require the exercise of professional judgement. GLVIA3 (2013) makes clear the importance of professional judgement (paragraph 2.23) and at paragraph 3.32 states:

"The (EIA) Regulations require that a final judgement is made about whether or not each effect is likely to be significant. There are no hard and fast rules about what effects should be deemed 'significant' but LVIAs should always distinguish clearly between what are considered to be significant and non significant effects".

148 Therefore, in line with GLVIA3 the final judgement on whether or not the effect is likely to be significant has been made on professional judgement, with a clear explanation and justification provided.

12.8 Baseline and Cumulative Assessment Data and Scope

149 The locations and status of all wind farms (for which data is publicly available) was identified within approximately 65 km of the Development are shown on Figure 12.8. This identifies all wind farms with WTGs larger than 50m in height (operational, under construction, application, at appeal and scoping). The status of the wind farms is taken to be current as of 1st November 2017.

150 The context for the 65 km radius search area agreed for the SLVIA is complex with over 130 sites, not including many smaller single turbines. Figure 12.8 shows the location and status of sites across the study area, including some beyond the study area which have been included for reference as requested by consultees.

151 An initial comparison review of the ZTVs of wind farm sites within the study area against the Development's ZTV was undertaken to consider whether cumulative effects would be likely. A judgement was then made on the wind farm sites to be included in the assessment based on the extent of simultaneous cumulative visibility predicted, size and proximity of each wind farm relative to the proposed development. This review also considered potential sequential cumulative effects on the key transport routes in the study area. Based on this review, the list of wind farms to be included in the detailed cumulative assessment was prepared. This totals 30 operational sites, 2 under construction, 9 consented, 1 in-planning and 1 in scoping. The oil-rig maintenance structures in Dundee Port have also been included given their height and location. ZTVs for all of these developments have been prepared and grouped to reflect similar planning status and where possible, the pattern of predicted visibility, for the purpose of being presented on the cumulative ZTVs. The grouped and individual wind farms are identified in Table 12.22 and on Figure 12.9.

Table 12.22: Wind farm developments included for assessment

ZTV Group	Site	Status	Number of WTGs	Blade Tip Height (m)	Approx. Distance and Direction to nearest Inch Cape WTG
1	Hillhead of Auquhirie	Operational	3	92m	40.0 km SSE
	Clochnahill	Operational	4	81m	39.9 km SSE
2	Brownieleys	Operational	3	100m	30.6 km SSE
	Paul Matthew Hill	Consented (July 2016)	2	99.5m	27.8 km SSE
	Tullo Farm	Operational	7	100m	30.3 km SSE
	Twinsheils	Operational	10	100m	31. km SSE
3	Hill of Stracathro	Operational	1	79.6m	30.8 km ESE
	Whitefield of Dun Farm	Operational	1	67m	29.1 km ESE
	East Drums	Operational	1	67m	29.8 km ESE
4	Ascurry Farm	Operational	1	77m	31.2 km E
	North Mains of Cononsyth	Operational	1	66.7m	27.8 km E
	Dubton Farm	Operational	1	77m	29.7 km ESE
	Pickerton	Operational	1	77m	30.1 km ESE
5	Frawney	Consented (2014)	5	80m	41.5 km E
	Govals	Consented (2014)	6	86m	42. km E
	Tealing	Operational	1	86m	42.3 km E
6	Airdrie Farm	Operational	1	74m	35.1 km NE
	Bonerbo	Operational	3	67m	37.4 km NE
7	Earlseat	Operational	9	120m	60.0 km NE
	East Fife Football Club (Bayview)	Consented	1	91m	54.8 km NE
	Levenmouth Demo Project	Operational	1	196m	56.9 km NE

ZTV Group	Site	Status	Number of WTGs	Blade Tip Height (m)	Approx. Distance and Direction to nearest Inch Cape WTG
	Methil Docks	Operational	1	81m	55.2 km NE
	Woodbank Farm	Operational	1	84m	59.6 km NE
8	Kinegar Quarry (Neuk)	Operational	2	130m	57.6 km N
	Ferneylea	Operational	2	71m	58.9 km N
	Hoprigshiels	Operational	3	125m	59.2 km N
9	Aikengall	Operational	16	125m	58.9 km N
	Aikengall 2	Operational	19	145m	60.3 km N
	Aikengall 2a	Consented (Oct 2016)	19	145m	60.7 km N
	Crystal Rig 1	Operational	20	100m	60.6 km N
	Crystal Rig 1a	Operational	5	100m	61.8 km N
	Crystal Rig 2	Operational	51	125m	60.6 km N
	Crystal Rig 2a	Operational	9	125m	60.4 km N
	Crystal Rig 3	Operational	6	125m	60.1 km N
WF1	St John's Hill	Operational	9	80m	32.6 km SSE
WF2	Michelin Tyre Co Ltd	Operational	2	120.5m	37.8 km E
WF3	Kenly	Consented (2013)	6	100m	33.0 km NE
WF4	Ferneylea 2*	Application (submitted July 2015)	6	115m	58.9 km N
OWF1	Kincardine Floating Wind Farm	Construction	8	192m	48.4 km S
OWF2	NNG	Consented	75	197m	11.2 km NNE
OWF3	Seagreen	Consented	75	209.7m	11.7 km SW
OWF4	Forthwind Offshore	Consented	2	198m	56.7 km NE
OWF5	Forthwind Offshore (extension)*	Application	9	225m max	56.7 km NE

ZTV Group	Site	Status	Number of WTGs	Blade Tip Height (m)	Approx. Distance and Direction to nearest Inch Cape WTG
S1	Dundee – Oil Rig Maintenance Structures	Operational	2-4 Lattice structures	127m	39.3 km ENE
WF = Onshore Wind Farm; OWF = Offshore Wind Farm; and S = Structure (non-wind) *For Ferneylea 2 and Forthwind Offshore (extension) these projects are considered only in the future cumulative assessment. All other projects are assessed in the baseline assessment, on the basis that they are operational or consented.					

152 For the purposes of the assessment, the baseline wind farms are defined as being operational and consented wind farms. Wind farms under construction are considered under the consented definition. Proposed wind farms which constitute the future cumulative scenario, comprise developments which are at application stage or at scoping stage where the latter are considered relevant to the cumulative assessment.

153 The relevant Cumulative Zones of Theoretical Visibility (CZTVs) are illustrated on Figures 12.10 to 12.22d. Each CZTV has been calculated to blade tip based on the available turbine dimensions and layouts for each site at the time of assessment. Cumulative ZTVs with onshore wind farms has only been considered within a 40 km radius of their respective locations. This is due to their turbine heights being below 150 m and taking into account SNH visualisation guidance (2017) which recommends a 40 km radius ZTV study area for turbines 131 m to 150 m to capture all potential significant effects. There are onshore turbines below this height but for consistency a 40 km ZTV radius has been used for all onshore. For offshore wind farms, as their turbine height is greater than 150 m in height, ZTVs to the full extents of the Inch Cape Wind Farm study area have been produced.

154 *Appendix 12B* provides a description of the theoretical cumulative visibility of the proposed development in addition to the identified groups and single wind farms listed in Table 12.22 above.

12.9 Impact Assessment – Construction (and Decommissioning) Stage: Offshore Export Cable Corridor

155 The potential effects associated with the construction (and decommissioning) of the offshore export cable corridor and its landfall to mean high water have been scoped into this assessment at the request of consultees. This relates to the presence of installation vessels and related works for the Export Cable Corridor, and cable trenching at the landfall location. A full assessment of the cable route inshore from the landfall is provided

in the Onshore EIA Report, which was accepted by East Lothian Council on 8th March 2018 which can be read on East Lothian Council's planning website[4].

156 Only construction and decommissioning activities related to the laying of the Offshore Export Cable have the potential to create seascape, landscape or visual impacts as the Offshore Export Cable will not be visible once laid. Construction will involve cable-laying and associated support vessels, and these are likely to be visible particularly from coastal areas closer to the Offshore Export Cable Corridor. Additionally, operational maintenance of the Inch Cape WTGs or OSPs is not likely to be visible from coastal areas. Accordingly, these activities are unlikely to give rise to significant impacts on seascape or visual amenity as they will take place within the Outer Firths of the Tay and Forth, in an environment where shipping movements and marine activity are commonplace. Therefore, the assessment focusses on such activity near the landfall location only.

157 The Offshore Export Cable landfall will be located at Cockenzie as shown on Figure 7.6 in *Chapter 7*. The method of constructing the cable landfall has not been finalised, but as set out in Table 12.10, for the purposes of this assessment, the worst case scenario for the construction has been based on the most visible method over the longest construction stage time frame (it is likely that the landfall construction will take approximately six months, whilst the construction of the substation will take approximately 24 months). Due to the location of these activities on, or close, to the foreshore it is considered that there may be significant effects on part of the Edinburgh to Gullane seascape character area, and visual amenity of recreational users of the open space at Preston Links between Cockenzie and Prestonpans, as well as walkers on the section of the John Muir Way which passes along the coastline at the landfall location. These effects will be localised in extent and temporary in duration.

12.10 Impact Assessment – Operational Stage: WTGs and OSPs

158 The potential effects associated with the construction, maintenance and decommissioning of the Inch Cape Wind Farm have been scoped out of this assessment, as discussed in *Section 12.3* above.

159 The SLVIA focusses on the effects occurring during the operational phase which relate to views of the WTGs, OSPs and their related components such as marine navigational lighting and aviation lighting. The assessment considers the operational SLV effects of the WTGs and OSPs as the worst case scenario as described in *Section 12.5.2*.

160 The assessment has been carried out to identify the additional effects of the Inch Cape WTGs and OSPs with the baseline of operational and consented wind farms identified in Table 12.22. As set out in Table 12.22 there is only one application stage wind farm and one scoping stage wind farm within the study area. The assessment also has taken account of this future cumulative scenario and identified the effects of Inch Cape with

[4] Available at: https://pa.eastlothian.gov.uk/online-applications/applicationDetails.do?activeTab=documents&keyVal=P4LTIAGNH3Y00 [Accessed 01/05/18]

the baseline and these two future cumulative developments for receptors where these are considered potentially significant.

161 The worst case scenario assessment has been carried out in respect of the tallest turbines at Inch Cape in conjunction with the consented NNG and Seagreen offshore farms. This is considered to represent the worst case scenario because it would result in the greatest contrast between the Inch Cape WTGs and the NNG and Seagreen developments, as agreed with SNH (see Table 12.2).

12.10.1 Visibility Analysis

162 In order to identify the parts of the SLVIA study area where the Inch Cape WTGs and OSPs could potentially cause seascape, landscape or visual effects, ZTVs have been analysed of the WTGs at blade tip (291 m) and hub (166 m) height, as well as cumulative ZTVs of the WTGs with existing, consented and submitted (application stage) and scoping wind farms.

163 ZTVs for the Inch Cape WTGs and OSPs are shown in Figures 12.4, 12.4a-d and Figure 12.5. They illustrate areas predicted to have views of the WTGs and OSPs based on bare ground analysis, i.e. the OS 1:50,000 digital terrain model with gridded height data at 50 m intervals, which does not take account of local landform, vegetation or buildings. Figures 12.4, 12.4a-d show areas from where any part of the Inch Cape WTGs up to the 291 m overall height are theoretically visible together with areas from where the WTGs up to hub height and areas from where the WTG bases are theoretically visible. Figure 12.5 shows areas from where any part of the Inch Cape OSPs up to 70 m height are theoretically visible. The horizontal subtended angle ZTV in Figure 12.6 shows the horizontal proportion of the view occupied by the Inch Cape WTGs at any given location within the SLVIA study area.

164 Descriptions of the geographic areas of predicted visibility for these ZTVs are provided below. *Appendix 12B* includes an analysis of the predicted visibility for the main SLV receptors identified in the SLVIA study area, comprising seascape character areas, LCTs and associated areas, landscape designations, residential settlements, road and rail routes, and recreational routes and facilities.

Blade Tip ZTV Analysis

165 The ZTVs show that for offshore areas, theoretical visibility is only limited by the curvature of the earth or by offshore islands, such as the Isle of May, which will limit views of the Inch Cape WTGs and OSPs from certain offshore locations. Beyond the 50 km SLVIA study area, theoretical visibility of the WTGs and OSPs reduces and the WTGs would disappear below the horizon at approximately 75 km from sea level views. It is also worth noting that visibility within the Inner Firths of Forth and Tay will be limited by distance, as described above, and also by the position of the WTGs and OSPs in relation to various headlands and promontories, which will screen views from certain areas.

166 The closest onshore location to the Development Area is at Cuthie Harbour, approximately 400 m south of Read Head and 1.6 km south of Lang Craig, at 15.60 km to the nearest Inch Cape WTG.

167 Within the SLVIA study area, the following broad patterns of theoretical visibility may be discerned. There will be almost continuous visibility of the Inch Cape WTGs and OSPs from the coastal edge, with the exception of certain areas of the Inner Firths of Forth and Tay where there will be no visibility; the stretch of coastline running south from Stonehaven to Crawton Ness where visibility will be intermittent; and other limited areas such as to the west of Lang Craig, where local topography will prevent views of the Inch Cape WTGs and OSPs.

168 Inland of the coastal edge, the extent of theoretical visibility is dictated by patterns of local topography. Between Stonehaven, the northern end of Montrose Bay and the A90, the hills attain heights of up to 266 m AOD and have a more pronounced form of ridge, summit and valley, with visibility limited to the south and south-west facing upper slopes and hilltops. To the north and west of Inverbervie and north of Stonehaven, theoretical visibility is even more limited. To the north-west of Montrose there will be visibility from the south facing slopes above the Montrose Basin. There will also be some visibility of the Inch Cape WTGs and OSPs from areas inland of Lunan Bay and along the stretch of coastline between Lang Craig and Arbroath.

169 Inland of Arbroath and Carnoustie, and at distances of between 20 km to 30 km from the Inch Cape WTGs and OSPs, there is a much greater extent of theoretical visibility, due to the lower height and gently rolling and sloping topography of the predominantly agricultural land, although it is likely that actual visibility will be more limited because of the screening effect of woodland and roadside vegetation.

170 There are large areas of Aberdeenshire and Angus which lie within the SLVIA study area which will have no visibility of the Inch Cape WTGs and OSPs. These areas include most of Strathmore, following the alignment of the A90, and the Howe of the Mearns, at between 30km and 40km distance from the Development Area. At beyond 40 km distance, theoretical visibility is limited to the summits and south-east facing slopes of the hills which rise above Strathmore. It is also worth noting several areas that have theoretical visibility of the WTGs and OSPs, but from where actual visibility is likely to be limited due to extensive woodland cover. These include Montreathmont Forest, between Brechin and Friockheim, and Drumtochty and Fetteresso Forests to the west of Stonehaven.

171 In the urban areas within and around Dundee, actual visibility of the Inch Cape WTGs and OSPs will be limited by intervening buildings and vegetation. To the north of Dundee, theoretical visibility is limited to the south and east facing slopes of the Sidlaw Hills.

172 Within East Fife, inland of the coastal edge, most areas of theoretical visibility lie between 30km and 40km to the south-east of the Development Area. Once again, the shallow sloping farmland results in a greater extent of theoretical visibility, but in practice many

inland areas will not have views of the Inch Cape WTGs due to the screening effect of intervening vegetation, particularly where there are large areas of woodland such as Tentsmuir Forest. Beyond 40 km from the Development Area, visibility within Fife will be much more intermittent with most areas beyond approximately 10 km from the coastline having no visibility of the WTGs.

173 The areas of East Lothian which lie within the SLVIA study area are very limited and visibility of the Inch Cape WTGs will be largely limited to the coastal edge and areas immediately inland of this. There is potentially visibility from the summit of North Berwick Law and the north facing slopes of the Lammermuir Hills which lie beyond the 50km study area where distance, intervening landform, and curvature of the earth would limit the extent of actual visibility.

Comparison of Blade Tip and Hub Height ZTVs

174 A comparison of the blade tip ZTV, hub height ZTV and WTG base is shown in Figures 12.4, 12.4a-d. These figures illustrate that for almost all areas having theoretical visibility of the Inch Cape WTGs, this visibility will include both WTG hubs and blade tips. There are only limited areas that will have visibility of blade tips only. These include the lower south and east facing slopes of the hills above Strathmore, the lower slopes of the shallow ridge to the north of the River South Esk, an area inland of Lunan Bay near Montreathmont Moor and to Leysmill, the lower slopes of the Sidlaws and adjacent hills, and parts of the Inner Firth of Tay. Within Fife, these areas are very limited in extent with the exception of an area of patchy blade tip visibility to the south between Anstruther, Kellie Law, and Elie. Within the SLVIA study area in East Lothian theoretical visibility of blade tips occurs mostly along parts of the coastline and is due to the effects of the curvature of the earth on visibility.

175 Figures 12.4, 12.4a-d also illustrate theoretical visibility of the top of the WTG substructures (WTG tower base). This illustrates that up to this height of 28 m there will be no visibility for a large inland area between Laurencekirk to Forfar where the blades and hubs will be visible. The low coastal plains around Tentsmuir will also have no visibility of the WTG substructures due to the low ground level and curvature of the earth. The coastal and inland coastal areas of hub and blade tip visibility within East Lothian (beyond the 50 km study area) will also not have visibility of the WTG substructures.

Horizontal Subtended Angle (HSA) ZTV

176 Figure 12.6 illustrates the HSA ZTV for the Inch Cape WTGs. Rather than illustrating the number of WTGs having theoretical visibility, this ZTV shows the angle from any point between the leftmost and rightmost visible WTG within the Development Area, with the aim of indicating the horizontal proportion of the view taken up by the Inch Cape WTGs at any given location. The angle decreases the greater the distance between the viewer and development but is also influenced by variations in topography. The general pattern shows that for locations either within or very close to the Development Area, the WTGs will occupy a HSA of between 90° and 360° of the view. Likewise, the area of coastline

along which views of the WTGs will occupy the greatest horizontal extent of the view (between 30.1° and 50°) lies in Angus, roughly between Montrose and Carnoustie (the HSA at Viewpoint 11: Arbroath Signal Tower is approximately 40°), with a somewhat lesser extent of the field of view being occupied by views of the Inch Cape WTGs and OSPs along stretches of coastline in Aberdeenshire and Fife (mostly between 15.1° to 30°, but lower than this around Stonehaven in the north and along the East Neuk of Fife coastline). The influence of topography on the HSA is more evident along certain stretches of coastline, for example the East Neuk and the Inner Firth of Tay where the location, form and topography of the coastal edge introduces progressive screening effects in relation to WTGs located at the outer extents of the Development Area. This effect is also more evident in certain inland locations, for example the area of land between the River North Esk and Fettercairn. Figures 12.6a to 12.6d provide this information in more detail.

Cumulative ZTV Analysis

177 *Appendix 12B* provides an analysis of the blade tip ZTVs of the Inch Cape Wind Farm and existing, consented and proposed wind farms within the study area. In summary this shows that the consented NNG and Seagreen Offshore Wind Farms have the most potential for cumulative visibility with the Inch Cape Wind Farm across the study area. There is a continuous distribution of onshore turbines across the study area with the largest clusters in Aberdeenshire (Group 2 and St John's Hill) and beyond the 50km study area Groups 7 in Fife, and 8 and 9 in East Lothian. Onshore wind farms have more localised areas of cumulative visibility with Inch Cape Wind Farm. However, those onshore wind farms nearest the coastline such as Group 2 are noticeably more visible with Inch Cape Wind Farm for larger areas of the study areas in comparison to the smaller wind farms and single turbines that lie inland.

Lighting Analysis

178 *Appendix 12H* describes the technical considerations on the likely observability of the lighting required on the WTGs. In summary this technical report identifies that a red 2000 candela light (the highest intensity light and colour required during the operation of the WTGs) has potential visibility (on a moonless night, in clear conditions away from street lighting) to a distance of approximately 37 km.

179 As the Inch Cape Wind Farm will have multiple turbines the report notes that overall light levels provided by an offshore wind farm (calculated using a total candela of 150,000), located at 15 km or further from the coast, will be lower than the ambient levels provided by starlight on a moonless night (see *Appendix 12H*).

180 The report also identifies that where multiple lights are perceived as an individual light (due to the limited angular resolution of the eye they are blended into a single, apparently brighter light) there may be an increase in light observed, e.g. there may be several locations along the coast from where one (or more than one) turbine is positioned almost directly behind another one, and the eye may fail to distinguish all lights

individually, which will result in apparently increased light levels. Such light will appear slightly brighter, and/or be visible to slightly greater distances, as illustrated in Figure 8 in *Appendix 12H*.

181 There is currently no guidance or methodology for the preparation of dusk or night time visualisations to provide representative images of known levels of lighting at particular distances from any given viewpoint location. The preparation of such visualisations involves multiple parameters which present several challenges, as acknowledged by SNH during consultation (see Table 12.4). However, as agreed through consultations, indicative lighting visualisations have been presented for four viewpoints: Viewpoint 6, Braehead of Lunan; Viewpoint 10 Clifftop Path, Victoria Park, Arbroath; Viewpoint 12 A92, East of Muirdrum; and Viewpoint 14 Carnoustie. These visualisations have been prepared without taking account of the observability of light at any given distance by the human eye, or the variations in observability due to atmospheric conditions and ambient light levels at the viewpoint locations.

182 It is considered that the effects of the lighting at the representative viewpoints would not be greater than the predicted effects on seascape, landscape character or visual amenity at each of the representative viewpoints. However, as described in *Section 12.6.6*, interpolation of the effects assessed in respect of the four night time viewpoint assessments has been carried out to inform a generic assessment of effects on SLV amenity receptors.

183 ICOL note that there may be different types of mitigation possible to reduce the lighting visible associated with the operation of the WTGs. ICOL will continue to discuss these mitigation possibilities, which include engineering mitigation, to reduce the amount of light visible along the coast.

12.10.2 Summary of Potential Effects Assessed at Viewpoints

184 *Appendix 12C* provides a detailed assessment of effects upon landscape and visual receptors at the agreed 26 viewpoint locations, including the assessment of night time effects at the four viewpoints noted above. A summary is provided below.

185 Significant effects on landscape or seascape character (Major or Moderate/Major) from the Inch Cape WTGs and OSPs are predicted at 10 of the 26 viewpoints.

- Major impacts are predicted at two of the 26 viewpoints – Viewpoint 5: Montrose and Viewpoint 6: Braehead of Lunan – both located within Angus, at distances of 19.99 km to 19.55 km respectively to the closest WTG within the Development Area. These are both impacts on seascape character where the character area is accorded a high sensitivity to change.
- Moderate/Major impacts are predicted at eight of the 26 viewpoints at distances ranging from 18.58 km to 34.81 km from the closest WTG within the Development Area. These are: Viewpoint 3: Beach Road, Kirkton, St Cyrus; Viewpoint 9: Minor Road South of Cairnconon Hill; Viewpoint 10: Clifftop Path North of Victoria Park; Viewpoint 11: Arbroath

Signal Tower; Viewpoint 16: Tentsmuir; Viewpoint 18: St Andrews, East Scores; Viewpoint 23: Fife Ness; and, Viewpoint 24: Isle of May.

186 Significant effects on visual amenity (Major or Moderate/Major) from the Inch Cape WTGs and OSPs are predicted at 13 of the 26 viewpoints. With the exception of Viewpoint 9: Minor Road South of Cairnconon Hill, these are all associated with high sensitivity visual receptors such as residents and/or recreational users whose attention will be focused on the view (hill walkers, etc.).

- Major impacts are predicted at four of the 26 viewpoints, of which three are located within Angus and one in Aberdeenshire, at distances ranging from 18.58 km to 19.99 km to the closest WTG within the Development Area. These are: Viewpoint 5: Montrose; Viewpoint 6: Braehead of Lunan; Viewpoint 10: Clifftop Path North of Victoria Park; and, Viewpoint 11: Arbroath Signal Tower.
- Moderate/Major (and significant) impacts are predicted at nine of the 26 viewpoints, of which two are in Aberdeenshire, three are in Angus and four in Fife. These nine viewpoints are located at distances ranging from 24.12 km to 34.81 km to the closest WTG within the Development Area. The viewpoints are: Viewpoint 2: A92 North of Inverbervie; Viewpoint 3: Beach Road, Kirkton, St Cyrus; Viewpoint 9: Minor Road South of Cairnconon Hill; Viewpoint 12: A92 East of Muirdrum; Viewpoint 14: Carnoustie; Viewpoint 16: Tentsmuir; Viewpoint 18: St Andrews, East Scores; Viewpoint 23: Fife Ness; and, Viewpoint 24: Isle of May.

187 It is important to reiterate that these are considered to be worst case effects which are only predicted to occur in conditions of good visibility and/or bright daylight, and that actual visibility may be limited with a corresponding reduction in the level of effect.

12.10.3 Potential Operational Effects

188 In this section, potential effects on seascape/landscape character and visual amenity are assessed taking into account the viewpoint assessment in *Appendix 12C* and the Regional Seascape Assessment in *Appendix 12D*. As previously stated, the assessment has been carried out to identify the additional effects on SLV amenity from Inch Cape Wind Farm with the baseline (operational and consented) wind farms, and where applicable the future cumulative effects arising with the one application wind farm and one scoping stage wind farm included in the assessment (see *Section 12.8*, Table 12.22 and Figure 12.9).

189 The SLVIA has considered the effects of the Inch Cape WTGs and OSPs on the following receptors:

- seascape character areas, and LCTs and associated areas;
- landscape designations including GDLs, LLAs and AGLVs; and
- visual amenity receptors including:
  - recreational users of footpaths and cycle routes;

- road users; and
- residents.

190 The effects on these receptors have been assessed through consideration of the predicted effects at the 26 agreed viewpoints as well as review of the ZTV plans presented to accompany this report to establish the extent of visibility of the Inch Cape WTGs and OSPs in relation to the range of SLV receptors across the SLVIA study area. This ZTV analysis is included in *Appendix 12B* with a summary included in *Section 12.10.1*.

191 In this section, the landscape, seascape and visual effects of the Inch Cape WTGs and OSPs are summarised in Table 12.23 to Table 12.26 below in relation to a baseline that includes existing and consented wind farms within the SLVIA study area as listed in Table 12.22 and shown in Figure 12.9. The assessment also takes account of the future cumulative scenario where either of the two application/scoping stage wind farms would be visible.

192 As noted in *Section 12.6.6*, night time effects arising from the aviation lighting of the peripheral Inch Cape WTGs has been interpolated based on the findings of the night time viewpoint assessment carried out in respect of Viewpoints 6, 10, 12 and 14. The magnitude of change identified below applies to both day time and night time effects unless otherwise indicated. Likewise, the residual effect applies to both day time and night time effects, unless otherwise indicated.

Table 12.23: Summary of effects on seascape and landscape character

Receptor	Sensitivity to Wind Farm Development	Magnitude of Change	Residual Effect (up to)
Seascape Character			
SA3: Cove Bay to Milton Ness	Moderate	Low to High	Minor/Moderate to Moderate and Moderate overall Localised **Moderate/Major** night time effects in southern part of SA Overall Moderate night time effect
	In the south of the character area, where there will be extensive visibility of the Inch Cape WTGs and OSPs, moderate effects on seascape character are predicted, as at Viewpoint 2 (A92 North of Inverbervie). Further north, around Stonehaven, the effects will be minor/moderate. These are locations in some of the more contained valleys where views towards the sea are more limited and focused and where the Inch Cape WTGs and OSPs will occupy a larger proportion of the available sea view. Such views, whilst		

Receptor	Sensitivity to Wind Farm Development	Magnitude of Change	Residual Effect (up to)
	possible at certain locations, do not reflect the overall character of sea views from the majority of this seascape character area. The Inch Cape WTGs and OSPs will be seen in seaward views with Seagreen offshore Wind Farm at similar distances. From some parts of this seascape character area, Inch Cape will also be seen to varying extents with the operational and consented onshore wind farms in Groups 1 and 2 as well as St Johns Hill. In hours of darkness, the aviation lighting on perimeter turbines at Inch Cape will be seen in addition to the Seagreen aviation lighting at slightly greater distance. SA3 has limited onshore night time lighting, being confined to sporadic settlement, and taking account of intermittent sources of offshore lighting. In this context, the addition of a group of fixed point sources of red lighting offshore to the consented Seagreen lit turbines, at distances of between approximately 23km and the perimeter of the 50km study area, will result in effects ranging from **Major/Moderate** and significant at and to the south of Inverbervie to Minor at the northern end of the SA. Overall the night time effect on this SA will be Moderate. The variation in predicted effect is due mainly to distance from the Development Area, visibility, and the character of views in which the Inch Cape WTGs and OSPs and other wind farms will be seen. Overall the effect of Inch Cape with the baseline wind farms on seascape character is considered to be Moderate.		
SA4: Montrose Bay	High	Moderate to High	**Moderate/Major to Major** and **Major** overall **Moderate/Major** night time
	Extensive visibility of the Inch Cape WTGs and OSPs is predicted throughout SA4, with expansive open sea views possible from most parts of the coastline, as demonstrated for example in views from St Cyrus (Viewpoint 3) and Montrose (Viewpoint 5). The position of the Inch Cape WTGs and OSPs in these views will vary from being seen in an area of open sea, to being seen in conjunction with adjacent headlands. Although there will be no visibility of the Inch Cape WTGs and OSPs between Scurdie Ness and Montrose, effects on seascape character generally will be significant and range from **Moderate/Major** towards the northern end of Montrose Bay to **Major** towards Montrose. Overall, the effect on this character area will be **Major** and significant. SA4 has limited onshore night time lighting apart from in and around Montrose where Viewpoint 5 is located. The introduction of a group of fixed point sources of red lighting offshore at distances of over approximately 19km seen in addition to the closest of the Seagreen lit turbines will result in a **Moderate/Major** and significant night time effect.		

Receptor	Sensitivity to Wind Farm Development	Magnitude of Change	Residual Effect (up to)
	None of the onshore baseline wind farms are in SA4, with Group 2 wind farms to the north and the scattered wind farms in Groups 3 and 4 occurring inland potentially visible from some more elevated areas. The Inch Cape WTGs and OSPs will be the closest of the offshore wind farms and from most locations in which it is visible it will be seen extending across part of the remaining sections of open sea horizon.		
SA5: Long Craig	Moderate	High	**Moderate/Major**
	Theoretical visibility occurs throughout SA5 and there are likely to be views of the Inch Cape WTGs and OSPs from most parts of the coastal edge, where they will be seen within an expansive seawards view, in addition to the consented Seagreen and more distant NNG offshore wind farms. The effect of Inch Cape with the operational and consented wind farms also visible on seascape character is considered to be **Moderate/Major** and significant. The Inch Cape WTGs and OSPs will be the closest of the offshore wind farms and will be seen across one of the remaining sections of open sea horizon. SA5 has limited night time lighting and the introduction of a group of fixed point sources of red lighting offshore at distances of over approximately 17km seen in addition to the closest Seagreen lit turbines will result in a **Moderate/Major** and significant night time effect.		
SA6: Lunan Bay	High	High	**Major**
	Although the Inch Cape WTGs and OSPs will not be visible between the southern end of the sandy bay and the headland at Lang Craig, generally they will occupy a relatively large proportion of the expansive seawards view obtained at most points in the character area from which the sea is visible, and particularly on the coastal edge and coastline. This is demonstrated in views from Viewpoint 6 (Braehead of Lunan). The Inch Cape WTGs and OSPs will occupy a relatively large proportion of the expansive seawards views and will be the closest of the offshore wind farms. Therefore, the effect on seascape character is considered to be **Major** and significant. SA6 has limited night time lighting, as described in respect of the night time viewpoint assessment for Viewpoint 6 Braehead of Lunan. The introduction of a group of fixed point sources of red lighting offshore at distances of approximately 17km seen in addition to the Seagreen lit turbines will result in a **Major** and significant night time effect.		
SA7: Lang Craig to the Deil's Heid	High	High	**Major**
	This is the closest seascape character area to the Development Area. There are expansive views of the open sea from the coastal edge, which possesses a wealth of small-scale detail and a strong sense of naturalness. The Inch Cape WTGs and OSPs will be a prominent feature in views towards the open sea as can be seen in the view from Viewpoint 10 (Clifftop Path North of Victoria Park). They will occupy a relatively large		

Receptor	Sensitivity to Wind Farm Development	Magnitude of Change	Residual Effect (up to)
	proportion of the horizontal view from some locations and are likely to be visible from most of the coastline. The Inch cape WTGs and OSPs will be seen in addition to the Seagreen and NNG offshore wind farms and will be the closest of these developments to the coast. Therefore, the effect on seascape character is considered to be **Major** and significant. SA7 is the closest seascape character area to Inch Cape with limited night time lighting. The introduction of a group of fixed point sources of red lighting offshore at distances of less than 16km seen in addition to the closest of the Seagreen lit turbines to the east and the NNG lit turbines to the south east will result in a **Major** and significant night time effect.		
SA8: Arbroath to Monifieth	Moderate	Moderate to High	Moderate to **Moderate/Major** and **Moderate/Major** overall
	This seascape character area is extensively developed, with the exception of the area around Barry Links and Buddon Ness. It has a strong horizontal emphasis with open and expansive sea views along the length of the coastline. There is almost continuous theoretical visibility of the Inch Cape WTGs and OSPs throughout the character area. Comparison of views at Viewpoint 11 (Arbroath Signal Tower) and Viewpoint 14 (Carnoustie) illustrates how views of the Inch Cape WTGs and OSPs will vary, becoming less prominent in the view with increasing distance. The Inch Cape WTGs and OSPs will be seen mainly in front of the more distant Seagreen with NNG visible also distantly to the south. Overall, due to the open sea views towards the Inch Cape WTGs and OSPs, it is considered that the effect on seascape character will be **Moderate/Major** and significant. SA8 has concentrations of night time lighting associated with the coastal settlements. The introduction of a group of fixed point sources of red lighting at distances of between approximately 18km and over 30km seen in addition to the lit turbine at NNG will result in night time effects varying between **Moderate/Major** and significant at the eastern end of the SA as described in respect of Viewpoint 10; Clifftop Path north of Victoria Park, Arbroath; and Moderate at the western end, as described in respect of Viewpoint 14, Carnoustie.		
SA9: Dundee	Low	Low	Minor overall
	Theoretical visibility of the Inch Cape WTGs and OSPs extends across many parts of the character area although actual visibility will be more limited, except in views from the coastline and hills, due to the density of built development. The view from Viewpoint 15 (Dundee Law) indicates the extent to which the Inch Cape WTGs and OSPs will be visible from elevated locations where panoramic views of the open sea can be obtained. These views typically include the Firth of Tay, and surrounding landscapes and		

Receptor	Sensitivity to Wind Farm Development	Magnitude of Change	Residual Effect (up to)
	seascapes of Fife and Angus. The Inch Cape WTGs and OSPs will introduce a large group of WTGs into seaward views but they will be seen at a considerable distance. They will be seen in addition to the nearby Michelin Tyre Factory turbines and the oil maintenance structures in Dundee Port. Within this context, it is considered that the effect on seascape character will be Minor. SA9 is well lit in hours of darkness with the lights of Dundee, the port, airport, bridges and vessels in, or moving to and from the docks. The introduction of a group of fixed point sources of red lighting at distances of over approximately 32km will result in a Minor night time effect.		
SA10: Inner Firth of Tay	Low	Low to Negligible	Negligible/Minor to Minor and Negligible/Minor overall Negligible night time
	Theoretical visibility of the Inch Cape WTGs and OSPs is limited from within this character area. The incised Inner Firth of Tay is the dominant feature within this character area which is contained by the Sidlaw and Ochil Hills. The Inch Cape WTGs and OSPs will be seen mainly from the northern side of the Inner Firth of Tay, introducing a large group of WTGs well outside the mouth of the Inner Firth. It will be seen in addition to the Michelin Tyre Factory turbines and the oil maintenance structures in Dundee Port from some locations, but the two consented offshore wind farms of Seagreen and NNG are not predicted to be visible. Overall, it is considered that the effect on seascape character will be Negligible/Minor. SA10 has limited night time lighting with the lights of Dundee visible to the east and limited, intermittent shipping movement on the Inner Firth of Tay. There is limited predicted theoretical visibility of the Inch Cape WTGs from the Inner Firth and the aviation lighting at distances of over approximately 36km seen beyond the lights of Dundee would result in a Negligible night time effect.		
SA11: St Andrews Bay	High	Moderate to Low	**Moderate/Major** to Moderate **Moderate/Major overall**
	This is a mostly large scale seascape combining a low-lying coastal landform with the expanse of the open sea. Theoretical visibility of the Inch Cape WTGs and OSPs extends across most of the character area and the predicted view from Viewpoint 16 (Tentsmuir) shows that the Inch Cape WTGs and OSPs will be a notable addition to the seascape. They will be seen in the context of an extensive view of the open sea dominated by		

Receptor	Sensitivity to Wind Farm Development	Magnitude of Change	Residual Effect (up to)
	horizontal elements. The Inch cape WTGs and OSPs will be seen in front of the more distant Seagreen offshore wind farm and NNG to the south which will be at a similar distance as Inch Cape. The overall impact on this character area is therefore considered to be **Moderate/Major** and significant. SA11 has limited night time lighting with the lights of Dundee visible to the north and Leuchars and St Andrews visible to the south and east respectively. The introduction of a group of fixed point sources of red lighting at distance of between 32km and 40km, in addition to the NNG lit turbines at similar distances will result in a **Moderate/Major** and significant night time effect.		
SA12: St Andrews to Fife Ness	High	Moderate	**Moderate/Major**
	This seascape character area comprises the largely rocky coastline between St Andrews and Fife Ness. It has a wealth of small scale detail within the coastal edge, coupled with expansive views out to sea and north to the distant Angus coastline. Theoretical visibility of the Inch Cape WTGs and OSPs will be possible throughout the character area and it is likely to be a notable feature in seaward views occupying a large area, albeit at some distance from the coastline, as can be seen in views from Viewpoint 18 (St Andrews, East Scores) and Viewpoint 23 (Fife Ness, Lochaber Rock). The Inch Cape WTGs and OSPs will be seen in addition to NNG which will be slightly closer to the coastal edge from most locations, with the onshore wind farms at Kenly and Group 6 also intermittently visible. The overall impact on this character area is considered to be **Moderate/Major** and significant. SA12 has limited night time lighting. The introduction of a group of fixed point sources of red lighting at distance of between approximately 28km and 35km, seen in addition to the NNG lit turbines at closer distance, will result in a **Moderate/Major** and significant night time effect.		
SA13: East Neuk of Fife	High	Low to Moderate	Moderate to **Moderate/Major** and Moderate overall Moderate/Minor night time
	This character area extends from Fife Ness to Chapel Ness near Earlsferry. It is a medium to high quality seascape of medium to large scale, orientated to the south and south-east. The coastline is rocky and views are mostly focused across the Firth of Forth but with open views out to sea increasing towards the east of the character area and at Fife Ness and considered to be of high sensitivity to offshore wind farm development. Theoretical visibility of the Inch Cape WTGs and OSPs occurs mainly in the east, between Fife Ness and Anstruther Easter and Pittenweem. Viewpoint 23 (Fife Ness) indicates the view of the Inch Cape WTGs and OSPs where it		

Receptor	Sensitivity to Wind Farm Development	Magnitude of Change	Residual Effect (up to)
	is seen within an open sea view. However the view from Viewpoint 22 (Anstruther Easter) is considered more typical of views towards the Inch Cape WTGs and OSPs, where they will be visible adjacent to, and mostly screened by, intervening coastal headlands. The Inch Cape WTGs and OSPs will be seen in addition to NNG which will be closer to the coastal edge, with the onshore wind farms in Groups 6 and 7 as well as the turbines at East Fife Football Club, Methil Docks and the Levenmouth Demo Project also visible from some parts of the seascape character area. The consented and application stage Forth Offshore Wind developments will also be visible. Therefore, although there may be localised significant effects on seascape character within a limited area, the overall effect of the Inch Cape Offshore Wind Farm is considered to be Moderate. SA13 has a regular pattern of coastal settlement contributing to intermittent sources of night time lighting in combination with shipping and vessel movement in the Firth of Forth and visibility of lighting along the southern shores of the river. The Inch Cape WTGs will have limited visibility from this SA and the introduction of a group of fixed point source of red lighting at distances of over 28km seen in addition to the NNG lit turbines at closer distance will result in Moderate/Minor to Negligible night time effects.		
SA14: Kirkcaldy to Largo Bay	Moderate	Negligible	Minor
	Theoretical visibility of the Inch Cape WTGs and OSPs within this character area is limited to a very small area on Kincraig Hill at a distance of just less than 47 km to the nearest Inch Cape WTG. NNG will be more widely visible and closer to this seascape character area, as well as with the Forth Offshore wind farms and other onshore wind developments. In this context, having regard to the limited additional impact of the Inch Cape WTGs and OSPs, the overall effect on the seascape character for both the current baseline and future with the inclusion of the Forth Offshore extension, is considered to be Minor. SA14 is a well let coastal edge with shipping movement in the Inner Firth of Forth apparent. As there is no hub height visibility predicted for the Inch Cape WTGs (see Figure 12.2b), it is unlikely that there will be any night time effects for this SA. Should there be any night lighting visible it is likely to be negligible and thus non-significant.		
SA17: Eyebroughy to Torness Point	Moderate	Negligible	Minor Negligible night time
	This is a large scale coastline, generally open and with expansive seaward views, of which a small part lies within the SLVIA study area. Theoretical visibility of the Inch Cape WTGs and OSPs from within this seascape is shown along most of the coastal edge and at a distance of not less than 50 km from the closest WTG. The Inch Cape WTGs and OSPs will be visible in		

Receptor	Sensitivity to Wind Farm Development	Magnitude of Change	Residual Effect (up to)
	distant views out to sea, but only in clear weather conditions, as shown in the view from Viewpoint 25 (Dunbar). The Inch Cape WTGs and OSPs will be seen in addition to, and generally behind, the closer NNG offshore wind farm. The operational and consented wind farms in Groups 8 and 9 are also theoretically visible from some locations in this seascape character area. The overall effect of the Inch Cape WTGs and OSPs on this character area will be Minor. SA17 has limited night time lighting. The aviation lighting on the peripheral turbines at Inch Cape will be at distances of over approximately 49km to the north north east of the coastal edge, seen beyond and behind the NNG lit turbines. It is therefore considered that there will be Negligible or no night time effects from the Inch Cape Wind Farm in both the landward and seaward components of this SA.		
Landscape Character			
ABS2: Agricultural Heartlands	Moderate	Low Low to Moderate night time	Moderate to Minor/Moderate Overall Minor/Moderate
	Within the SLVIA study area this comprises three separate but adjacent character areas. Overall visibility of the Inch Cape WTGs and OSPs from within these areas is limited and views of the sea are not possible from the majority of the landscape which lies within Strathmore and the Howe of the Mearns. Parts of the landscape where the sea is an important component of the view are limited to the south and south-east facing slopes of the Hill of Garvock. The Inch Cape WTGs and OSPs are predicted to be visible from the higher east facing slopes of the hills which run along the coast and from the south-eastern edge of the Grampians, as well as from a more low lying area to the south and west of Laurencekirk. Seagreen and NNG are also predicted to be theoretically visible from limited parts of these areas, particularly the east facing slopes of the hills adjacent to the coast, where the onshore wind farms in Group 2 and St Johns Hill are located. Within this context whilst there will be locations on the eastern side of the Agricultural Heartlands with moderate effects, the overall effect on landscape character from the addition of the Inch Cape WTGs and OSPs is considered to be Minor/Moderate. ABS2 has limited night time lighting with concentrations associated with settlements, lit junctions on the A90, communications masts and the lights of Aberdeen visible to the north. The introduction of a group of fixed point sources of red lighting out to sea will be at distances of between approximately 23km and the perimeter of the 50km study area, with the closest of the lit Seagreen turbines visible at distances over approximately 35km. The majority of the predicted theoretical hub height visibility at Inch Cape will be at distances of over 30km, where night time effects are considered to be Minor/Moderate. In the southern part of ABS2, between		

Receptor	Sensitivity to Wind Farm Development	Magnitude of Change	Residual Effect (up to)
	Inverbervie and Marykirk on the east facing slopes of the Garvock Hills, night time effects will be Moderate.		
ABS4: Moorland Plateaux	Moderate	Low	Minor/Moderate
	Within the SLVIA study area this comprises one character area. Where visible, the sea will be just one component of the distant and panoramic views available from some of the higher locations within the south-eastern part of this landscape character area. Overall visibility of the Inch Cape WTGs and OSPs from this landscape is limited and where visible, it will be seen as a distant element within an overall expansive view, as shown in the view from Viewpoint 4 (Cairn o' Mount). Seagreen is predicted to be visible at slightly greater distance with the wind farms in Group 2 the closest of the onshore developments included in the cumulative assessment. In this context, and the distance of the Inch Cape WTGs and OSPs, the overall effect on landscape character from the addition of the Inch Cape WTGs and OSPs is considered to be Minor/Moderate. ABS4 has limited night time lighting although night time views south eastward from this upland area towards Inch Cape are across the more settled Howe of the Mearns with associated night time lighting. The aviation lighting on peripheral turbines at Inch Cape will introduce a group of fixed point red lighting to the sea at distances of over approximately 36km, resulting in a Minor/Moderate night time effect. Seagreen aviation lighting is unlikely to be visible.		
TAY1: Highland Glens	High	Negligible	Minor Negligible night time
	Although the LCT is accorded a high sensitivity to wind farm development on account of its medium to small scale and degree of enclosure, theoretical visibility of the Inch Cape WTGs and OSPs is limited and, where visible, they will be seen at a minimum distance of 38 km to the nearest WTG. In this context, it is considered that the overall effect on landscape character is Minor. TAY1 has limited night time lighting. There is very limited theoretical hub height visibility in this landscape character area at distances of over 38km and accordingly night time effects from Inch Cape will be Negligible/None.		
TAY3: Highland Summits and Plateaux	Moderate to High	Low Negligible/No night time	Minor/Moderate Negligible/No night time
	This character type occurs within three parts of the SLVIA study area, although the higher sensitivity locations (such as the Cairngorms National Park and Deeside and Lochnagar National Scenic Area) all lie outside the SLVIA study area. Within the SLVIA study area, overall visibility of the Inch Cape WTGs and OSPs will be limited and where visible, they will be seen on		

Receptor	Sensitivity to Wind Farm Development	Magnitude of Change	Residual Effect (up to)
	the distant sea horizon as just one element within an overall expansive view over the surrounding landscape. The consented NNG and Seagreen offshore wind farms whilst predicted to be visible, would be more distant with the onshore wind farms in Groups 3 and 4 also predicted to be intermittently visible. In this context, the overall effect of the addition of the distant Inch Cape WTGs and OSPs on landscape character is Minor/Moderate. TAY3 has very limited night time lighting. The Inch Cape aviation lighting will be at distances of over approximately 38km and it is unlikely to be visible. Accordingly, there will be Negligible/No night time effect.		
TAY5: Highland Foothills	Moderate	Low	Minor/Moderate Overall Minor/Negligible night time
	There will be limited or no visibility of the Inch Cape WTGs and OSPs from the higher sensitivity parts of areas having this character type. Areas from which the Inch Cape WTGs and OSPs will be visible are the upper slopes and summits of the hills overlooking Strathmore, from where they will be seen on the distant sea horizon as one element in an overall panoramic and expansive view over the surrounding landscape. This can be seen in the view from Viewpoint 8 (White Caterthun Hill Fort). NNG and Seagreen are theoretically visible from similar parts of the Highland Foothills with the onshore wind farms in Groups 3 and 4 visible at closer distances. In this context, the overall effect on landscape character is Minor/Moderate. TAY5 has limited night time lighting. The Inch Cape aviation lighting will be at distances of over approximately 37km with the majority of the predicted hub height visibility at over 40km. There may be a Minor effect on the north eastern edge, to the south east of Viewpoint 8 White Caterthun Hill Fort, decreasing to Negligible with a Minor/Negligible overall night time effect.		
TAY8: Igneous Hills	Moderate	Low	Minor/Moderate Negligible/No night time effect
	Within the SLVIA study area this comprises one character area. Visibility of the Inch Cape WTGs and OSPs from this character area will be limited to the less sensitive upper slopes and summits of the Sidlaw Hills overlooking the coastal farmlands of Angus and the outer Firth of Tay. In views of the surrounding landscape, which can be obtained from these locations, the Inch Cape WTGs and OSPs will be visible on the distant sea horizon as just one element in an overall panoramic view. The consented offshore wind farms of NNG and Seagreen are also predicted to be visible from parts of		

Receptor	Sensitivity to Wind Farm Development	Magnitude of Change	Residual Effect (up to)
	this character area within which some of the Group 5 onshore wind farms are located. This can be seen in the view from Viewpoint 13 (Dodd Hill). Therefore, the overall effect on landscape character from the addition of the Inch Cape WTGs and OSPs is considered to be Minor/Moderate. TAY8 has limited night time lighting. The Inch Cape aviation lighting will be at distances of over approximately 30km from the eastern extremity of this character area, with the majority of the predicted hub height visibility at distances over 40km. It is unlikely that the aviation lighting on Seagreen or NNG will be visible from this area. There will be a Negligible/No night time effect from the Inch Cape aviation lighting.		
TAY10: Broad Valley Lowlands	Moderate	Negligible Negligible to localised Moderate night time	Minor Minor to localised Moderate night time Overall Minor night time effect
	Within the SLVIA study area this comprises two character areas focused on Strathmore and the Lower South and North Esk River Valleys. There will be limited visibility of the Inch Cape WTGs and OSPs from within this largely agricultural landscape. Even where theoretically visibility is indicated, actual visibility is likely to be limited as seen in the view from Viewpoint 7 (Brechin). There is limited and distant theoretical visibility of NNG and Seagreen, with the onshore wind farms in Groups 3 and 4 also predicted to have some theoretical visibility from parts of this character area. The overall effect of the addition of the Inch Cape WTGs and OSPs on landscape character is considered to be Minor. TAY10 has a low level of night time lighting associated with scattered settlements, the A90 lit junctions and communication masts. There are two areas of predicted hub height visibility: one along the northern edge of the LCA and the other in the south east extending from Brechin eastward to Hillside, north west of Montrose. From the former area, the Inch Cape aviation lighting will be at distances of over approximately 35km and the night time effect is considered to be Minor/Negligible. For the area to the east of Brechin, the night time effect from the introduction of a group of fixed red lighting on the peripheral Inch Cape WTG seen in addition to the closest of the Seagreen aviation lights at approximately 34km, may result in localised Moderate effects. However, given the limited extent of predicted visibility in the LCA, the overall effect is considered to be Minor.		
TAY12: Low Moorland Hills	Moderate	Low Localised High night time	Minor/Moderate Localised **Moderate/Major** night time

Receptor	Sensitivity to Wind Farm Development	Magnitude of Change	Residual Effect (up to)
			Overall Moderate night time
	Within the SLVIA study area this comprises one character area. Although theoretical visibility of the Inch Cape WTGs and OSPs is indicated over parts of this character area, these areas are often located within forest, therefore actual visibility is likely to be limited. From higher points in the character area, which are not forested, there may be views across the surrounding landscape to the distant sea in which the Inch Cape WTGs and OSPs will be seen on the horizon. The consented NNG and Seagreen as well as onshore Groups 3 and 4 are predicted to be visible from localised parts of the Low Moorland Hills. Overall, the effect of the addition of the Inch Cape WTGs and OSPs on landscape character is considered to be Minor/Moderate. TAY12 has limited night time lighting. The Inch Cape aviation lighting may be visible from the part of this character area to the east of Forfar at distances of between 26km and 35km. It is unlikely that the Seagreen or NNG aviation lighting will be visible from this area. There are likely to be localised **Moderate/Major** and significant effects from isolated parts of the area with open seaward views, however the overall effect is considered to be Moderate.		
TAY13: Dipslope Farmland	Moderate	Low to High	Minor/Moderate to **Moderate/Major** and Moderate overall
	This LCT is found over a large area, stretching from the coast south of Montrose to the edge of the SLVIA study area west of Dundee. There is theoretical visibility of the Inch Cape WTGs and OSPs across approximately half of this area, including locations from which views of the sea are also possible. In some of these locations, particularly where the view towards the sea is focused, the Inch Cape WTGs and OSPs will occupy a large proportion of the available sea horizon. From similar parts of the Dipslope Farmland the consented offshore wind farms at NNG and Seagreen are also predicted to be theoretically visible at considerable distance. For example, at Viewpoint 9 (Minor Road South of Cairnconon Hill), the localised effect is predicted to be **Moderate/Major** and significant. However, at other locations there would be less extensive visibility as shown in respect of Viewpoint 12 (A92, East of Muirdrum) where a Moderate effect is predicted. The overall effect on landscape character from the addition of the Inch Cape WTGs and OSPs is considered to be Moderate. TAY13 has a dispersed pattern of night time lighting. The Inch Cape aviation lighting may be visible across quite extensive parts of this character area (see Figure 12.2b), at distances of between approximately		

Receptor	Sensitivity to Wind Farm Development	Magnitude of Change	Residual Effect (up to)
	16km and the perimeter of the 50km study area. It is anticipated that there may be localised **Moderate/Major** and significant night time effects on the closest and darkest parts of this character area to the lit Inch Cape WTGs, but overall the night time effect will be Moderate.		
TAY15: Lowland Basins	Moderate	Low Localised High night time	Minor/Moderate Localised **Moderate/Major** night time Overall Minor/Moderate night time
	Within the SLVIA study area this comprises one character area. Theoretical visibility of the Inch Cape WTGs and OSPs from within this landscape character area is limited to the northern side of the Montrose Basin, from where the Seagreen offshore wind farm and the onshore wind farms in Groups 3 and 4 also predicted to be visible. In views where the Inch Cape WTGs and OSPs will be seen, visibility is likely to be limited to WTG blades, seen beyond a skyline comprised of trees and buildings in the surrounding landscape, rather than against a sea horizon. The overall effect on landscape character is therefore considered to be Minor/Moderate. TAY15 has a dispersed pattern of low level lighting with the lights of Montrose influencing the eastern edge of the area. The aviation lighting at Inch Cape will be seen at distances of between 19km and 30km on the northern and western sides of the Montrose Basin, beyond the lights of Montrose. It is anticipated to give rise to localised **Moderate/Major** and significant night effects on elevated and open parts of the character area, but overall the night time effect is considered to be Minor/Moderate.		
FFE3: Upland Foothills	Moderate	Low	Minor/Moderate
	Within the SLVIA study area this comprises a number of discontinuous areas in the north-east of Fife. These are medium to large scale landscapes with extensive views across other landscape types. Theoretical visibility of the Inch Cape WTGs and OSPs is shown across parts of the character areas, mostly around the hill tops and east facing slopes. The consented offshore wind farms of NNG and Seagreen are also predicted to be visible, with Seagreen at considerable distance and behind Inch Cape. Where visible the Inch Cape WTGs and OSPs are likely to be seen on the distant sea		

Receptor	Sensitivity to Wind Farm Development	Magnitude of Change	Residual Effect (up to)
	horizon comprising one element in extensive views across the surrounding landscape. In this context, the overall effect on landscape character is considered to be Minor/Moderate. FFE3 has limited night time lighting, with the lights of Dundee and around the Firth of Tay more apparent outwith the area to the north. There is intermittent hub height predicted visibility (see Figure 12.2b). The majority of the predicted visibility is at distances of over 37km from the nearest Inch Cape WTG where the aviation lighting would be barely visible, seen in addition to the NNG lit turbines at slightly closer distances. Accordingly, the night time effect from Inch Cape in addition to NNG is considered to be Minor/Moderate.		
FFE4: Pronounced Volcanic Hills and Craigs	Moderate to High	Low Low/Negligible night time	Minor/Moderate Negligible/None
	There is limited visibility of the Inch Cape WTGs and OSPs from within character areas of this type, occurring mainly on the higher ground of the hill tops and east facing slopes below the summits, and therefore the higher sensitivity locations within these character areas will not be affected. NNG is theoretically visible from similar areas with the onshore wind farms in Group 6 and Kenly. As can be seen in the view from Viewpoint 19 (Largo Law), the Inch Cape WTGs and OSPs will be seen as an element on the distant sea horizon, in an extensive view over the surrounding landscape. The overall effect on landscape character is considered to be Minor/Moderate. FFE4 has limited night time lighting. Areas of theoretical visibility are at distances of over approximately 40km and accordingly it is considered that there will be Negligible/No night time effect from the aviation lighting at Inch Cape.		
FFE5: Lowland Hills and Valleys	Moderate	Low to Moderate	Minor/Moderate to Moderate and Minor/Moderate overall
	This character type is found in several locations within the SLVIA study area with theoretical visibility of the Inch Cape WTGs and OSPs varying from area to area. In the areas where visibility is possible, which are likely to be larger scale, more open areas of the landscape having a lower sensitivity, the Inch Cape WTGs and OSPs are likely to be seen as an element on the distant sea horizon, from locations in which the sea may be just one component of the view. The more elevated and open parts of the Lowland Hills and Valleys on either side of the A915 is predicted to have the most extensive visibility of the Inch Cape WTGs and OSPs at distances of over 30km. The consented offshore wind farms at NNG and Seagreen as well as the onshore wind farms in Group 6 and Kenly are also predicted to be		

Receptor	Sensitivity to Wind Farm Development	Magnitude of Change	Residual Effect (up to)
	visible from similar elevated parts of this landscape. In this context, and taking the variable patterns of visibility across these areas into account, whilst there will be localised Moderate effects, the overall effect on this character type is considered to be Minor/Moderate. FFE5 has a limited low level of night time lighting. The Inch Cape aviation lighting will be at distances of between approximately 32km and the perimeter of the 50km radius study area. It will be seen in addition to the NNG lit turbines at over approximately 20km. It is considered that the night time effect from the Inch Cape aviation lighting will be Minor/Moderate overall with localised Moderate effects at the eastern end of the character area.		
FFE 6: Lowland Open Sloping Farmland	Moderate	Low to Moderate	Minor/Moderate to Moderate and Minor/Moderate overall
	This character type occurs within two areas in Fife that lie within the SLVIA study area, a small area to the east of St Andrews and a much more extensive area inland of Fife Ness. Theoretical visibility of the Inch Cape WTGs and OSPs occurs across much of these character areas. Views of the sea are possible from parts of the landscape although it is often screened from view by intervening vegetation and local landform. The consented offshore wind farm at NNG is also theoretically visible from similar areas at closer distances than the Inch Cape WTGs and OSPs, with the onshore Kenly and Group 6 wind farms located mainly in this landscape. In views across the landscape in which the Inch Cape WTGs and OSPs will be visible they will be seen as an element on the distant sea horizon, as shown for Viewpoint 20 (B9131 South of Dunino) where a localised Moderate effect is predicted. The overall impact of the addition of the Inch Cape WTGs and OSPs on landscape character is considered to be Minor/Moderate. FFE6 has limited night time lighting. The Inch Cape aviation lighting will be at distances of between approximately 29km and 42km to the north east and will be seen in addition to the NNG lit turbines at closer distances to the east. It is considered that the introduction of an additional group of fixed point red lights further to the north east will result in Moderate night time effects in the east of the area, but overall a Minor/Moderate night time effect on this area.		
FFE 7: Lowland Dens	Medium	Negligible to Low	Negligible/Minor to Moderate/Minor and Negligible/Minor overall
	This character type occurs across several locations within the SLVIA study area with the most extensive area occurring around Largo Law. Although theoretical visibility of the Inch Cape WTGs and OSPs is shown in parts of these areas along with the consented offshore NNG, it is considered that		

Receptor	Sensitivity to Wind Farm Development	Magnitude of Change	Residual Effect (up to)
	actual visibility from within the wooded valleys will be negligible and limited elsewhere. Therefore the overall effect on landscape character from the addition of the Inch Cape WTGs and OSPs is considered to be Negligible/Minor. FFE7 has limited night time lighting. The Inch Cape aviation lighting will be visible from limited parts of this character area at distances of between 30km and approximately 48km. There may be localised Moderate/Minor night time effects at locations in the eastern parts of the area, however the overall night time effects from the Inch Cape aviation lighting seen in addition to the NNG lit turbines at closer distances are considered to be Negligible/Minor.		
FFE 8: Lowland Glacier Meltwater Valleys	Moderate	Negligible to Low Negligible/None night time	Minor to Minor/Moderate and Minor overall Negligible/No night time effect
	This character type occurs at only one location within the SLVIA study area south of Newport-on-Tay between the A914 and the A92. Theoretical visibility of the Inch Cape WTGs and OSPs is limited. Actual visibility will be less than that indicated on the ZTV due to the screening effect of intervening woodland and buildings in the landscape. The consented offshore wind farms at NNG and Seagreen are also predicted to be visible at greater distances. In this context it is considered that the effect on landscape character from the addition of the Inch Cape WTGs and OSPs will be Minor. FFE8 has a dispersed pattern of night time lighting associated with settlement, road junctions and communication masts, as well as the influence of lighting from Dundee to the north. The Inch Cape aviation lighting will be visible at distances of over 38km with the NNG lit turbines at slightly closer distances in the southern part of the area. Given the intervening distance, it is considered that there will be a Negligible/No night time effect from the Inch Cape aviation lighting.		
FFE 11: Coastal Hills	Moderate	Low	Minor/Moderate
	This character type also occurs at only one limited location in the SLVIA study area to the west of St Andrews around Strathkinness, although theoretical visibility of the Inch Cape WTGs and OSPs is shown across most of the area. Views of the sea are an important element in the character of this landscape and the Inch Cape WTGs and OSPs will be visible in these views, occupying part of the distant open sea horizon. The consented offshore NNG wind farm is also predicted to be visible slightly closer than Inch Cape with Seagreen theoretically visible at considerable distance. The view from Viewpoint 17 (Strathkinness) is representative of views towards		

Receptor	Sensitivity to Wind Farm Development	Magnitude of Change	Residual Effect (up to)
	the Development Area from this area of landscape. In this context it is considered that the overall effect on landscape character will be Minor/Moderate. FFE 11 has limited night time lighting. The Inch Cape aviation lighting is predicted to be visible across most of this small character area seen beyond the lights of St Andrews at distances of over 30km in addition to the NNG lit turbines at slightly closer distance to the east south east. Given the intervening distances, it is considered that there will be a Minor/Moderate night time effect from the Inch Cape aviation lighting.		
FFE 12: Coastal Terraces	Moderate	Low	Minor/Moderate
	This LCT occurs inland of Tentsmuir Forest and in an area to the south west of the Eden estuary. Although theoretical visibility of the Inch Cape WTGs and OSPs is shown across parts of this landscape, it is considered that actual visibility will be limited due to buildings and vegetation in the surrounding landscape. Where the Inch Cape WTGs and OSPs are visible, they may be seen on the distant sea horizon or as views of WTG blades over intervening skylines with the consented offshore NNG wind farm also theoretically visible slightly further away. It is considered that the overall effect on landscape character from the addition of the Inch Cape WTGs and OSPs will be Minor/Moderate. FFE12 has limited night time lighting. The Inch Cape aviation lighting is predicted to have limited visibility at distances of over 28km in addition to the NNG lit turbines at slightly closer distance to the east south east. Given the intervening distances, it is considered that there will be a Minor/Moderate night time effect from the Inch Cape aviation lighting.		
FFE 15: Coastal Flats	Moderate	Low Low to Negligible	Minor/Moderate Minor/Negligible night time effect
	This LCT occurs in several locations inland of Tentsmuir Forest. It is considered that actual visibility will be limited mainly due to vegetation in the surrounding landscape. Where the Inch Cape WTGs and OSPs are visible, they may be seen on the distant sea horizon or as views of WTG blades over intervening skylines together with the more distant consented NNG offshore wind farm. It is considered that the overall effect on landscape character from the addition of the Inch Cape WTGs and OSPs will be Minor/Moderate. FFE 15 has limited night time lighting. The Inch Cape aviation lighting is predicted to have limited visibility at distances of over 32km in addition to the NNG lit turbines at similar distances to the south east. Given the		

Receptor	Sensitivity to Wind Farm Development	Magnitude of Change	Residual Effect (up to)
	intervening distances, it is considered that there will be a Minor/Negligible night time effect from the Inch Cape aviation lighting.		

193 The residual effects on landscape designations are described in Table 12.24 below. Where night time magnitudes of change and related effects differ from day time assessments, this is identified in the table. No assessment has been made of the night time effects in GDLs as these are rarely open to the public in hours of darkness.

Table 12.24: Summary of effects on landscape designations

Receptor	Sensitivity	Magnitude of Change	Residual Effect (up to)
SLA			
South East Aberdeenshire Coast	Moderate to High	Low to Moderate None to Moderate night time	Minor/Moderate to **Moderate/Major** None to **Moderate/Major** night time
	Theoretical visibility of the Inch Cape WTGs and OSPs is possible from within almost all of this SLA given its coastal extents. The Inch Cape WTGs and OSPs will be seen with the consented and existing wind farms across Aberdeenshire, particularly Group 2 and St John's Hill, although not continuously. Visibility of the Inch Cape WTGs and OSPs with Seagreen offshore wind farm is consistent across the same areas with Kincardine Offshore wind farm also theoretically visible from the northern extents of the SLA. As the distance to Inch Cape Wind Farm varies considerably within this SLA (between 22 km and the edge of the study area) the effects also vary and, as demonstrated by Viewpoint 3, St Cyrus, the Inch Cape Wind Farm would become a noticeable feature in the sea views that are a characteristic of the SLA with a **Moderate/Major** and significant effect. However, as described in respect of Viewpoint 1, Garron Point, to the north the effect would be Minor/Moderate. Therefore, the overall impact on the SLA is predicted to be at most **Moderate/Major** in localised southern areas reducing to Minor/Moderate in the northern part of the SLA. Night time lighting varies across this extensive coastal SLA, with concentrations in the north at Aberdeen and at settlements to the south. As in the case of day time effects, the distance from the SLA to the nearest of the peripheral lit turbines at Inch Cape will also vary, with the southern end of the locally designated landscape between Inverbervie and south of St Cyrus having predicted visibility of the aviation lighting at between 30km and 22km respectively. Accordingly, the introduction of a group of fixed point red lights offshore at Inch Cape, seen in addition to the nearest of the lit Seagreen		

Receptor	Sensitivity	Magnitude of Change	Residual Effect (up to)
	turbines to the north east, is considered likely to result in **Moderate/Major** and significant night time effects in the southern part of the SLA, decreasing to Moderate, Minor and No effects at the northern extremity of the SLA in the study area.		
The Braes of Mearns	High	Low	Moderate Moderate/Minor night time effect
	Theoretical visibility of the Inch Cape WTGs and OSPs is possible from south and south west facing slopes and hill tops within this SLA but actual visibility in many locations will be limited due to the screening effect of large areas of coniferous and mixed plantations. NNG and Seagreen are also predicted to be visible from the more elevated parts of this SLA, with the onshore sites across Aberdeenshire also visible in the fore and middle ground of most views from this SLA and the Inch Cape WTGs and OSPs visible in the distance beyond. Therefore, the overall effect on the SLA is predicted to be Moderate. Night time lighting is limited in the Braes of Mearns SLA. The Inch Cape aviation lighting will be at distances of over 37km to the south east with the closest of the lit Seagreen turbine may be just visible to the east. It is possible that the closest of the peripheral lit turbines at Inch Cape will be visible seen beyond intervening land based lighting from intervening settlement. The night time effect from the introduction of a group of fixed point red lighting in seaward views form this locally designated landscape is considered to result in a Moderate/Minor night time effect.		
LLA			
Craigtoun	High	Low	Moderate Minor night time effect
	Although theoretical visibility of the Inch Cape WTGs and OSPs is possible throughout this LLA, actual visibility in many locations will be limited due to the screening effect of woodland. The consented offshore NNG and Seagreen wind farms are also theoretically visible, with NNG at a similar distance to Inch Cape. The overall effect on the LLA with the addition of the Inch Cape WTGs and OSPs is predicted to be at most Moderate. Night time lighting is limited in the Craigtoun LLA, with lighting from St Andrews seen in seaward views towards Inch Cape. The Inch Cape aviation lighting will be at distances of over 36km seen in addition to the NNG lit turbines at slightly closer distance. The night time effect is considered to be Minor.		
Dura Den	Moderate	Negligible	Minor/Negligible

Receptor	Sensitivity	Magnitude of Change	Residual Effect (up to)
			Negligible/No night time effect
	Theoretical visibility of the Inch Cape WTGs and OSPs across this LLA is limited and does not occur within the Den itself. Therefore, the overall effect on the LLA from the addition of the Inch Cape WTGs and OSPs is predicted to be Minor/Negligible. The Inch Cape aviation lighting will be at distances of over 42km from this LLA and therefore the effect of night time lighting is considered unlikely to be visible resulting in a Negligible/No night time effect.		
East Neuk	High	Low to Negligible No night time change	Moderate to Minor/Moderate and Minor/Moderate overall No night time effect
	This LLA is characterised by extensive seaward views although overall theoretical visibility of the Inch Cape WTGs and OSPs is limited as a result of the south-easterly easterly aspect of the coastline. The consented offshore NNG wind farm is theoretically more visible and at closer distance, as well as the consented and application stage Forthwith Offshore developments and onshore Group 7 wind farms. The overall effect on the LLA from the addition of the Inch Cape WTGs and OSPs is predicted to be Minor/Moderate. There is no predicted theoretical hub height visibility of the Inch Cape WTGs in the East Neuk LLA (see Figure 12.3a) and accordingly it is unlikely that there will be any night time effect on this locally designated landscape.		
Forth Islands	High	Moderate	**Moderate/Major** but limited to Isle of May Moderate night time effect
	Of the three islands within this LLA only the Isle of May lies within the SLVIA study area. Theoretical visibility of the Inch Cape WTGs and OSPs extends across most of the island and the predicted view from Viewpoint 24 (Isle of May) shows that the Inch Cape WTGs and OSPs will be a feature in open sea views with NNG and Seagreen also visible. The onshore wind farms in Fife and East Lothian are also predicted to be more distantly visible. The effect of the Inch Cape WTGs and OSPs on the part of the LLA comprising the Isle of May is therefore considered to be **Moderate/Major** and significant. The Isle of May has limited lighting apart from the lighthouse on the island with shipping movement on the Firth of Forth apparent as well as the lights of coastal settlement on either side of the Firth also visible. The Inch Cape		

Receptor	Sensitivity	Magnitude of Change	Residual Effect (up to)
	aviation lighting will be at distances of over 34km to the north east seen beyond the much closer NNG lit turbines. The addition of the Inch Cape aviation lighting to night time views from this LLA seen in addition to the NNG lit turbines is considered to result in a Moderate night time effect, having regard to the intervening distance and closer proximity of the NNG aviation lighting.		
Largo Law	Moderate	Low to Negligible	Minor/Moderate to Minor and Minor overall Negligible/No night time effect
	Much of the landscape value of this LLA derives from the pronounced form of Largo Law which contributes to the sense of place in this part of Fife. However, theoretical visibility of the Inch Cape WTGs and OSPs is limited to the summit and upper slopes of Largo Law, with the majority of the Largo LLA having no theoretical visibility. The consented offshore NNG wind farm is predicted to be more widely visible from the LLA, along with the Forthwind Offshore consented and application development and the onshore Group 7 wind farms in closer proximity. The overall effect on the LLA from the addition of the Inch Cape WTGs and OSPs is predicted to be Minor. As noted above, the only part of this LLA with predicted hub height visibility of the Inch Cape WTGs is Largo Law at approximately 48km from the nearest lit turbine. Accordingly, it is considered that the night time effect will be Negligible/None.		
St Andrews to Fife Ness	High	Moderate	**Moderate/Major**
	This LLA comprises the long stretch of rocky coastline extending from St Andrews around Fife Ness to Crail. The relationship between the landscape and coastal edge contributes to the distinctive character of this area which includes the extensive seaward views which may be obtained throughout the LLA. Theoretical visibility of the Inch Cape WTGs and OSPs extends across most of the LLA and the predicted view from Viewpoints 21 (Kingsbarns) and 23 (Fife Ness) show that the Inch Cape WTGs and OSPs will be a notable feature in open sea views. Both NNG and Seagreen are theoretically visible with NNG slightly closer than the Inch Cape WTGs. The onshore wind farms in Group 6 and Kenly are also predicted to be intermittently visible but unlikely to affect the coastal character. The overall effect on this designated area from the addition of the Inch Cape WTGs and OSPs is therefore considered to be **Moderate/Major** and significant. There is limited night time lighting in this LLA being confined to the sporadic settlement along the coast with the Fife Ness Lighthouse visible at the south east extremity of the designated area and the lights of St Andrews apparent at the northern end. The introduction of an additional group of fixed point red lighting seen at distances of over 28km to the north east in conjunction with		

Receptor	Sensitivity	Magnitude of Change	Residual Effect (up to)
	the closer NNG lit turbines is considered to result in a **Moderate/Major** and significant night time effect decreasing to Moderate at the northern end of the LLA.		
St Andrews Links	High	Moderate	**Moderate/Major** Moderate night time effect
	Theoretical visibility of the Inch Cape WTGs and OSPs extends across all of this LLA. The Inch Cape WTGs and OSPs are likely to be a notable feature in the seascape with the consented offshore wind farm at NNG also visible at slightly closer distance although seen more obliquely from the links. Other onshore wind farms included in the cumulative assessment are also theoretically visible but less likely to influence the character of the Links. Therefore, overall effect from the addition of the Inch Cape WTG and OSPs on this LLA is considered to be **Moderate/Major** and significant. There is limited night time lighting in this LLA with the lights of St Andrews apparent in seaward views. The Inch Cape aviation lighting will be at distances of over 35km to the east north east with the NNG lit turbines visible at closer distances to the east south east. The effect of the addition of the Inch Cape aviation lighting with the NNG lit turbines is considered to be Moderate having regard to the intervening distance and the influence of nearby coastal lighting.		
Tarvit and Ceres	Moderate	Low to Negligible	Minor/Moderate to Minor and Minor overall Negligible night time effect
	Theoretical visibility of the Inch Cape WTGs and OSPs across this LLA is limited to scattered areas with similarly limited visibility of the other consented offshore wind farms at NNG and Seagreen and limited theoretical visibility of the onshore wind farms included in the cumulative assessment. The overall effect on the LLA from the addition of the Inch Cape WTGs and OSPs is predicted to be Minor. There is limited hub height visibility from the Inch Cape WTGs predicted for this LLA at distances of over 43km and accordingly the night time effect is considered to be Negligible.		
Tay Coast	Moderate	Low to Negligible	Minor/Moderate to Minor and Minor overall Negligible night time effect
	Part of the Tay Coast LLA lies outside the SLVIA study area and theoretical visibility of the Inch Cape WTGs and OSPs across this LLA is limited to scattered areas. It is likely that intervening woodland will further restrict visibility and		

Receptor	Sensitivity	Magnitude of Change	Residual Effect (up to)
	from the locations where it will be seen, Inch Cape is likely to be a distant feature seen outside the Firth of Tay. Similarly, theoretical visibility of the consented offshore wind farms at NNG and Seagreen is also limited, with the Dundee Port oil maintenance structures and Group 5 onshore wind farms theoretically more widely visible. The overall effect on the LLA from the addition of the Inch Cape WTGs and OSPs is predicted to be Minor. Hub height visibility from the Inch Cape WTs is predicted in the eastern part of this LLA where the lights of Dundee, the bridges, port, airport and associated movements are apparent. The effect of the Inch Cape aviation lighting at distances of over 37km is considered to be Negligible.		
Tentsmuir Coast	High	Moderate	**Moderate/Major**
	This LLA comprises the large stretch of sandy coastline extending west and south of Tentsmuir Point and ending at the Eden Estuary. It combines a low-lying coastal landform with the expanse of the open sea. There are very few vertical elements in the landscape apart from the low lying Tentsmuir Forest which backs the coast. Theoretical visibility of the Inch Cape WTGs and OSPs extends across most of the LLA and the predicted view from Viewpoint 16 (Tentsmuir) shows that the Inch Cape WTGs and OSPs will be a notable feature in the seascape. The consented offshore wind farm at NNG will also be visible at slightly closer distance and seen separately from Inch Cape with Seagreen theoretically visible behind the Inch Cape WTGs. The overall effect on this LLA is considered to be **Moderate/Major** and significant. There is very limited lighting within the Tentsmuir Coast LLA although the lights of Dundee and settlement along the coastal edge of the Firth of Tay are apparent to the north with the lights of St Andrews visible to the south with the Bell Rock Lighthouse visible in seaward views. The introduction of an additional group of fixed point red lighting in these seaward views at distances of over 32km to the east north east with the NNG lit turbines at slightly closer distances to the south east is considered to result in a **Moderate/Major** and significant night time effect having regard to the intervening distance.		
AGLV			
North Berwick to Dunbar Coast	High	Negligible	Minor/Moderate
	Although located at considerable distance (48.7 km) from the Development Area, there will be views of the Inch Cape WTGs and OSPs in conditions of good visibility, seen partially behind the closer consented offshore wind farm at NNG. In these circumstances it is considered that the effect on this coastal AGLV from the addition of the Inch Cape WTG and OSPs will be Minor/Moderate.		

Receptor	Sensitivity	Magnitude of Change	Residual Effect (up to)
	The Inch Cape aviation lighting will be at distances of over 48km and accordingly it is considered that it is unlikely to be visible from this AGLV and therefore there will be no night time effect.		
GDLs in inland locations			
All	High	Negligible to Low	Moderate to Minor/Moderate
	For the GDLs located within inland parts of the SLVIA study area and having theoretical visibility of the Inch Cape WTGs and OSPs, the visibility analysis including examination of satellite imagery indicates that actual visibility in most cases will be limited. This is due to the mature policy woodlands that typically enclose these landscapes and screen views of the wider surroundings, including screening of distant views towards the sea. Cumulative visibility of other wind farms across the study area will be similarly restricted by the vegetation cover within the GDLs. Therefore, it is predicted that effects from the addition of the Inch Cape WTGs and OSPs to the baseline wind farms will vary from Minor/Moderate to Moderate.		
GDLs in coastal locations			
St Andrews Links	High	Low	**Moderate/Major**
	Open sea views are possible from many places in this GDL, from which there is theoretical visibility of the Inch Cape WTGs and OSPs across most areas. The Inch Cape WTGs and OSPs are likely to be a notable feature in the seascape with the consented offshore wind farm at NNG also visible at slightly closer distance, although seen more obliquely from the links due to its location to the south of Inch Cape. Other onshore wind farms included in the cumulative assessment are also theoretically visible but less likely to influence the character of the Links. Therefore, the overall effect from the addition of the Inch Cape WTG and OSPs on this GDL is considered to be **Moderate/Major** and significant.		
Cambo	High	Moderate to Low	**Moderate/Major** to Moderate/Minor
	Open sea views towards the Development Area are possible from the wider designed landscape surrounding the woodland garden at the core of the GDL which extends around Cambo House and down to the coastal edge. The consented offshore wind farms at NNG and Seagreen are also theoretically visible from the same locations in the wider designated area, together with the onshore wind farm at Kenly visible in quite close proximity. It is considered that there may be up to **Moderate/Major** and significant effects from the addition of the Inch Cape WTGs and OPSs on this landscape.		
Tyninghame	High	Negligible	Minor/Moderate
	Located at considerable distance from the Inch Cape WTGs and OSPs, there may be views towards the Development Area from parts of this designed landscape. The Inch Cape WTGs will be visible partially behind NNG with the		

Receptor	Sensitivity	Magnitude of Change	Residual Effect (up to)
	onshore wind farms in Groups 8 and 9 also intermittently theoretically visible from the GDL. The landscape effects from the addition of the Inch Cape WTGs may be up to Minor/Moderate.		

Settlements

194 Whilst theoretical visibility of the Inch Cape WTGs and OSPs is shown for many settlements, it is considered that the degree of actual visibility from within settlements will, in most cases, be limited by the screening effect buildings and vegetation. The summary section contained below in Table 12.25 records what the greatest level of residual effect will be, recognising that this may only occur for a limited number of properties, which have open sea views, in settlements located within the SLVIA study area.

Table 12.25: Summary of effects on settlements

Receptor	Sensitivity	Magnitude of Change	Residual Effect (up to)
Coastal Settlements in Aberdeenshire	High	Moderate to Negligible/None	**Moderate/Major** (up to 30 km distance from closest Inch Cape WTG)
	Of the settlements considered in the assessment, theoretical visibility of Inch Cape Wind Farm is indicated for parts of Inverbervie and St Cyrus, together with all of Gourdon and Johnshaven. Theoretical visibility of the Inch Cape WTGs and OSPs with existing and consented onshore wind farms from these settlements is overall limited with some visibility of Group 2 and St John's Hill from Inverbervie, very limited visibility of Group 1 and part visibility of St John's Hill from Gourdon, part visibility of Group 4 from Johnshaven and part visibility of Groups 2, 3 and 4 with limited visibility of Group 5 from St Cyrus. Theoretical cumulative visibility of the offshore wind farms considered in the assessment with Inch Cape Wind Farm is indicated for Kincardine, Seagreen and NNG from all of Johnshaven. NNG and Seagreen are also theoretically visible from all of Gourdon as well as part visibility of the Kincardine offshore development. NNG and Seagreen are theoretically visible from parts of Inverbervie and St Cyrus. Actual visibility of the Inch Cape WTGs and OSPs is likely to be limited, however where properties have open sea views, residents may experience up to **Moderate/Major** and significant effects on visual amenity. Night time effects are considered to be up to **Moderate/Major** for settlements within 30km of the nearest lit Inch Cape turbine, comprising Inverbervie, Gourdon, Johnshaven, and St Cyrus. For settlements to the north of		

Receptor	Sensitivity	Magnitude of Change	Residual Effect (up to)
	Inverbervie, effects will diminish with distance from Moderate to Negligible/None beyond 40km.		
Coastal Settlements in Angus	High	High to Negligible/None	**Major** (up to 20 km distance from closest Inch Cape WTG) **Moderate/Major** (up to 26.5 km distance from closest Inch Cape WTG) **Moderate/Major** (up to 30km) night time effect
	Theoretical visibility is indicated across the whole of Monifieth, Lunan, and Auchmithie, from most of Carnoustie and Montrose as well as parts of Arbroath. Theoretical cumulative visibility of the Inch Cape WTGs and OSPs with existing and consented onshore wind farms is variable across these settlements. There is no cumulative visibility within Lunan and only limited cumulative visibility with Group 6 and Kenly at Auchmithie. There is part theoretical visibility of Groups 2, 3, and 4 and limited visibility of Group 5 from Montrose. Further south at Arbroath there is some limited theoretical visibility of Group 3, the oil maintenance structures at Dundee to the south west along with part visibility of the Michelin Tyre Factory turbines. Groups 4, 5 and 6, and Kenly would have the most theoretical visibility with Inch Cape Wind Farm from Arbroath. From Carnoustie and Monifieth, the most potential for theoretical visibility with Inch Cape Wind Farm is with the Group 6 and Kenly turbines, the oil maintenance structures and the Michelin Tyre Factory turbines in Dundee. There is more limited theoretical visibility of the Inch Cape WTGs with the Group 5 turbines. Theoretical cumulative visibility is indicated in most of these settlements for both NNG and Seagreen offshore wind farms in conjunction with the Inch Cape WTGs and OSPs, with the exception of Lunan from where there will be no cumulative visibility of NNG. Kincardine Offshore Wind Farm is also theoretically visible from Montrose and possibly Auchmithie but at a considerable distance. Actual visibility of the Inch Cape WTGs and OSPs will be much more limited; however, it is anticipated that up to **Major** and significant effects on visual amenity may be experienced where properties have open sea views, particularly between Carnoustie and Montrose. All the coastal settlements within Angus are within 30km of the nearest peripheral lit turbines at Inch Cape, apart from Monifieth at just over 33km to the east. The Inch Cape aviation lighting will be seen in addition to the Seagreen lit turbines in the northern part of the council area (Montrose and Lunan), and in addition to the NNG lit turbines from the southern settlements (Arbroath and Carnoustie). For the settlements within 30km it is considered that the night time effects of the Inch Cape aviation lighting will be **Moderate/Major** and significant. For coastal settlements at over 30km, (Monifieth) night time effects will be Moderate or less. For inland settlements with predicted hub height visibility of		

Receptor	Sensitivity	Magnitude of Change	Residual Effect (up to)
	the Inch Cape WTGs, the night time effect from the aviation lighting at Inch Cape is considered to be Moderate/Minor or less.		
Coastal Settlements in Fife	High	Moderate to Negligible/None	**Moderate/Major** (up to 35 km distance from closest Inch Cape WTG)
	Of the settlements considered in the assessment, theoretical visibility is indicated across the whole of Tayport, most of St Andrews, Guardbridge, and Crail, parts of Anstruther Easter and limited parts of Pittenweem. Theoretical cumulative visibility of the Inch Cape WTGs and OSPs with the existing and consented onshore wind farms varies between the locations of the settlements on the north and south of the Fife coast but all have most or part theoretical visibility with the Group 6 and Kenly turbines. There is theoretical visibility of Group 5, Michelin Tyre Factory turbines, and the oil maintenance structures at Dundee from most of Tayport and Guardbridge, although slightly more limited at the latter location. From St Andrews there is theoretical visibility of Inch Cape Wind Farm with Groups 4 and 5 as well as the Michelin Tyre Factory turbines, and oil maintenance structures at Dundee. At Crail, aside from Group 6 and Kenly, there is theoretical visibility of Groups 8 and 9 turbines although distant. At Anstruther Easter and Pittenweem which lie on the south coast, there is more potential for theoretical visibility of the Group 7 turbines towards the west, and Group 8 and 9 to the south with Inch Cape Wind Farm. Of the offshore sites, there is theoretical visibility of NNG from within all of these settlements due to its close proximity to Fife. Seagreen will be more distant and have more limited visibility from the East Neuk settlements. The Forthwind consented and proposed offshore turbines are theoretically visible from a limited area of St Andrews and more widely visible within Anstruther Easter and Pittenweem. As with other settlements having theoretical visibility of the Inch Cape WTGs and OSPs, actual visibility will be more limited than shown on the ZTV plans; however, the viewpoint analysis suggests that up to **Moderate/Major** and significant effects may be experienced where properties have open sea views in the direction of the Inch Cape WTGs and OSPs north west of Fife Ness. The visual effect of the Inch Cape Wind Farm with the baseline wind farms and the proposed Forthwind Extension will also be **Moderate/Major** and significant**.** The majority of the settlements in Fife are over 30km distance from the nearest peripheral lit turbine at Inch Cape with St Andrews, Crail, Boarhills and Kingsbarns all just under 30km. At these settlements, apart from Crail, the introduction of an additional group of fixed point red lighting offshore seen in conjunction with the NNG lit turbines in close proximity, the night time effect from the Inch Cape aviation lighting is considered to be **Major/Moderate** and a significant night time effect. From Crail, the peripheral lit turbines at Inch Cape will be seen partially and along the coast rather than in direct seaward views and the effect of night time lighting is considered to be Moderate/Minor.		

Receptor	Sensitivity	Magnitude of Change	Residual Effect (up to)
	At coastal locations beyond 30km, the night time effect of the aviation lighting at Inch Cape is considered to be Moderate or less, reducing to Negligible/None beyond 40km.		
Inland Settlements in Fife	High	Moderate to Negligible/None	**Moderate/Major** (up to 35 km distance from closest Inch Cape WTG)
	The ZTVs indicate that theoretical visibility of the Inch Cape WTGs and OSPs is possible across all of Balmullo, Kingsbarns, Strathkinness and Dairsie, across most of Leuchars and across part of Boarhills. Actual visibility will be more limited; however, the viewpoint analysis suggests that up to **Moderate/Major** and significant effects may be experienced where properties have open sea views. Theoretical visibility of Inch Cape with the existing and consented wind farms is variable across the settlements, although Dairsie has no visibility of any of the baseline wind farms except Group 6 and Kenly. The other settlements have theoretical visibility of Inch Cape with Group 6 and Kenly and also limited and part theoretical visibility with Groups 4 (except Balmullo and Leuchars) and Group 5, the Michelin Tyre Factory turbines, and the oil maintenance structures at Dundee. Visibility of the NNG and Seagreen offshore wind farms in conjunction with the Inch Cape WTGs and OSPs is also indicated across all of these settlements except Dairsie. There is potentially visibility of the consented and proposed Forthwind Offshore Wind Farm from Leuchars but this would be very limited. Actual visibility will be more limited; however, the viewpoint analysis suggests that up to **Moderate/Major** and significant effects may be experienced where properties have open sea views in the direction of the Inch Cape WTGs and OSPs. The visual effect of the Inch Cape Wind Farm with the baseline wind farms and the proposed Forthwind Extension will also be **Moderate/Major** and significant. The majority of the inland settlements in Fife are at distances of over 37km from the peripheral lit turbines at Inch Cape seen in addition to the closer NNG lit turbines and accordingly it is considered that the night time effects will be Moderate or less, reducing to Negligible/None at distances over 40km.		
Other Settlements	High	Low to Negligible/None	Moderate Negligible/No night time effect
	Theoretical visibility of the Inch Cape WTGs and OSPs will be possible from parts of Dundee, Broughty Ferry and, at a much greater distance, Dunbar and North Berwick in East Lothian. Where properties have open sea views, residents may experience up to Moderate effects on visual amenity. Cumulative visibility of the Inch Cape WTGs and OSPs with onshore existing and consented wind farms from Dundee and Broughty Ferry is limited to Group 5, 6, Kenly, the Michelin Tyre Factory turbines, and oil maintenance structures at		

Receptor	Sensitivity	Magnitude of Change	Residual Effect (up to)
	Dundee. From Dunbar and North Berwick theoretical visibility would be limited to distant views of Group 6, Kenly, Group 7, and more locally Groups 8 and 9, and the proposed Ferneylea 2 wind farm. The other offshore wind farms at Seagreen and NNG also demonstrate theoretical visibility in conjunction with the Inch Cape WTGs and OSPs from all of these settlements. The proposed and consented Forthwind offshore wind farm would be theoretically visible with Inch Cape from most of Dunbar and all of North Berwick. It is considered that actual visibility will be more limited than indicated on the ZTVs however, where properties have open sea views, residents may experience up to Moderate effects on visual amenity. There will also be Moderate effects from Inch Cape with the baseline developments and the proposed Forthwind offshore extension. The aviation lighting at Inch Cape will be at distances of approximately 46km and 36km from Dundee and Broughty Ferry respectively. Accordingly, and in the context of the well lit baseline at Dundee it is considered that the Inch Cape lighting is unlikely to be visible. At Broughty Ferry, the Inch Cape aviation lighting will be seen in addition to the NNG lit turbines at slightly greater distance. However due to the intervening distance, the effect is considered to be Negligible.		

Routes

195 The routes considered in the assessment cross large areas of seascape and landscape at varying distances from the Development Area. The routes assessed are shown on Figure 12.7a. Figures 12.7b and 12.7c show more detail of these routes, marked into sections (A to B/F) according to the predicted theoretical visibility of Inch Cape and the other developments included in the cumulative assessment. The location of these developments are also shown on Figures 12.7b and 12.7c. Figure 12.7d identifies the various sections of each route and the related developments predicted to be visible. Table 12.26 below identifies the developments with which Inch Cape WTGs and OSPs will contribute most to sequential cumulative visibility and related effects.

196 Theoretical visibility of the Inch Cape WTGs and OSPs from along these routes may vary from no visibility to visibility over continuous stretches of road or path. A series of graphs showing predicted theoretical visibility of the Inch Cape WTGs based on the blade tip ZTVs, are presented in Figure 12.23 to Figure 12.34. Actual visibility may also vary considerably due to the screening effect of vegetation and buildings, both at the roadside, but also in the surrounding landscape or seascape. The summary section contained in Table 12.26 below records what the greatest level of residual effect will be, recognising that this may only occur for a short section or localised area of the route.

197 It is considered that **Moderate/Major** and significant night time effects may occur for sections of the A92 and the A917, as well as NCN1 and the Fife Coastal Path within 30km of the peripheral lit turbines at Inch Cape. However, due to a combination of distance and the baseline context of lighting from other vehicles, it is considered unlikely that there will be significant night time effects on other main transport or recreational routes included in the SLVIA.

Table 12.26: Summary of effects on transport and recreational routes

Receptor	Sensitivity	Magnitude of Change	Residual Effect (up to)
Roads			
A91	Moderate	Moderate	Moderate
	The visibility analysis shows that the Inch Cape WTGs and OSPs are theoretically visible from the entire length of this route between Guardbridge and St Andrews, and intermittently over the majority of the route between the outskirts of Cupar and Guardbridge. In many places actual visibility may be more limited although the road does pass very close to the coastline, from where the Inch Cape WTGs and, over short sections of the route, OSPs may be visible on the distant sea horizon. Cumulative visibility with NNG and Seagreen, and also the closest onshore operational and consented wind farms is theoretically possible, but in practice may be limited as described in the visibility analysis in *Appendix 12B*. Within this context, it is considered that the effect on visual amenity arising from the addition of the Inch Cape WTGs and OSPs to the baseline wind farms will be at most Moderate, but mainly Minor/Moderate.		
A914	Moderate	Low	Minor/Moderate
	The Inch Cape WTGs and OSPs are theoretically visible intermittently between the junction with the A92 south of Newport-on-Tay to Balmullo and then more continuously to Dairsie. The extensive coniferous forest at Tentsmuir lies between the road and the coastal edge and is likely to screen most seaward views. However, some sections of the road south of Balmullo are more elevated from where there may be views of Inch Cape. NNG and Seagreen are also theoretically visible over similar sections of this route with actual visibility likely to be restricted as described. The visibility analysis (*Appendix 12B*) describes that only Group 6 and Kenly turbines would potentially be visible from this road with Inch Cape for very limited sections. The effect on the visual amenity of road users from the addition of the Inch Cape WTGs is therefore considered to be at most Minor/Moderate.		
A915	Moderate	Low	Minor/Moderate
	There is theoretical visibility of the Inch Cape WTGs and OSPs for just less than half of the length of the route which is within the SLVIA study area. It is predicted that actual visibility will be possible from certain sections of the road. In these locations the Inch Cape WTGs and OSPs will be seen occupying part of the distant sea horizon. Theoretical visibility is indicated along this stretch of route for the Inch Cape WTGs and OSPs with a number of existing and consented onshore wind farms, particularly those Group 6 and Kenly, and those around Dundee, although the latter are less likely to be visible due to intervening vegetation and local landform. Theoretical visibility		

Receptor	Sensitivity	Magnitude of Change	Residual Effect (up to)
	with offshore wind farms would be most likely with NNG and there also would be theoretical visibility of the proposed and consented Forthwind Offshore Wind Farm from the southern extents of the route. In this context, it is considered that the additional effect on visual amenity resulting from the Inch Cape WTGs and OSPs will be at most Minor/Moderate for both Inch Cape with the baseline developments and with the proposed Forthwind Offshore extension.		
A917	Moderate	Moderate	Moderate
	Theoretical visibility of the Inch Cape WTGs and OSPs is indicated for two-thirds of this road eastward from the west edge of Anstruther. Along many sections of the road from which there are open views of the sea, it is likely that the Inch Cape WTGs and OSPs will be visible, occupying part of the seawards horizon. Theoretical visibility with offshore wind farms would be most likely with NNG which would be visible for most of the route, closer than Inch Cape. There would also be theoretical visibility of the proposed and consented Forthwind Offshore Wind Farm from the Crail to Elie part of the route, travelling in the opposite direction to visibility of Inch Cape Wind Farm. Theoretical visibility is indicated along part of this stretch of route (between B9171 and St Andrews) for the Inch Cape WTGs and OSPs with a number of existing and consented onshore wind farms, mostly quite distant but Group 6 and Kenly would lie within 2km of the road. When considered in addition to the baseline wind farms, the Inch Cape WTGs and OSPs will be seen occupying part of the distant sea horizon and will represent a noticeable increase in the proportion of the seawards view occupied by wind farm development. Therefore, in these locations, road users may experience up to a Moderate cumulative effect on visual amenity from Inch Cape with the baseline as well as with the addition of the proposed Forthwind development.		
A919	Moderate	Low	Minor/Moderate
	The Inch Cape WTGs and, potentially over a short section OSPs, are theoretically visible for most of this short route between the A91 and the A914 north of Guardbridge. However, in many areas views towards the Development Area will be screened by buildings, particularly through Leuchars, as well as by Tentsmuir Forest. This is likely to be the same for other existing and consented wind farms, including the offshore wind farms, which are also theoretically visible. Therefore, the effect on the visual amenity of road users resulting from the Inch Cape WTGs and OSPs is considered to be Minor/Moderate at most.		
A92	Moderate	High to Negligible	**Moderate/Major** and Moderate to Moderate/Minor overall
	The visibility analysis indicates that the Inch Cape WTGs and OSPs are theoretically visible for two-thirds of this route, with OSPs more intermittently. Actual visibility is most likely on sections of the road which pass in close proximity to the coastline where up to moderate/major and significant effects may occur; however, these locations will be limited to the geographical areas which are closest to the		

Receptor	Sensitivity	Magnitude of Change	Residual Effect (up to)
	Development Area, for example, the short stretch road to the south of Arbroath, and the section to the west of Lunan Bay. Cumulative visibility with both onshore and offshore consented and existing wind farms is also possible from much of the route. In inland locations there is likely to be sequential cumulative visibility with several wind farms considered in this assessment, for example where the road passes between Stonehaven and Montrose, there will be views of St John's Hill and the Group 2 wind farms on the Hill of Garvock, as shown in respect of Viewpoint 2, on the A92 north of Inverbervie. Further south, the Michelin Tyre Factory turbines and Dundee Port oil maintenance structures are visible intermittently to the east of Dundee with Kenly and Group 6 turbines also theoretically visible to the south of Arbroath. Overall, there will be a variety of sequential effects on visual amenity throughout the length of the route. It is considered that there will be localised **Moderate/Major** and significant effects arising from the addition of the Inch Cape WTGs and OSPs as described in respect of Viewpoint 12, on the A92 east of Muirdrum. However, it is considered that significant effects on the A92 will be limited in duration and extent, resulting in a Moderate to Moderate/Minor overall effect.		
A933	Moderate	Moderate to Negligible	Moderate
	This route extends between Arbroath and Brechin, with theoretical visibility of the Inch Cape WTGs and OSPs occurring for approximately two-thirds of the route. The route analysis figure distinguishes between the bypass round Arbroath identified as A933a, and the main route identified as A933b. It is considered that actual visibility will be more limited than predicted on the ZTV, due mostly to the effects of intervening woodland within the surrounding landscape. Theoretical visibility of Inch Cape Wind Farm and onshore consented and existing wind farms from the A933 is variable with Groups 3 and 4 in close proximity and theoretically visible for much of the route, and other more distant wind farms more intermittently visible. Although Kenly and Group 6 onshore wind farms are theoretically visible, they are at considerable distance and unlikely to influence cumulative effects. NNG and Seagreen offshore wind farms are also predicted to be seen with Inch Cape Wind Farm for the same extents. Given the limited visibility by woodland and roadside vegetation, the effect on visual amenity from the addition of the Inch Cape WTGs and OSPs will be Moderate at most.		
A935	Moderate	Low to Negligible/None	Minor/Moderate
	The Inch Cape WTGs are theoretically visible for approximately three quarters of this route that extends from the A90 west of Brechin to Montrose. It is considered that actual visibility will be limited due to the screening effects of vegetation and buildings in the surrounding landscape, particularly around Montrose. Theoretical visibility with consented and existing onshore wind farms is likely with Groups 3 and 4 wind farms for most of the route with more limited cumulative		

Receptor	Sensitivity	Magnitude of Change	Residual Effect (up to)
	visibility with Group 2 and 5. Theoretical visibility with Seagreen offshore wind farm is predicted for the same extents as Inch Cape Wind Farm. Limited actual visibility of the Inch Cape WTGs and OSPs and cumulative sites is predicted from this route, mostly due to the effects of intervening woodland within the surrounding landscape. Therefore, the effect on the visual amenity of road users from the addition of the Inch Cape WTGs and OSP will be at most Minor/Moderate.		
A937	Moderate	Low to Negligible/None	Minor/Moderate
	Route analysis indicates that the Inch Cape WTGs will be theoretically visible for approximately half the length of this road that extends from Laurencekirk to Montrose, with the OSPs theoretically visible for short sections of the route north of Montrose. Cumulative visibility, both combined and sequential, of the Inch Cape WTGs and OSPs with existing and consented wind farms will be possible, mostly with Groups 2, 3 and 4 as well as the consented Seagreen offshore wind farm. It is considered that the overall effect on the visual amenity of road users from the addition of the Inch Cape WTGs and OSPs is likely to be at most Minor/Moderate given the distance of Inch Cape from the road and the intervening trees and vegetation as well as settlements limiting actual visibility.		
Recreational Routes			
Fife Coastal Path	High	Moderate to Low	**Moderate/Major**
	The Inch Cape WTGs and OSPs will be theoretically visible for much of this route particularly to the east and north of Anstruther and it is considered that actual visibility will be possible along many sections, particularly between Anstruther Easter and St Andrews where the footpath follows the coastal edge closely. There will be sequential visibility of the Inch Cape WTGs and OSPs with the Group 6 and Kenly wind farms for much of this route. There will also be simultaneous visibility of the Inch Cape WTGs and OSPs with the NNG and Seagreen offshore wind farms, particularly between Fife Ness and St Andrews, from where there will also be inland views of other existing and consented onshore wind farms across the Firth of Tay. In this context, it is likely that footpath users, who are considered to have a high sensitivity to change, may experience up to **Moderate/Major** and significant effects on visual amenity from the addition of the Inch Cape WTGs and OSPs.		
NCN Route 1	High	High to Moderate/Low	**Major** and **Major/Moderate** overall
	The route analysis has been divided into two: with Route 1a on Figure 12.33a showing theoretical visibility between Johnshaven and Inverbervie where the route follows an alternative alignment, and Route 1b on Figure 12.33b showing theoretical visibility from the remainder of this route through the study area. The Inch Cape WTGs and OSPs will be theoretically visible for most of the NCN Route 1 over both sections analysed. As the route passes through Angus, it runs adjacent or close to the coastal edge, and the Inch Cape WTs and OSPs will be seen in open seaward views. They will		

Receptor	Sensitivity	Magnitude of Change	Residual Effect (up to)
	be visible at a closest distance of 17.2 km near Arbroath varying to 20.4 km and 26.4 km in Montrose and Carnoustie respectively. Intermittent visibility is likely of the onshore wind farms, particularly St John's Hill and Group 2 wind farms. The consented offshore wind farms at Kincardine, Seagreen and NNG are also theoretically visible from the majority of the route between Johnshaven and Inverbervie, with Seagreen and NNG theoretically visible from most of the rest of the route. Sections of the route in Angus closest to the Development Area will incur a high magnitude of change resulting in a **Major** and significant effect for cyclists along localised sections between Arbroath and Carnoustie. Significant effects may also be experienced along sections of the route in Aberdeenshire, between Inverbervie and Montrose.		
Train Lines			
Edinburgh to Aberdeen	Moderate	High to Negligible/None	**Moderate/Major**
	Theoretical visibility of the Inch Cape WTGs and OSPs is predicted from just over half of this route where it passes through the study area. Actual visibility for passengers on this route is likely to be more limited due to adjacent landform, buildings and vegetation adjacent to the line, as well as the direction of views. The consented offshore wind farms at Seagreen and NNG are also theoretically visible from similar sections of the route, with the onshore wind farms at St John's Hill, Group 1, Group 2 and Group 3 theoretically visible from the route to the north of Montrose. South of Montrose, the Michelin Tyre Factory turbines, oil maintenance structures at Dundee Port as well as Group 6 and Kenly turbines are also theoretically visible. Passengers on this route may experience up to **Moderate/Major** and significant effects on visual amenity, although this is likely to be for short sections of the route only, particularly along the stretch between Carnoustie and Arbroath where there will be open sea views from the coastal edge. For much of the route, there will be no visibility of the Inch Cape WTGs and OSPs, for example where the train passes through Strathmore.		

Other Recreational Receptors

198 Based on the findings of the viewpoint assessment, recreational receptors having open sea views where the Inch Cape WTGs and OSPs are an element within these views, **Major** and significant effects on visual amenity may be experienced at locations up to 20 km distance. Where the available sea view is more focused and in locations where the Inch Cape WTGs and OSPs will occupy a greater extent of a limited sea view, **Major/Moderate** effects on visual amenity may be experienced at up to approximately 35 km distance for high sensitivity receptors. However, it is important to recognise that such locations are likely to be limited and not generally representative of typical sea views obtained from the coastal edge within the SLVIA study area.

199 As identified in respect of the baseline, the Firths of Tay and Forth and adjacent outer waters in the North Sea are established shipping routes for both commercial and cruise vessels. The closer inshore waters are used for recreational water based activities including visits to the islands in the Firth of Forth, notably the Isle of May. It is anticipated that high sensitivity recreational receptors, either taking part in water based activities, visiting the Forth islands or on cruise ships will experience **Major** and significant effects from the Inch Cape WTGs and OSPs, at distances similar to those at which land based effects are assessed as being significant.

12.11 Cumulative Impact Assessment Operational Stage: WTGs and OSPs – Application and Scoping Stage Developments

200 As set out in *Section 12.8* there is only one application stage wind farm and one scoping stage development included within the assessment for the Inch Cape WTGs and OSPs. These comprise: namely Ferneylea 2 application located in the Lammermuir Hills of East Lothian at 58.9 km to the south of the nearest Inch Cape WTG; and Forthwind Offshore Extension on the northern shores of the Firth of Forth at over 56.7 km from the nearest Inch Cape WTG. The Ferneylea 2 application would be close to the consented wind farms in Group 8 and Group 9, whilst the Forthwind Offshore Extension would be close to the onshore Group 7 wind turbines in Fife.

201 As shown on Figure 12.21, there are no parts of the study area where the Inch Cape WTGs will be visible only with these two application and scoping stage wind farms, which would only be seen in the south west part of the study area. In this context and particularly given the considerable distance between these two proposed wind farms, it is considered that the effects of the Inch Cape WTGs and OSPs with the baseline of operational and consented wind farms and these two proposed wind farms, would be no greater than the effects assessed for Inch Cape with the operational and consented developments included in the assessment. Accordingly, the effects for the future cumulative scenario of Inch Cape WTGs and OSPs with the application and scoping stage wind farms included in the assessment may be considered to be as assessed in *Section 12.10*.

12.12 Impact Interactions

202 There is an inherent linkage between SLV effects insofar as the changes predicted to occur for seascape or landscape character would affect views and visual amenity. This is reflected in the methodology where the magnitude of change for seascape, landscape character and visual amenity are considered to be the same, but the sensitivity of the respective landscape and visual receptors may vary according to the criteria identified in *Section 12.7.1* and *Section 12.7.2*.

203 The SLVIA has identified the linkages between different chapters in this EIA Report where relevant. Specifically, potential impacts upon tourism and recreational receptors and general socio-economic impacts, are fully assessed in *Chapter 16: Socio-economics and Tourism*. In addition, potential impacts on cultural heritage receptors both within the

Development Area and the SLVIA study area have been fully assessed in *Chapter 17*. Any effects are identified and assessed in the respective chapter.

204 It is not considered that there will be any significant cumulative seascape, landscape or visual effects arising from the interaction between the construction of the Offshore Export Cable and the Inch Cape WTGs and OSPs. The effects of the Inch Cape WTGs and OSPs in conjunction with other wind farms are separately addressed within the baseline assessment in *Section 12.10* (for operational and consented wind farms) and in *Section 12.11* for application and scoping stage wind farms**.**

12.12.1 Development and Onshore Transmission Works (OnTW)

205 It is not anticipated that there would be any significant cumulative effects on seascape, landscape or visual amenity from construction in the Development Area in addition to the construction of the OfTW or OnTW, due to the distance between the Development Area and the landfall locations and Onshore Area, as well as the limited duration of the construction.

206 There will be no cumulative effects on seascape, landscape or visual amenity from the operation of the Wind Farm, OfTW, and the OnTW due to the distance between them and nature of Export Cables (as they will be buried). It is not anticipated that the installed OnTW will be visible from any of the agreed viewpoints or other identified receptors.

207 During the construction (and decommissioning) phase, there may be simultaneous visibility of the Offshore Export Cable installation with the OnTW. However, it is considered that the cumulative effect on seascape or landscape character, or on visual amenity of the combined construction would be no greater than the effects assessed from the construction phase of the OfTW considered on its own, as set out in *Section 12.9* above. Therefore, whilst significant effects are likely on part of the Edinburgh to Gullane seascape character area, and visual amenity of recreational users of the open space at Preston Links between Cockenzie and Prestonpans, as well as walkers on the section of the John Muir Way which passes along the coastline at the landfall location, these will be localised in extent and temporary in duration.

12.13 Conclusion and Summary of Effects

208 The SLVIA has assessed relevant aspects of the construction and operational stages arising from the Inch Cape Wind Farm on seascape, landscape character and designations and visual amenity within the 50 km SLVIA study area (described in *Section 12.6.1*). A worst case scenario has been assessed, as described in Section *12.5.2*. A description of the aviation and maritime navigational lighting has also been included in the assessment, as set out in *Section 12.5.2*.

12.13.1 Construction (and decommissioning) Stage: Offshore Export Cable

209 The potential effects associated with the construction (and decommissioning) of the offshore export cable corridor and its landfall to mean high water will derive from the

presence of installation vessels and related works for the Export Cable Corridor, and cable trenching at the landfall location. As noted in *Section 12.9*, a full assessment of the cable route inshore from the landfall is provided in the Onshore EIA Report.

210 The presence of installation vessels during the construction stage is not considered to represent a high magnitude of change given the extent of vessel activity and movement within the study area.

211 The construction works that will occur in the vicinity of the landfall will be temporary in nature. However, directional drilling and associated activity for the construction (and decommissioning) of the landfall at Cockenzie will result in localised significant effects from the construction (and decommissioning) stage on a small part of the Edinburgh to Gullane seascape character area. It is also considered that there will be temporary and significant effects from the construction (and decommissioning) stage on the visual amenity of recreational users of the open space at Preston Links between Cockenzie and Prestonpans, as well as walkers on the section of the John Muir Way which passes along the coastline at the landfall location.

12.13.2 Operational Stage: WTGs and OSPs with Operational and Consented Wind Farms

212 Thirty eight operational or consented onshore wind farms; four consented or under construction (Kincardine Floating Wind Farm) and the operational oil rig maintenance structures in Dundee Port have been included in the assessment. As these developments are already operational or will be operational following construction, the SLVIA has been carried out to identify the additional effect of the Inch Cape WTGs and OSPs with these developments which constitute the baseline.

213 The SLVIA has established that there will be overall significant effects from the Inch Cape WTGs and OSPs with these operational and consented wind farms, on seascape character areas SA4: Montrose Bay; SA5: Long Craig; SA6: Lunan Bay; SA7: Lang Craig to the Deil's Heid; SA8: Arbroath to Monifieth; SA11: St Andrews Bay and SA12: St Andrews to Fife Ness. With the exception of SA 12, which is in Fife, all of these character areas are located within Angus at a closest distance of between 15.61 km and 32.44 km from the closest WTG within the Development Area.

214 Significant night time effects are predicted from the aviation lighting of Inch Cape Wind Farm seen in addition to either the Seagreen or NNG lit turbines, based on interpolation from the four viewpoints assessed (Viewpoints 6; 10; 12 and 14, see *Appendix 12C* and related Figures) at the same seascape character areas as those for which significant day time effects are predicted. Additionally, localised significant night time effects are predicted in the southern part of SA3 Cove Bay to Milton Ness, all at distances of less than 30km from the nearest peripheral lit Inch Cape WTG.

215 There are not predicted to be any overall significant effects on LCTs and associated character areas within the SLVIA resulting from the Inch Cape WTGs and OSPs considered in addition to the operational and consented wind farms. However, there may be localised significant effects on landscape character, for example on parts of the Dipslope

Farmland (TAY13) landscape in which open sea views are an important characteristic of the landscape and in which the Inch Cape WTGs will be seen at a closest distance of 16.03 km.

216 No overall significant night time effects on LCTs and associated areas within the SLVIA are predicted from the aviation lighting of the Inch Cape Wind Farm. However, localised significant night time effects on landscape character are predicted in the closest parts of TAY12 Low Moorland Hills; TAY12 Dipslope Farmland and TAY15 Lowland Basins.

217 There are no national landscape designations (National Parks or National Scenic Areas) within the study area. Locally designated landscapes: Special Landscape Areas (SLAs); Local Landscape Areas (LLAs) and one Area of Great Landscape Value (AGLV) occur respectively in Aberdeenshire, Fife and East Lothian. The assessment has identified that significant effects will occur in the southern parts of the South East Aberdeenshire Coast SLA, as described in respect of Viewpoint 3, in St Cyrus, where open seaward views are a characteristic of the designated coastline. In Fife, significant effects are predicted for the Tentsmuir Coast LLA, as described in respect of Viewpoint 16 at Tentsmuir; St Andrews Links and St Andrews to Fife Ness, as described in respect of Viewpoint 18, on the East Scores in St Andrews; as well as on the Isle of May, one of the islands in the Forth Islands LLA. No significant effects are assessed for the Braes of Mearns SLA in Aberdeenshire; the Tay Coast, Tarvit and Ceres, Craigtoun, Dura Den, East Neuk, or Largo LLAs in Fife; or the North Berwick to Dunbar Coast AGLV in East Lothian.

218 Significant night time effects from the Inch Cape aviation lighting seen in addition to either the nearest lit turbines at Seagreen or NNG, are assessed for the southern parts of South East Aberdeenshire Coast SLA; as well as the Tentsmuir Coast and St Andrews to Fife Ness LLAs. None of the other locally designated landscapes included in the SLVA are predicted to incur significant night time effects.

219 No significant effects are predicted from the Inch Cape WTGs and OSPs on any of the inland GDLs in the study area. The assessment has identified that localised significant effects will occur in parts of the Cambo GDL, as well as on St Andrews Links (also a LLA). No significant effect is predicted for the Tyninghame GDL in East Lothian.

220 In respect of impacts on visual amenity, significant effects have been assessed for parts of the coastal settlement of St Cyrus in southern Aberdeenshire, as described for Viewpoint 3, on Beach Road, Kirkton. No significant effects are predicted for the inland settlements of Aberdeenshire for which theoretical visibility is limited and the combination of distance and intervening elements is likely to further restrict actual visibility of the Inch Cape offshore wind farm.

221 In respect of night time effects on visual amenity, significant effects are assessed for the coastal settlements of Inverbervie, Gourdon, Johnshaven and St Cyrus from the Inch Cape aviation lighting seen in addition to the nearest lit turbines at Seagreen.

222 In Angus, significant effects are predicted on visual amenity for residents with open seaward views from the coastal settlements of Montrose, as described for Viewpoint 5; Braehead of Lunan, as described for Viewpoint 6; Arbroath as described for Viewpoints 10 and 11; and Carnoustie as described for Viewpoint 14. Theoretical visibility from inland settlements in Agnus is more extensive than Aberdeenshire, but again due to the combination of distance and intervening elements likely to restrict actual visibility, no significant effects on visual amenity have been assessed, as described in respect of Viewpoint 7 in Brechin.

223 In respect of night time effects on visual amenity, significant effects are assessed for the coastal settlements of Montrose and Lunan where the Inch Cape aviation lighting will be seen in addition to the nearest lit turbines at Seagreen; and at Arbroath and Carnoustie, where the Inch Cape aviation lighting will be seen in addition to the nearest lit turbines at NNG.

224 In Fife, for residents of St Andrews significant effects on visual amenity are predicted for residents with elevated and/or open seaward views, as described for Viewpoint 18. At the settlements located close to the coastal edge, such as Kingsbarns and Boarhills north of Fife Ness, significant effects may occur from the Inch Cape WTGs and OSPs for residents of properties with open and/or elevated seaward views. However, no significant effects are predicted for the southward facing settlements on the Firth of Forth in Fife, as described for Viewpoint 22 in Anstruther Easter. For the majority of the inland settlements Fife, significant effects are not predicted.

225 Significant night time effects from the Inch Cape aviation lighting seen in addition to the nearest lit NNG turbines at St Andrews; Boarhills; and Kingsbarns.

226 Sequential effects from the Inch Cape WTGs and OSPs have been assessed for nine road routes; the Fife Coastal Path; NCN Route 1; and the main railway between Edinburgh and Aberdeen. The predicted effects on these routes varies but the only road predicted to incur significant effects is the A92 which is the longest trunk road within the study area with extensive theoretical visibility of the Inch Cape WTGs and OSPs. Significant effects are predicted to occur on sections of this road with open seaward views between inland of Carnoustie and Montrose, as described for Viewpoint 12, east of Muirdrum.

227 The Fife Coastal Path follows the coastline between Lower Largo on the south west edge of the study area and Tayport and therefore obtains extensive open seaward views, and walkers on the majority of the route will incur significant effects on visual amenity from the addition of the Inch Cape WTGs and OSPs to the operational and consented wind farms. Similarly, cyclists on NCN Route 1 are also likely to incur significant effects on sections of the route with open seaward views between Johnshaven and Tayport and between St Andrews and Fife Ness. Views from the main railway line between Edinburgh and Aberdeen through the study area may be significantly affected by the Inch Cape WTGs and OSPs for sections with open seaward views, particularly between Carnoustie and Arbroath.

228 Significant night time effects from the aviation lighting of the peripheral Inch Cape WTG is predicted for parts of the A92, A917, NCN 1 and the Fife Coastal Path within approximately 30km of the nearest Inch Cape lit turbine.

229 The assessment of the effects of the lighting required for the Inch Cape Wind Farm has been carried out drawing on the findings of the four viewpoints selected for night time assessment as directed by consultees, as well as work commissioned by ICOL from the University of Edinburgh's Institute of Astronomy (see *Appendix 12H*). It is considered that the visibility of night time lighting from both on and offshore wind farms requires further study and refinement of related visualisation and assessment techniques, and therefore a degree of caution should be applied to the night time assessment findings presented in current assessments.

12.13.3 Cumulative Impacts from Operational Stage: WTGs and OSPs with Application and Scoping Stage Wind Farms

230 As described in *Section 12.12*, the cumulative impacts from the Operational Stage of the Inch Cape WTGs and OSPs with the baseline of operational and consented wind farms as well as the two application and scoping stage wind farm is considered to be no greater than those effects as summarised in *Section 12.13.2*.

12.13.4 Summary

231 The Inch Cape Offshore Wind Farm will consist of up to 72 turbines of up to 291m to blade tip height, occupying a sea area to the east of the Angus and north Fife coastlines, at distances of over 15.60 km which is the closest distance between the nearest Inch Cape WTG and the coast south of Red Head in Angus. It is predicted to give rise to a number of daytime and night time significant effects on SLV amenity when considered in addition to the operational and consented offshore and onshore wind farms, as well as conjunction with the two proposed wind energy developments included in the cumulative assessment. This is due to the height and horizontal extent of the turbines. The assessment has assumed a worst case scenario of 40 turbines up to 291m to blade tip height and clear visibility. Analysis of the visibility data in Graph 12.i shows that at a distance of around 35km, which is the furthest distance at which significant effects are predicted for high sensitivity landscape or visual receptors, visibility of the WTGs is likely to occur for on average, just under 40% of the year.

References

Aberdeenshire Council (2017). *Aberdeenshire Local Development Plan*.

Aberdeenshire Council (April 2017). *Aberdeenshire Special Landscape Areas, Aberdeenshire Local Development Plan Supplementary Guidance*.

Aberdeenshire Council (March 2014). *Strategic Landscape Capacity for Wind Energy in Aberdeenshire.*

Aberdeenshire Council (August 2005a). *Use of Wind Energy in Aberdeenshire Part One – Guidance for Developers.*

Aberdeenshire Council (August 2005b). *Use of Wind Energy in Aberdeenshire Part Two – Guidance for Assessing Wind Energy Developments.*

Angus Council (2016). *Angus Local Development Plan*.

Angus Council (2014). *Strategic Landscape Capacity Assessment for Wind Energy in Angus*.

Angus Council (October 2016). *Renewable and Low Carbon Energy Development Supplementary Guidance Consultation Draft.*

Countryside Council for Wales, Brady Shipman Martin, University College Dublin (2001). *Guide to Best Practice in Seascape Assessment*.

Department of Environment, Food and Rural Affairs (March 2011). *UK Marine Policy Statement*.

Department of Trade and Industry (2005). Guidance on the Assessment of the Impact of Offshore Wind Farms: Seascape and Visual Impact Report.

East Lothian Council (2016). Proposed Local Development Plan, Technical Note 9: East Lothian Local Landscape Designation Review and Appendices I - IV.

East Lothian Council (June 2013). Planning Guidance for Lowland Wind Turbines.

East Lothian Council (December 2013). Guidance for Wind Farms of 12 MW and Over.

East Lothian Council (December 2011). East Lothian Supplementary Landscape Capacity Study for Smaller Wind Turbines.

East Lothian Council (2008). *East Lothian Local Plan*.

East Lothian Council (2005). Landscape Capacity Study for Wind Turbine Development in East Lothian.

Fife Council (May 2013). Review of Onshore Wind Energy in Fife – Strategic Cumulative Landscape and Visual Impact Assessment.

Fife Council (June 2013). Fife Wind Energy Supplementary Planning Guidance.

Fife Council (2012). St Andrews & East Fife Local Plan.

Historic Environment Scotland, *Inventory of Gardens and Designed Landscapes*. Available online at: http://portal.historicenvironment.scot/[Accessed 01/05/18]

Landscape Institute (March 2017). *Visual representation of development proposals, Technical Guidance Note 02/17*.

Landscape Institute and Institute of Environmental Management & Assessment (December 2013). *Guidelines for Landscape and Visual Impact Assessment*, Third Edition (GLVIA 3).

Landscape Institute (March 2011). *Photography and photomontage in landscape and visual impact assessment*, Advice Note 01/11.

Scottish Natural Heritage (February 2017). *Visual Representation of Windfarms – Good Practice Guidance*, Version 2.2.

Scottish Natural Heritage (2017a). *Siting and Designing Windfarms in the Landscape*.

Scottish Natural Heritage (March 2012). *Assessing the Cumulative Impact of Onshore Wind Energy Developments*.

Scottish Natural Heritage (2012b). *Offshore Renewables – guidance on assessing the impact on coastal landscape and seascape*.

Scottish Natural Heritage (2010, revised 2014). *Renewable Energy and the Natural Heritage*.

Scottish Natural Heritage (2008). *Guidance on Landscape/Seascape Capacity for Aquaculture*.

Scottish Natural Heritage (2005a). *An Assessment of the sensitivity and capacity of the Scottish seascape in relation to offshore windfarms*.

Scottish Natural Heritage (1999a). No.113 Fife: Landscape Character Assessment.

Scottish Natural Heritage (1999b). No.122 Tayside: Landscape Character Assessment.

Scottish Natural Heritage (1998). No.102 South and Central Aberdeenshire: Landscape Character Assessment.

The Countryside Agency and SNH (2002). Landscape Character Assessment Guidance of England and Scotland.

The Scottish Government (2017). The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations.

The Scottish Government (March 2015). *Scotland's National Marine Plan*.

The Scottish Government (June 2014). *Scottish Planning Policy*.

The Scottish Government (2010b). Scotland's Offshore Wind Route Map – Developing Scotland's Offshore Wind Industry to 2020 and Beyond.

The Strategic Development Planning Authority for Dundee, Angus, Perth and North Fife (SDPA) (June 2012) *TAYplan*

The Strategic Development Planning Authority for Edinburgh and South East Scotland (SES) (June 2013). *Strategic Development Plan*.

Contents

List of Tables

List of Figures

Abbreviations and Acronyms

AEZ	Archaeological Exclusion Zone
AHER	Angus Historic Environment Record
CIA	Cumulative Impact Assessment
CIfA	Chartered Institute for Archaeologists
COWRIE	Collaborative Offshore Wind Research into the Environment
EIA	Environment Impact Assessment
ELC	East Lothian Council
ELHER	East Lothian Historic Environment Record
HER	Historic Environment Record
HES	Historic Environment Scotland
ICOL	Inch Cape Offshore Limited
JNAPC	Joint Nautical Archaeology Policy Committee
MS-LOT	Marine Scotland Licensing Operations Team
NnG	Neart na Gaoithe
OfTW	Offshore Transmission Works
OSP	Offshore Substation Platform
O&M	Operation and Maintenance
PAD	Protocol for Archaeological Discoveries
ROV	Remotely Operated Vehicle
SLVIA	Seascape, Landscape and Visual Impact Assessment
SNH	Scottish Natural Heritage
SPP	Scottish Planning Policy
UK	United Kingdom
WA	Wessex Archaeology
WTG	Wind Turbine Generator
WSI	Written Scheme of Investigation
ZTV	Zone of Theoretical Visibility

13 Cultural Heritage and Marine Archaeology

13.1 Introduction

1 This chapter presents the assessment of potential impacts upon cultural heritage and marine archaeology predicted to arise from the Inch Cape Wind Farm and associated Inch Cape Offshore Transmission Works (OfTW).

2 The cultural heritage and marine archaeology baseline has been characterised within and around the Development Area and Offshore Export Cable Corridor through desk based studies, and the onshore area through those receptors that may experience an impact on their setting, as defined in *Managing Change in the Historic Environment: Setting* (HES, 2016b).

3 The following appendix and chapter should also be read in conjunction with this chapter and the introductory chapters (1-8):

- *Appendix 13A: Geoarchaeological Assessment of the Offshore Export Cable Corridor*; and
- *Chapter 12: Seascape, Landscape and Visual Impact Assessment* (SLVIA)

13.2 Consultation

4 Scoping responses relating to cultural heritage and marine archaeology were included within the formal Scoping Opinion[1], received from Marine Scotland Licensing Operations Team (MS-LOT) on 28 July 2017 which included a response from Historic Environment Scotland (HES), East Lothian Council (ELC) and Angus Council. *Table 13.1* summarises the responses received. A further meeting was held with ELC to discuss the scope of the Environment Impact Assessment (EIA), whereby a discussion was had on the setting impacts on the Historic Environment in East Lothian, a summary of which is provided in Table 13.2.

Table 13.1: Scoping responses and actions

Consultees	Scoping Response	ICOL Response
Historic Environment Scotland (HES)	HES note that there has been a substantive review of historic environment baseline data and are content that this is sufficient to underpin the forthcoming assessment. HES welcome the proposal to ensure that appropriate mitigation is embedded into the revised scheme. As part of this, HES would highlight the requirement for the preparation of a project specific WSI with a Protocol for	Inch Cape Offshore Limited (ICOL) note that HES agree on the approach to the baseline, which is provided in *Section 13.6* *Section 13.5.2* identifies the embedded mitigation proposed to minimise impacts on marine archaeology. Both a WSI and a PAD are being proposed as the main ways of ensuring impacts are minimised. ICOL have proposed the wording of the consent conditions to deal with

[1] At the time of writing these documents can be found at this link: http://www.gov.scot/Topics/marine/Licensing/marine/scoping/ICOLRevised-2017 [Accessed 25/04/2018]

Consultees	Scoping Response	ICOL Response
	Archaeology Discoveries (PAD). HES recommend cumulative impacts are carefully considered and provided consulting Managing Change guidance note (HES 2016b). HES also recommended that particular attention is paid to Bell Rock Lighthouse as part of the Environmental Impact Assessment (EIA) Report and that the assessment is supported by visualisations.	these commitments, which are contained in *Section 13.5.3.* Setting effects upon the identified onshore receptors are assessed in *Section 13.8.1* and cumulatively in *Section 13.9*, both assessments include impacts on Bell Rock Lighthouse. The assessment uses *Managing Change in the Historic Environment: Setting* (HES, 2016b). New data searches have produced no updated records for seabed features such as ship and aircraft wrecks. It is confirmed here, that these known receptors are scoped-out, as agreed with MS-LOT and HES, of impact assessment in this chapter (*Section 13.3*). Geotechnical survey datasets (2012, 2013) have been geoarchaeologically assessed within the Export Cable Corridor to investigate submerged prehistory potential (see *Appendix 13A*).
Angus Council	Angus Council agree with the use of HES guidance note *Managing Change in Historic Environment: Setting* (HES 2016b) but refer back to their response to the Original Development EIA which noted that they were of the opinion that the impacts on the setting of the Bell Rock Lighthouse and Ladyloan Signal Tower required further consideration.	Setting effects upon the identified onshore receptors are assessed in *Section 13.8.1*, this assessment includes impacts on Bell Rock Lighthouse and Ladyloan Signal Tower. The assessment uses the *Managing Change in the Historic Environment: Setting* (HES, 2016b).
East Lothian Council (ELC)	ELC recommend that potential indirect effects should be considered, including onshore works. An increase in blade heights will potentially have significant impacts on a number of Heritage receptors in East Lothian including (but not limited to) North Berwick Law	Setting effects upon the identified onshore receptors are assessed in *Section 13.8.1*. This assessment considered, from review of the ZTV and SLVIA wirelines, designated assets with a maritime or marine element to their setting. Historic Environment receptors within East Lothian

Consultees	Scoping Response	ICOL Response
	and Dunbar Battery. Receptors are to be assessed based upon a ZTV, which identifies the potential heritage receptors that may be impacted upon. ELC recommend cumulative impacts are carefully considered for impacts associated with both offshore and onshore windfarms.	were not taken forward to EIA as it was judged that no likely significant effects resulted from indirect impacts to the setting and therefore not required to be assessed in this EIA. Viewpoint 25: Dunbar and Viewpoint 26: North Berwick Law (which can be viewed in *Chapter 12, Appendices 12C.26 and 12C.27 respectively*). Cumulative impacts are addressed in *Section 13.9*.

Table 13.2: Key points from consultations carried out to clarify the Scope of the EIA

East Lothian Council (Pre-submission meeting) (13/03/2018)	ELC asked about the archaeology assessment, and what heritage features would be assessed for setting impacts in ELC. ICOL noted that historic environment receptors within East Lothian were not taken forward to EIA as it was judged that no likely significant effects resulted from indirect impacts to the setting and therefore not required to be assessed in this EIA. The wirelines from the SLVIA assessment for both Dunbar and North Berwick Law were reviewed, and it was confirmed in the opinion of the professional expert that these viewpoints were representative of potential visibility from heritage assets in ELC and from these there would be no significant effect experienced on setting.
East Lothian Council (telephone call between Andrew Bicket (Wessex Archaeology) and Andrew Robertson (East Lothian Council Archaeology Service (ELCAS)) (16/07/2018)	A brief discussion was held on the approach to incorporating onshore cultural heritage receptors in East Lothian, and the relevant draft EIA Report text was emailed to ELCAS for information. It was confirmed on the call that Wessex Archaeology had considered receptors along the East Lothian coast, however that as these were unlikely to rise to a significant effect that they were not taken forward for detailed setting assessment. At the time of the call ELCAS were content with the approach. Subsequently Wessex Archaeology asked for confirmation in email but at the time of writing no response was received.

5 The information received through this process and recognised best-practice, has informed the methodology and scope for the assessment of the impacts on cultural heritage and marine archaeology presented in this chapter.

13.3 Scope of Assessment

6 As part of this application ICOL has drawn on the detail presented in the Scoping Report and subsequent Scoping Opinion[2] from MS-LOT to agree on those impacts that may lead to a significant effect. Therefore, this chapter focusses on those impacts that have been agreed throughout this process as being necessary to be assessed.

7 For clarity, those impacts that have been agreed to be scoped in are included below in Table 13.3. Those that have been agreed to be scoped out are included in Table 13.4.

Table 13.3: Scope of assessment covered in this Chapter – Development Area

Potential Impact	Scope of Assessment	Reason
Operation & Maintenance (O&M) Phase		
Setting changes	Bell Rock Lighthouse Signal Tower, Bell Rock Lighthouse, Tentsmuir Coastal Defences, St Andrews Cathedral and adjacent ecclesiastical remains, St Andrews Castle and Crail Airfield pillbox.	Wind Turbine Generators (WTGs) of 291 m to tip are being proposed, therefore there is the potential that the turbines would have significant impacts on the setting of important cultural heritage assets.

8 The following impacts have been scoped out of the Environmental Impact Assessment (EIA), in agreement with MS-LOT and HES in the Scoping Opinion and subsequent consultation, as the impacts are unlikely to lead to significant effects.

Table 13.4: Impacts scoped out of this Chapter

Construction (& Decommissioning) Phase – Development Area & Offshore Export Cable Corridor
Damage to or removal of heritage features resulting from direct physical impacts (Known maritime features (A1), unconfirmed locations of shipwrecks (A3) and known intertidal heritage assets.
Damage to or removal of heritage features resulting from direct physical impacts (Unknown maritime, aviation and intertidal heritage features).
Damage to or removal of heritage features resulting from direct physical impacts (Potential seabed prehistory).
Operation & Maintenance Phase – Development Area & Offshore Export Cable Corridor
Damage to or removal of heritage features resulting from direct physical impacts (Known maritime features (A1), unconfirmed locations of shipwrecks (A3) and known intertidal heritage assets)
Damage to or removal of features (Unknown maritime, aviation and intertidal heritage features)

[2] At the time of writing these documents can be found at this link: http://www.gov.scot/Topics/marine/Licensing/marine/scoping/ICOLRevised-2017 [Accessed 25/04/2018]

9 For impacts on 'Known maritime features (A1), unconfirmed locations of shipwrecks (A3) and known intertidal heritage assets' updated data searches of the following records were carried out with no new records found:

- East Lothian Historic Environment Record (ELHER),
- HES Records (Canmore); and
- United Kingdom (UK) Hydrographic Office records.

10 It was agreed through email consultation, after receiving the formal Scoping Opinion, with MS-LOT in consultation with HES, that there was therefore no requirement to include this within the EIA.

11 It was also agreed, after receiving the formal Scoping Opinion, with MS LOT and HES that 'Damage to or removal of heritage features resulting from direct physical impacts' associated with the installation of the offshore export cable corridor could also be excluded from the EIA

12 This was based on the geoarchaeological assessment of the Export Cable Corridor through review of the geotechnical bore hole data (2012/2013) report (provided in *Appendix 13A*). The majority of the cores contain Forth Formation (FH) sediments, but there are a few core logs suggesting sediments of medium and high palaeoenvironmental potential which has informed the assessment within *Appendix 13A.*

13.4 Regulations and Guidance

13 In undertaking the assessment, the following legislation has been considered:

- *Ancient Monuments and Archaeological Areas Act 1979* (as amended); and,
- *Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997*; as amended in,
- *Historic Environment Scotland Act 2014*.

14 The principal policy and guidance documents and information used to inform the assessment of potential impacts on archaeology and cultural heritage are as follows:

- *Planning Advice Note 2/2011: Planning and Archaeology.* The Scottish Government (2011);
- *Scottish Planning Policy (SPP).* Scottish Government (2014);
- *Scotland's Marine Plan*. Scottish Government (2016);
- *Historic Environment Scotland Policy Statement* (HES, 2016a);
- *Managing Change in the Historic Environment: Setting* (HES, 2016b);
- *The Code of Practice for Seabed Developers* (The Joint Nautical Archaeology Policy Committee (JNAPC), 2006);

- Collaborative Offshore Wind Research into the Environment (COWRIE), *Historic Environment Guidance for the Renewable Energy Sector* (Wessex Archaeology (WA), 2007);
- COWRIE *Guidance for Assessment of Cumulative Impact on the Historic Environment from Offshore Renewable Energy* (Oxford Archaeology, 2008);
- *Model Clauses for Archaeological Written Schemes of Investigation*, Offshore Renewables Project (Crown Estate, 2010); and,
- *Standard and Guidance for Desk Based Assessment* (Chartered Institute for Archaeologists [CIfA], revised 2017).

15 Table 13.5 sets out the key provisions of the relevant policies and legislations.

Table 13.5: Relevant policies and legislations

Policy / Legislation	Key Provisions	Section where requirement is addressed
Ancient Monuments and Archaeological Areas Act 1979	Legal protection for scheduled cultural heritage assets of national importance.	Impacts to the setting of scheduled cultural heritage assets of national importance discussed in *Section 13.8*.
Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997	Legal protection for designated cultural heritage assets of national importance.	Impacts to the setting of cultural heritage assets of national importance is discussed in *Section 13.8*. These are identified in *Section 13.6.2*.
Scottish Planning Policy (SPP) 2014	Sets out the role of the planning system in protecting ancient monuments, archaeological sites and landscapes.	The standards and guidance within this document is applied to all discussions of impacts on cultural heritage assets in *Section 13.8*.
HES Policy Statement (HES 2016a)	Sets out guidance for the implementation of SPP 2014 in relation to the Historic Environment.	The standards and guidance within this document is applied to all discussions of impacts on cultural heritage assets in *Section 13.8*.

13.5 Design Envelope and Embedded Mitigation

13.5.1 Design Envelope

16 As the design of the Wind Farm is not fixed and flexibility in the design envelope is required, the following key parameters, detailed in Table 13.6, represents the worst case scenario for impacts on cultural heritage and marine archaeology interests. For the impacts on setting, the tallest turbines and the greatest number of structures at this height proposed are likely to be the most apparent from key receptors and therefore this would represent the worst case

impact. This approach is the same taken for the SLVIA and was agreed with Scottish Natural Heritage (SNH) as likely to cause the greatest impacts.

17 The below Table 13.6 sets out the worst case scenarios defined by the wind farm and OfTW for archaeology and cultural heritage.

Table 13.6: Worst case scenario definition - Development Area

Potential Impact	Design Envelope Scenario Assessed
Operational Phase	
Impacts on the setting of cultural heritage assets	Operational period for: Up to 40 WTGs with the largest visibility (291 m blade height); and, Two Offshore Substation Platforms (OSPs).

13.5.2 Embedded Mitigation

18 The primary method of mitigation when dealing with the unknown archaeological resource is the precautionary principle, based on the prevention of damage to receptors by proactively putting in place protective measures rather than attempting to repair damage after it has occurred. Therefore, a series of embedded mitigation measures to ensure that significant direct physical impacts will not occur during the construction, operation or decommissioning of the Wind Farm and associated infrastructure have been applied.

19 The following embedded mitigation is proposed for all physical impacts. This includes Archaeological Exclusion Zones (AEZs) around known marine and intertidal cultural heritage features (shown in Figure 6.1 of *Chapter 6: Site Selection and Alternatives*) and programmes of mitigation works where physical impacts are unavoidable. AEZs are the principal means by which any sites or deposits of known or potential archaeological interest are preserved in situ.

- Development specific WSI will be prepared, in consultation with HES, once the final layout of the Development Area and OfTW infrastructure is established (which will be post consent, will take into account all known features insofar as possible). The WSI will set out the design and implementation of a programme of detailed mitigation works. This will comply with guidance current at the time of its development (presently The Crown Estate, 2010).
- Analysis of pre-construction survey data will be undertaken to refine the identified potential marine archaeology assets at infrastructure locations. Appropriate micro-siting allowance for identified assets will be agreed in consultation with HES. Known features will be avoided (with appropriate buffer) insofar as possible.
- Both the micro-siting allowance and AEZs will be detailed in the WSI described above. This will reduce any potential impacts on marine archaeology.

- The WSI will include a Protocol for Archaeological Discoveries (PAD) (The Crown Estate, 2014) which will be prepared in consultation HES. PAD will ensure that an agreed monitoring system is in place for unexpected or incidental archaeological finds. This will mitigate the risk of damage to any previously unrecorded archaeological remains.
- Mitigation relating to effects of the Development Area and OfTW on the setting of cultural heritage receptors will be as per SLVIA mitigation described in *Chapter 12, Section 12.5.4* and include:
  - WTGs will be placed in a grid or offset grid pattern (subject to micro siting requirements);
  - WTGs will all be of similar dimensions to hub height and blade tip subject to WTG and substructure design and installation specification; and,
  - The WTGs will all be pale grey in colour with a semi-matt finish. This tends to reduce the distance over which the WTGs are visible, especially in dull or overcast conditions, which often occur. As offshore WTGs are often viewed against the sky, pale grey is the most appropriate colour as it is closest to that of the lower part of the sky under the most frequent UK weather conditions.

13.5.3 Consent Conditions

20 As well as the embedded mitigation measures, ICOL proposes to commit to the purpose of the relevant consent conditions granted for the Inch Cape 2014 Consent, as they are still relevant to this application. This will provide reassurance to stakeholders that the relevant issues will be addressed and secured by way of appropriate conditions.

21 ICOL recognises that the wording and detail of the consent conditions will be at the discretion of the Scottish Ministers. For Cultural Heritage and Marine Archaeology interests, ICOL propose that the consent conditions address matters surrounding, but not limited to, the following;

- Production of a WSI; and
- Production of a Protocol for Archaeological Discoveries (PAD).

22 The WSI will be a live document with any changes in the development reflected in it. This will be in line with the model clauses set out by the Crown Estate (Crown Estate 2010).

23 The purpose of a WSI is to agree with consultees the need and scope of required mitigation measures for the marine works, with the overall aim of reducing risk and uncertainty. WSIs generally include a combination of the following:

- Set out the responsibilities and lines of communication between the developer, main contractors, archaeological contractors/consultants, and the archaeological curators;
- Ensure that any further geophysical and geotechnical investigations associated with the Development are subject to archaeological input and assessment.

- Provide for archaeological involvement in any diver and/or Remotely Operated Vehicle (ROV) obstruction surveys conducted for the marine works;
- Provide information about AEZs and methodologies for their implementation;
- Propose measures for mitigating effects on any archaeological material encountered during installation and maintenance activities; and
- Establish the reporting, publication, conservation and archiving requirements for the archaeological works undertaken in the course of the scheme.

24 Additionally, it is anticipated that the Section 36 consent may state that to ensure any accidental discovery of archaeological interest is properly and correctly reported, a PAD similar to the established *Protocol for Archaeological Discoveries: Offshore Renewables Projects* (WA and The Crown Estate, 2014) and the *Marine Aggregate Industry Protocol for the Reporting of Finds of Archaeological Interest* (WA, 2005) will be established for the Development and agreed in consultation with HES within the body of the over-arching WSI.

13.6 Baseline Environment

25 The baseline characteristics for cultural heritage and marine archaeology, which includes known wrecks and obstructions, identified geophysical receptors, the potential for further maritime and aviation archaeological receptors and potential seabed prehistory and the setting of identified onshore cultural heritage receptors, has been set out in WA (2015a; 2015b; 2016a; 2016b).

13.6.1 Data Sources

26 This section identifies baseline data sources that were used to characterise the cultural heritage resource and within and around the Development Area, Offshore Export Cable Corridor and onshore receptors (for setting impacts).

27 The principal sources consulted during the archaeological assessment were:

- Records held by Historic Environment Records (HER) Angus Historic Environment Record (AHER) CANMORE updated in 2017;
- Modern Admiralty and geological charts relevant to the study area; and
- Secondary sources relating to previous archaeological and geophysical work in the region and including both academic papers and unpublished reports that are in the public domain.

13.6.2 Study Area

28 Two archaeological study areas were established by WA, consisting of:

- Development Area and Offshore Export Cable Corridor; and,
- Identified designated cultural heritage receptors.

29 As previously discussed impacts to seabed prehistory, maritime and aviation archaeology have been scoped out, therefore only setting impacts will be discussed. Receptors identified for setting analysis are numbered using their relevant designation/catalogue number.

Setting Baseline

30 The receptors considered for the settings impact assessment are either designated sites or scheduled monuments. These sites were identified by Angus Council and Fife Council from their HERs as cultural heritage receptors within the Zone of Theoretical Visibility (ZTV) (shown in *Appendix 12E* and *12F* of *Chapter 12*) of the Development that have settings that are directly related to the sea or have significance in their visual and physical interaction with the sea. These are listed in the below Table 13.7.

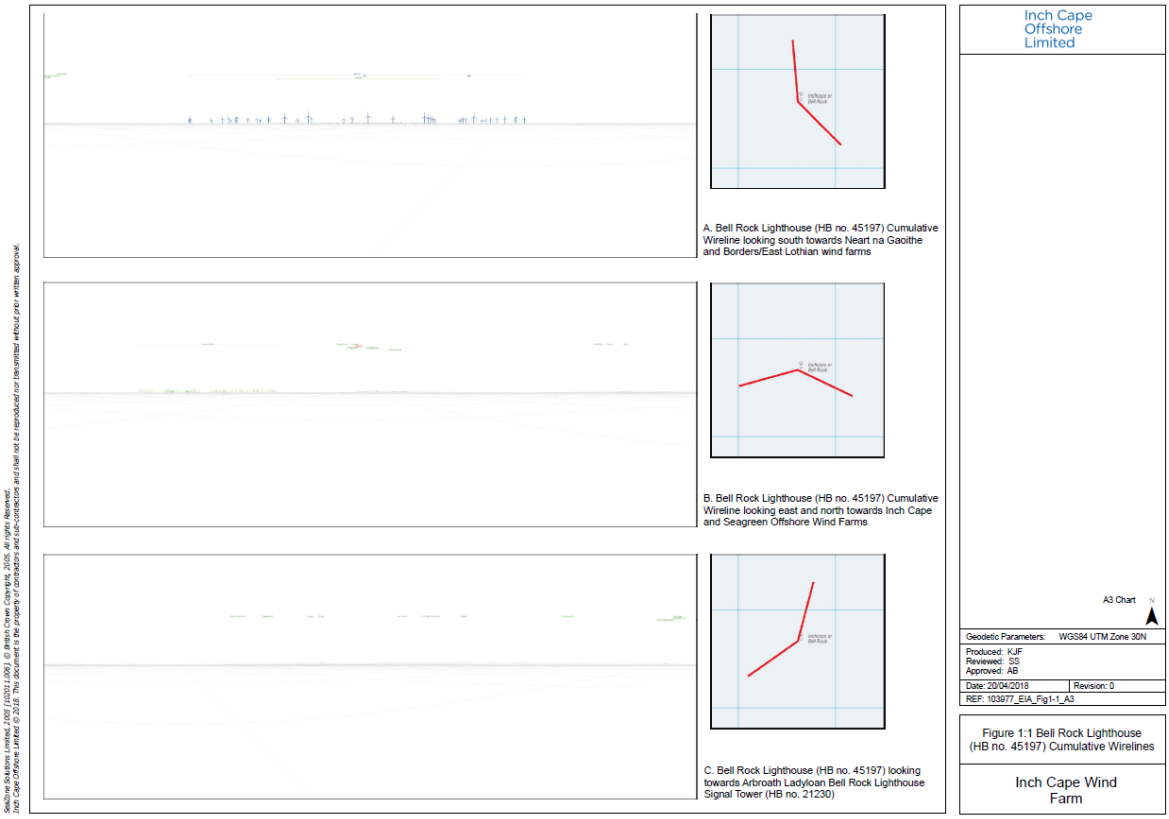
31 Additional, sites were considered from the ZTV (shown in *Appendix 12E* and *12F* of *Chapter 12*) and SLVIA wirelines and viewpoints to identify designated assets which might have a marine or maritime element to their setting in relation to the worst-case scenario design. For example, further sites in Angus and Fife have been taken forward in the EIA. Following review of SLVIA visualisations from North Berwick Law and Dunbar (including schemes considered for the Cumulative Impact Assessment (CIA)) (which can be viewed in *Appendices 12C.26 and 12C.27* no additional sites were identified in East Lothian that, in professional opinion, would likely to experience a significant effect from the Development. This is in part due to considerable distance from the Development and extremely small area on the horizon.

Table 13.7: Cultural heritage assets considered with respect to setting effects

Name	Designation	Reference Number	Distance to Development Area	Viewpoint
Bell Rock Lighthouse Signal Tower, Ladyloan	Category A – listed structure	HB no. 21230	19.63 km	11*
Bell Rock Lighthouse	Category A – listed structure	HB no. 45197	7.9 km	Figure 13.1
Tentsmuir Coastal Defences	Scheduled Monument	Index no. 9712	33.16 km	16*
St Andrews Cathedral and adjacent ecclesiastical remains	Scheduled Monument	Index no. 90260, HB nos. 40585, 40586, 40587, 40588, 40589, 40592	34.53 km	18*
St Andrews Castle	Scheduled Monument	Index no. 90259, HB no. 40599	34.53 km	18*
Crail Airfield, pillbox, Foreland Head	Scheduled Monument	Index no. 6461	27.37 km	23*

*Wirelines from each of these viewpoints can be found in *Appendix 12E* and *12F* of *Chapter 12*

Figure 13.1: Wireline models for Bell Rock Lighthouse (HB no. 45197)



13.6.3 Baseline without Development

32 Generally, without the Development natural processes will continue to affect the cultural heritage baseline influenced by local environmental conditions and climate change which may preserve or deteriorate their condition, above and below the ground. Natural processes may be of longer duration and occurring over longer timescales.

13.7 Assessment Methodology

33 This assessment considers the potential impacts associated with the operation and maintenance of the Development and the significance of their effect assessed regarding the sensitivity of receptors and the magnitude of the impact.

13.7.1 Guidance and Methods

Approach

34 Setting impacts on cultural heritage receptors are often considered to be indirect. These can occur where the visible elements of the Development Area and OfTW are intervisible with cultural heritage receptors and can also include non-visual changes. In order to assess setting impacts the setting of that receptor must first be defined. It is noted that a crucial factor in the assessment of physical impacts on cultural heritage features is the extent of ground disturbance. All damage to archaeological sites or material is effectively permanent and

recovery is limited to stabilisation or re-burial, limiting further impact. The exceptions to this are with regard to setting impacts from which full recovery is possible.

35 The importance of an archaeological receptor is assessed by examining the receptor's age, type, rarity, survival and/or condition, fragility and/or vulnerability, group value, documentation, associations, scientific potential and outreach potential. These factors help to characterise a site or feature, to assess how representative it is in comparison to other, similar sites, and to assess its potential to contribute to knowledge, understanding and outreach. In most cases, statutory protection is only provided to a site or feature judged to be the best known or an above average example in regard to these factors.

Setting Impacts

36 The methodology for assessment of setting impacts upon the cultural heritage significance of the selected receptors has been undertaken in line with Managing Change in the Historic Environment: Setting (HES, 2016b). The approach taken is to:

- Identify the cultural heritage assets that might be affected;
- Define the setting of each asset (without reference to the development); and
- Assess how the development would impact upon this defined setting.

37 Once an impact has been identified the final stage in this chapter is to consider the significance of any impact in EIA terms.

38 Although many of the viewpoint locations are the same for this chapter and for visualisations found in *Chapter 12*, it should be noted that the methodology for assessment of cultural heritage setting impacts is distinct from aesthetic heritage setting impacts and is undertaken in line with discipline-specific guidance (e.g. HES, 20116b. The setting assessment included in this chapter has been carried out to identify where changes in setting have a potential to impact upon the cultural heritage significance of assets as distinct from the aesthetic land and seascapes. Therefore, there is no direct correlation between the magnitude and significance of setting impacts identified in the separate chapters.

39 The cultural heritage assets have been defined through a process of consultation and discussion outlined in *Section 13.2*. The setting of assets has been established through site visits to all assets considered with the exception of the Bell Rock Lighthouse, where visitation was not possible or practical.

40 Setting as defined in the HES guidance is not limited to visual factors. Setting includes the way in which the surroundings of an historic asset or place contribute to how it is experienced, understood and appreciated. However, due to the distances involved between the receptors and the Development Area (with a minimum distance of approximately 8 km) mean that assessment of impacts upon the setting of these assets is considered to be limited to visual impacts in this instance.

41 Assessment of the setting impacts on cultural heritage assets is ultimately rooted in the professional judgement of the assessor but it is possible to highlight a number of key factors that have been considered in defining setting. Setting factors considered to be of particular importance in consideration of the Inch Cape Wind Farm include:

- the key vistas that give an asset a context, particularly where these relate to a direct link with the seascape;
- the prominence of the cultural heritage asset or its place in views throughout the surrounding area and the character of the surrounding landscape; and
- the relationships between built and natural features.

42 Assessment of the magnitude of setting effects on a cultural heritage asset is therefore complex and is not simply a function of the proximity of the development in question.

43 For terrestrial heritage assets, a ZTV has been generated for the assessment based on parameters provided by the SLVIA's proposed scope. The ZTV indicates areas whereby there is potential intervisibility between the Inch Cape Wind Farm and heritage assets, particularly those which have a distinct maritime aspect to their setting. The ZTV used to inform this assessment is shown in *Figure 12.3a of Chapter 12.*

44 It is also noted that impacts on setting relating to the construction and decommissioning of the OfTW will be short term and temporary. The assessment of setting impacts therefore focuses on the operational impacts arising from the Inch Cape Wind Farm.

13.7.2 Sensitivity of Receptor

45 The sensitivities of the setting of archaeology and cultural heritage assets are defined by both their potential vulnerability to an impact from the Inch Cape Wind Farm, their recoverability and value or importance of the asset.

46 The potential importance of an asset to setting changes is firstly based on relevant statutory designations e.g. scheduling under the *Ancient Monuments and Archaeological Areas Act 1979* or Category 'A' listed buildings through the Planning *(Listed Buildings and Conservation Areas) (Scotland) Act 1997*. These would all be considered as important, with all nationally designated assets being allotted at least a High value.

47 The vulnerability of an asset to setting impacts can be more finely assessed through site visits and analysis of the surroundings of the site e.g., does it have inter-visibility with the Inch Cape Wind Farm; does it specifically reference the area of the Inch Cape Wind Farm or deliberately ignore it; is the view important to the function and/or appreciation of the site.

48 The assessment of setting in this document follows the guidance discussed in the paragraphs above, is based on the baseline assessment, and is described using the following two factors:

- **Physical surroundings and views** – which includes the physical presence of the asset on the seabed, its surroundings, and relationship with other assets and navigational hazards

in the immediate area. Views to and from the asset, and how the asset is experienced in its immediate physical surroundings are also considered; and;

- **Non-visual factors** – including the way the asset is appreciated in a broader historical, artistic and intellectual capacity, and the asset's associations.

49 The capability of a receptor to accommodate change and its ability to recover if affected is a function of its sensitivity. Receptor sensitivity is typically assessed via the following factors:

- **Adaptability** – the degree to which a receptor can avoid or adapt to an impact;
- **Tolerance** – the ability of a receptor to accommodate temporary or permanent change without significance adverse impact;
- **Recoverability** – the temporal scale over and extent to which a receptor will recover following an impact; and,
- **Value** – a measure of the receptor's importance, rarity and worth.

50 Archaeological and cultural heritage receptors cannot typically adapt, tolerate or recover from physical impacts resulting in material damage or loss caused by development. Consequently, the sensitivity of each asset is predominantly quantified only by its value.

51 Based on *Historic Scotland's Policy Statement* (HES, 2016), the significance of a historic asset 'embraces all the diverse cultural and natural heritage values that people associate with it, or which prompt them to respond to it'.

52 Within this document, significance is weighed by consideration of the potential for the asset to demonstrate the following value criteria:

- **Evidential value** – deriving from the potential of a place to yield evidence about past human activities;
- **Historical value** – deriving from the ways in which past people, events and aspects of life can be connected through a place to the present. It tends to be illustrative or associative;
- **Aesthetic value** – deriving from the ways in which people draw sensory and intellectual stimulation from a place; and,
- **Communal value** – deriving from the meaning of a place for the people who relate to it, or for whom it figures in their collective experience or memory. Communal values are closely bound up with historical (particularly associative) and aesthetic values, but tend to have additional and specific aspects.

53 The value of known archaeological and cultural heritage assets were assessed on a five-point scale using professional judgement informed by criteria provided in Table 13.8 below.

Table 13.8: Criteria to assess the archaeological value of cultural heritage assets

Value	Definition
Very High	Best known or only example and/or significant potential to contribute to knowledge and understanding and/or outreach. Assets with a demonstrable international dimension to their importance are likely to fall within this category.
	Enlisted as a World Heritage Site – cultural and/or natural sites considered to be of 'Outstanding Universal Value', inscribed on the World Heritage List by the World Heritage Committee.
High	Above average example and/or high potential to contribute to knowledge and understanding and/or outreach. Assets with a demonstrable national dimension to their importance are likely to fall within this category.
	Receptors of recognised national significance such as Inventory Battlefields or Inventory Gardens and Designed Landscapes.
	Category A-listed Structures – buildings of national or international importance, either architectural or historic; or fine, little-altered examples of some particular period, style or building type.
Medium	Average example and/or moderate potential to contribute to knowledge and understanding and/or outreach.
	Category B-listed structures – buildings of regional or more than local importance; or major examples of some particular period, style or building type, which may have been altered.
Low	Below average example and/or low potential to contribute to knowledge and understanding and/or outreach.
	Category C-listed structures – buildings of local importance; lesser examples of any period, style or building type, as originally constructed or moderately altered.
Negligible	Poor example and/or little or no potential to contribute to knowledge and understanding and/or outreach. Assets with little or no surviving archaeological interest.

Sensitivity of the Setting Receptors

54 It is noted that the setting impacts may cease upon decommissioning of the Development, which would give all impacts a high degree of recoverability. However, all operational impacts should be assumed to be at least semi-permanent due to the long life of the operational Development (up to 50 years). The definitions of terms relating to the sensitivity of archaeology and cultural heritage assets are detailed in Table 13.9.

Table 13.9: Criteria for classifying sensitivity of receptor to setting effects

Sensitivity	Definition
High	Asset of international, or importance, retaining a clearly defined setting that can easily be appreciated on the ground and remains important to their cultural heritage significance.
Moderate	Asset of regional or local importance, retaining a moderately defined setting that can be appreciated on the ground and remains moderately important to their cultural heritage significance.
Low	Asset of regional or local importance, retaining some, potentially poorly defined setting that may be difficult to appreciate readily on the ground and may be slightly important to their cultural heritage significance.
Negligible	Asset where the setting has either already been heavily compromised, rendering it very difficult or impossible to appreciate on the ground, or, is considered unimportant to their cultural heritage significance.

13.7.3 Magnitude of Impact

55 The magnitude of an impact is defined by a series of factors including the spatial extent of any interaction, the likelihood, duration, frequency and reversibility of a potential impact. The definitions of the levels of magnitude used in this assessment for scoped-in archaeology and cultural heritage assets are described in Table 13.10.

Table 13.10: Classification of magnitude of setting impact

Magnitude	Definition
High	Comprehensive, long term or permanent physical damage or changes to the defined setting.
Moderate	Considerable medium/long term semi-permanent or long-term temporary changes that affect the character of the asset, resulting in considerable physical damage.
Low	Minor medium-term temporary or semi-permanent change that partially affect the setting of the asset, resulting in some physical damage.
Negligible	Very minor or negligible temporary or semi-permanent change to the defined setting of the asset, with physical damage leading to an imperceptible change to the baseline.

56 The magnitude of an impact looks at the extent of change to an asset's setting. Several factors can affect the overall magnitude of an impact including:

- **Obstruction of, or distraction from, key views**- some assets are placed deliberately in the landscape to be afforded a certain view which visitors can still enjoy e.g. prehistoric tombs overlooking a particular bay or the designed vista of a country house;
- **Changes in prominence**- Assets can be placed on a prominent place in the landscape which is key to their value and experience e.g. ridgetop cairns and castles on hilltops;
- **Changes in landscape character**- Assets may be linked to a particular land use, the changing or removal of may compromise their setting and the value of the asset as a whole e.g. the extra mural fortifications of a town are of significance to the defensive town wall;
- **Duration of impact**- the longer the impact will continue, the larger the magnitude of the impact will be; and
- **Reversibility of impacts**- if the setting will be restored at the end of the development or can be easily reversed then it will be of lesser magnitude than an irreversible change.

13.7.4 Method for assigning significance of effect

57 The magnitude of the impact is correlated against the sensitivity of the asset to provide a level of significance. For the purposes of this assessment any effect that is considered major, in the matrix in Table 13.11, is considered to be significant in EIA terms. Any effect that is moderate or below is not considered significant.

Table 13.11: Significance of potential effects

Magnitude	Sensitivity		
	Low	**Moderate**	**High**
Negligible	Negligible	Minor	Minor
Low	Minor	Minor/Moderate	Moderate
Moderate	Minor	Moderate	**Moderate/Major**
High	Moderate	**Moderate/Major**	**Major**

58 The matrix is not used as a prescriptive tool and the methodology and analysis of potential effects at any particular asset will require the exercise of professional judgement. Therefore, the final judgement on whether or not the effect is likely to be significant has been made on professional judgement, with a clear explanation and justification provided.

13.8 Impact Assessment- Development Area

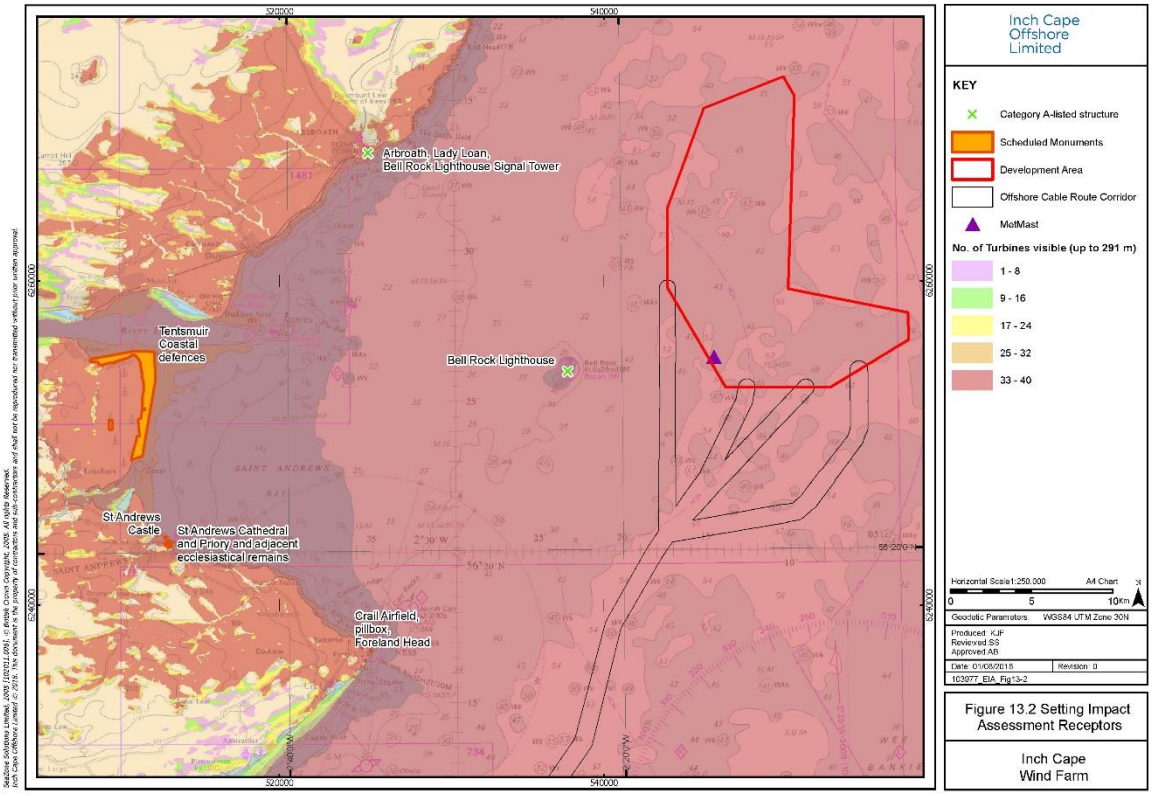
59 This section considers the source and nature of the effects of the Inch Cape Wind Farm on the cultural heritage resources and the degree to which the setting of the archaeological receptors (listed in Table 13.12) are exposed to and affected by the Inch Cape Wind Farm. The impact

assessment is considered in relation to the Operation and Maintenance (O&M) of the Inch Cape Wind Farm (Figure 13.2).

Table 13.12: Cultural heritage receptors – Development Area study area

Receptor (Setting)
Bell Rock Lighthouse Signal Tower, Ladyloan
Bell Rock Lighthouse
Tentsmuir Coastal Defences
St Andrews Cathedral and adjacent ecclesiastical remains
St Andrews Castle
Crail Airfield, pillbox, Foreland Head

Figure 13.2: Setting Impact Assessment Receptors



13.8.1 Effects of Operation and Maintenance

Setting Changes

60 The following section details the assessment carried out on each of the receptors.

Bell Rock Lighthouse Signal Tower, Ladyloan (HB no. 21230)

61 The Signal Tower is Category A-listed and is also linked with the Bell Rock Lighthouse to mark the functional relationship between the subjects. The setting of the Signal Tower is considered to be the open coastal location with an appreciable relationship with the adjacent town of Arbroath. The key view from the tower is the intervisibility with the Bell Rock Lighthouse although this can only be appreciated in optimal weather conditions. The Signal Tower retains a clearly-defined setting that forms a central part of its cultural heritage significance and it is therefore considered that the structure has a High Sensitivity to effects upon this defined setting.

62 In optimal weather conditions the WTGs will be visible in the view from the Bell Rock Lighthouse Signal Tower to the Bell Rock Lighthouse and will lie to west of it, occupying part of the horizon and appearing above the entrance to the harbour. However, given the distance of over 18 km between the Signal Tower and lighthouse and the very focused nature of that view it is considered that the Inch Cape Wind Farm will not dominate or detract from this view. It is considered the effect upon setting will be of Negligible Magnitude leading to a **Minor** effect and therefore not significant for the purposes of this assessment.

Bell Rock Lighthouse (HB no. 45197)

63 The Bell Rock Lighthouse is Category A-listed with the known functional relationship between Bell Rock Lighthouse Signal Tower, in Arbroath (see separate entry above). The Bell Rock Lighthouse is sited on a half-tide complex of reefs with panoramic views of the sea. Significant remains of structural elements surviving from the period of its construction can still be noted nearby including elements of a cast-iron railway and the site of a beacon house erected to house the workers on an adjacent spot on the reef. The closest land to the lighthouse is over 18 km distant.

64 The key elements of the setting of the Bell Rock Lighthouse are considered to be the open views of the sea around it, the reefs on which it was built (including related structural elements and landing points still in occasional use) and the view towards the Bell Rock Lighthouse Signal Tower. When these elements are considered together it is apparent that the lighthouse retains a clearly-defined setting that can easily be appreciated on the ground and that the setting forms a central part of its cultural heritage significance. It is therefore considered that the lighthouse has a High Sensitivity to impacts upon its defined setting.

65 The Inch Cape Wind Farm will be visible to the east of the lighthouse at a distance of just under eight kilometres. This Wind Farm will appear as a relatively contiguous group of WTGs and OSPs on the horizon. It will appear as a modern element in views directly to the east. It should be noted that the lighthouse stands on a busy seaway, which is rarely empty of modern maritime receptors such as cargo ships, oil rigs in transportation and fishing boats, and therefore the setting is not one of total isolation. The WTGs and OSPs will occupy a small percentage of the sea view around the lighthouse and will not detract from its open and panoramic quality. Although this assessment is based upon a WTG tip height of 291 m and the lighthouse is 36 m tall, at this distance the lighthouse will not appear to be surrounded or

competing in scale with the WTGs and OSPs. Key views from the lighthouse to the surrounding reef will be unaffected. The other known key view is towards the signal tower and has been considered as part of the setting assessment; this key view is considered to be unaffected as the Inch Cape Wind Farm is located to the east of the lighthouse, and does not restrict it. Although the lighthouse is considered to have a High Sensitivity to effects on its defined setting it is considered that the impact on the setting of the Bell Rock Lighthouse will be of Negligible Magnitude and will therefore have a **Minor** effect and therefore not significant for the purposes of this assessment.

Tentsmuir Coastal Defences (Index no. 9712)

66 The entry for Tentsmuir Coastal Defences in the register of Scheduled Monuments (HES) states that:

'the monument is of national importance as one of the best preserved stretches of coastal defences dating from the period of WWII in Scotland, and as a complex of defences in which a widely representative range of defensive types is still to be seen.'

67 The original setting of the defences is largely intact although many of the defences themselves have decayed, have been removed or are now covered by sand. A significant proportion of the identified remains of the coastal defences have open views of the sea across dunes and intertidal sands. Despite the relatively good preservation of this area relative to similar examples, there are large areas within the scheduled extent of the coast where no coastal defences are apparent. The key elements of the setting of the coastal defences here are the views to other parts of the defences, i.e. north and south along the coast and westwards towards the camp. It is also considered that the generally open nature of the seaward views of the coastal parts of the monument is relevant to its setting. This asset is considered to have a High Sensitivity to setting effects.

68 The WTGs and OSPs will be visible from east-facing coastal parts of the scheduled area at a distance of 33 km over a relatively small area on the horizon. Operation of the Inch Cape Wind Farm will introduce an additional modern element to the views to the east. Given the distance and horizontal spread it is considered that the impact on the setting of this asset will be of Low Magnitude leading to a **Moderate** effect and therefore not significant for the purposes of this assessment.

St Andrews Cathedral and Adjacent Ecclesiastical Remains (Index no. 90260, HB nos. 40585, 40586, 40587, 40588, 40589, 40592)

69 Key elements of the setting of St Andrews Cathedral are considered to be its position in relation to the adjacent town and views within the walled enclosure. Views from within the cathedral precinct are very limited at ground level due to the high walls although there is some visibility towards the town. Key views from the cathedral to locations outside the precincts include the view of St Andrews Castle and the nearby harbour. The views of both these features are key in appreciating the historic context of the site. Key views towards the cathedral include the view from the harbour and seafront as well as the views of the cathedral

from other parts of the town. This asset is considered to have a High Sensitivity to setting effects.

70 The Inch Cape Wind Farm will be visible in views from outside the precinct walls to the east and from the tops of two surviving cathedral towers. It will appear on a small part of the horizon to the north east at a distance of 34 km. Given the distance it is considered that the impact on the setting of this asset will be of Low Magnitude leading to a **Moderate** effect and therefore not significant for the purposes of this assessment.

St Andrews Castle (Index no. 90259, HB no.40599)

71 Key elements of the setting of St Andrews Castle are considered to be its position in relation to the adjacent town. Key views from the castle to other locations include the view of St Andrews Cathedral. The view of the cathedral is central to the historic context of the castle. Key views towards the castle include the view from the landward side of the castle by its entrance. Views from the cathedral are considered under the entry for the castle. This asset is considered to have a High Sensitivity to setting effects.

72 The Inch Cape Wind Farm will be visible in views from the walls of the castle to the east. It will appear on a small part of the horizon to the north east at a distance of 34 km. Given the distance it is considered that the impact on the setting of this asset will be of Low Magnitude leading to a **Moderate** effect and therefore not significant for the purposes of this assessment.

Crail Airfield, Pillbox, Foreland Head (Index no. 6461)

73 The entry for the pillbox at Foreland Head in the register of Scheduled Monuments (HES) states that:

'the monument is of national importance for its group value as part of the defences of the Crail Airfield complex. As such it is part of a complex which is probably the finest of its class in Scotland, and serves to illustrate in concrete form the intense effort which went into defensive construction during the earlier years of WWII.'

74 The principal elements of the setting are considered to be the coastal setting of the pillbox, and its views across the beach, intertidal zone and immediate sea, given its function of coastal defence. This setting has been somewhat degraded by the construction of a modern lighthouse immediately adjacent to it in 1975. The pillbox is not a prominent feature and the views from inside it are very constrained but there are extensive and open views from the exterior to it's key view. It is therefore considered that the pillbox has a Moderate Sensitivity to setting effects due to these limitations.

75 The Inch Cape Wind Farm will be visible as a modern element occupying a small area on the horizon to the north-east of the pillbox at a distance of over 27 km. It is considered that the effect on the setting of the pillbox will be of Low Magnitude leading to an impact of **minor / moderate** effect and therefore not significant for the purposes of this assessment.

76 A summary of the effects on the setting of cultural heritage assets is provided below in Table 13.13.

Table 13.13: Summary of effects on the setting of cultural heritage assets

Name	Sensitivity	Magnitude of Change	Effect	SLVIA Viewpoint
Bell Rock Lighthouse Signal Tower, Ladyloan	High	Negligible	Minor	11
Bell Rock Lighthouse	High	Negligible	Minor	Figure 13.1 (of this assessment)
Tentsmuir Coastal Defences	High	Low	Moderate	16
St Andrews Cathedral and adjacent ecclesiastical remains	High	Low	Moderate	18
St Andrews Castle	High	Low	Moderate	18
Crail Airfield, pillbox, Foreland Head	Moderate	Low	Minor/ Moderate	23

77 In summary, following this assessment the effects from the operation of the Inch Cape Wind Farm upon the setting of cultural heritage receptors are judged to be not significant for the purposes of this assessment.

13.8.2 Effects of Decommissioning

78 The potential effects of decommissioning are considered to have occurred during construction phase assuming the footprint of decommissioning is the same as the construction phase, leading to a situation of no further physical impacts. The approach to decommissioning is described in *Chapter 7: Description of Development*.

79 Development impact assessment scoped-in effects assessed for the Inch Cape Wind Farm (impacts on setting) are no worse when considered as a Development, as the Offshore Export Cable is buried and not visible. Therefore, the assessment carried out above remains relevant for the Development impact assessment

13.9 Cumulative Impact Assessment (CIA)

Developments Considered

80 Other marine activities considered as part of the CIA have been included on the basis that they have the potential to have a visual or physical impact on the setting of cultural heritage receptors. Types of activities considered may include:

- Other wind farms;

- Sub-sea cables; and
- Commercial fisheries within the Development Area and Offshore Export Cable Corridor.

81 This assessment has considered existing and consented wind farms, as identified in Table 13.14. These include both offshore wind farms, such as Neart na Gaoithe (NnG) and Seagreen, and onshore wind farms such as Crystal Rig, Tullo and Twinshiels. It should be noted that in line with the SLVIA, the worst case scenario for the CIA considers the consented NnG and Seagreen developments. All inclusions have been agreed as part of consultation, as outlined in *Section 13.2*. The developments considered for physical impacts on cultural heritage are those closest to the Development Area and Offshore Export Cable Corridor.

82 As the baseline and status for cumulative projects are ever evolving a cut-off date of November 2017 was used to allow the EIA and CIA to progress. ICOL appreciates and acknowledges that the status of some of these projects may have changed since this date and note however that the individual status of projects has not been updated in the EIA Report due to the time restrictions associated with the assessment.

Table 13.14: Developments considered within cumulative assessment

Offshore Wind Farms within Cumulative Assessment	
Neart na Gaoithe (NnG) OWF	Consented
Seagreen	Consented
Onshore Wind Farms within Cumulative Assessment	
St Johns Hill	Built
Hillhead of Auquhirie	Built
Clochnahill	Built
Brownieleys	Built
Paul Matthew Hill	Built
Tullo and Twinshiels Group	Built
Hill of Strathcathro	Built
Pickerton	Built
North Mains of Cononsyth	Built
Ascurry Farm	Built
Govals	Built
Frawney	Built
Tealing Airfield	Built

Michelin Tyre Factory	Built
Kenly	Built
Bonerbo	Built
Airdrie Farm	Built
Crystal Rig Group	Built
Aikengall Group	Built
Ferneylea	Built
Ferneylea 2	Consent pending
Hopsprigshiels	Built
Kinegar Quarry	Built

13.9.1 Effects of Operation and Maintenance

83 Cumulative effects on cultural heritage receptors arising from the O&M of the Development are likely to relate to changes in the setting of onshore cultural heritage.

Setting Impacts

84 Setting impacts on cultural heritage receptors arising from the Development in combination with other developments have been considered. For those receptors considered to have a potential for setting impacts, cumulative visualisations have been prepared (see Table 13.13 for list of key viewpoints assessed).

Bell Rock Lighthouse Signal Tower, Ladyloan (HB no. 21230)

85 The cumulative assessment on Bell Rock Lighthouse Signal Tower has considered those cumulative schemes that may influence the impact on the panoramic sea views surrounding the signal tower and those that would influence the intervisibility between it and the Bell Rock Lighthouse (assessed below).

86 No onshore wind farms have been considered cumulatively at this receptor as they would not influence the setting impact.

87 Seagreen will theoretically be visible from this location, however at over 40 km from the viewpoint the Seagreen turbines will be barely discernible. Further to this Seagreen will be viewed to the north of Inch Cape, and not influence the key view from the Signal Tower and intervisibility with the Bell Rock Lighthouse. Therefore, Seagreen is not considered to influence the cumulative setting effects.

88 NnG will be seen to the south east of Inch Cape in slightly closer proximity and wider extent than Seagreen. NnG will be viewed to the south of Bell Rock from the Signal Tower and whilst not influencing the key view it will be viewed to the south of Bell Rock, albeit in the distance (approximately 32km from the Signal Tower).

89 Therefore, as the setting is potentially only partially affected by the cumulative effect of two discrete concentrations of turbines it is considered the effect upon setting will be of Low Magnitude leading to a **Moderate** cumulative effect and therefore not significant for the purposes of this assessment.

Bell Rock Lighthouse (HB no. 45197)

90 The cumulative assessment on Bell Rock Lighthouse has considered those cumulative schemes that may influence the impact on the panoramic sea views surrounding the lighthouse and those that would influence the intervisibility between it and the Bell Rock Lighthouse Signal Tower (as assessed above). Inch Cape is located to the east of this view and therefore does not influence the intervisibility.

91 Figure 13.1 shows the wire line of the theoretical cumulative visibility of all the wind farms visible from Bell Rock Lighthouse. As can be seen from these wirelines, wind farms are potentially visible from all views from the lighthouse. However, in views to the east (towards NnG) and north (Inch Cape- wire lines B and C respectively) the wind farms will lie at distances that it is not anticipated that the setting from these views would be impacted. In the view to the south (wire line A) Inch Cape will be visible at a distance of just under 8 kilometres, with Seagreen sitting directly behind much further away in the distance, with the turbines only discernible on very clear days.

92 As noted in the individual setting assessment above, the setting of the receptor is not clear of modern maritime receptors, due to the busy nature of the seaway. It could also be argued that the presence of construction, O&M craft during the lifetime of the developments, will have a positive effect on the setting of the lighthouse, giving more individuals the opportunity to appreciate its role as a vital navigational aid as they operate vessels within its operational range.

93 Therefore, the impacts on cumulative setting are considered to be of Low Magnitude and will therefore have a **Moderate** effect and therefore not significant for the purposes of this assessment.

Tentsmuir Coastal Defences (Index no. 9712)

94 The cumulative assessment on the Tentsmuir Coastal Defences has considered those projects that may affect the key views to other parts of the defences, i.e. north and south along the coast and westwards towards the camp as well as those that may affect the generally open nature of the seaward views of the coastal parts of the monument relevant to its setting.

95 The introduction of Inch Cape Wind Farm will introduce a modern element to the views to the east from the coastal defences over a relatively small area on the horizon. Both Seagreen and

NnG have been considered cumulatively and the impacts on setting considered. The inclusion of Seagreen which sits behind Inch Cape from this view is not likely to be visible due to distance, which means that all but blade tips will be screened by the horizon and therefore will not influence the cumulative effect from the coastal defences.

96 From this location, NnG will appear on the open sea horizon to the right of, but separated from, the Inch Cape WTGs and OSPs. NnG, will be viewed at similar distances to Inch Cape and its introduction will increase the visibility of wind turbines along the horizon.

97 The consented Kenly wind farm, south of St Andrews, will also be viewed from this location at approximately 13 km south and would likely be discernible on the skyline.

98 Cumulatively, both NnG and Kenly will add to inclusion of a modern element along key views, however at the distance in which they'll be viewed, and that they'll be viewed separately, not as one continuous block of WTGs, the setting will only partially affected. Therefore, it is considered the effect will be of Low Magnitude leading to a **Moderate** cumulative effect and therefore not significant for the purposes of this assessment.

St Andrews Cathedral and Adjacent Ecclesiastical Remains (Index no. 90260, HB nos. 40585, 40586, 40587, 40588, 40589, 40592)

99 With the exception of the Michelin Tyre Factory, Govals, Frawney and Tealing Airfield other existing and consented onshore wind farms are not seen, or will be unlikely to be visible, in views from outside the precinct walls due to their distance from the viewpoint. Onshore developments that are visible would be at distances of over 17 km and likely to be minor elements in the view and will not be seen in the same field of view as the Inch Cape WTGs and OSPs.

100 Seagreen will be located at a distance of around 57 km. Due to the curvature of the earth, only the blade tips would be theoretically visible, although this is unlikely at this distance. NnG will be seen at a distance of around 28 km to the east. Some WTGs at the southern extent of the NnG array will be screened by the coast, with only blade tips being visible above the skyline.

101 Given the distance it is considered that the cumulative impact on the setting of this asset will be of Low Magnitude leading to a **Moderate** effect and therefore not significant for the purposes of this assessment.

St Andrews Castle (Index no. 90259, HB no.40599)

102 With the exception of the Michelin Tyre Factory, Govals, Frawney and Tealing Airfield, other existing and consented onshore wind farms are not seen, or will be unlikely to be visible, in views from the walls of the castle due to their distance from the viewpoint. Onshore developments that are visible would be at distances of over 17 km and likely to be minor elements in the view and will not be seen in the same field of view as the Inch Cape WTGs and OSPs.

103 Of the two other offshore wind farms, Seagreen will be located at a distance of around 57 km. Due to the curvature of the earth, only the blade tips would be theoretically visible, although this is unlikely at this distance. NnG will be seen at a distance of around 28 km to the east. Some WTGs at the southern extent of the NnG array will be screened by the coast, with only blade tips being visible above the skyline.

104 Given the distance it is considered that the cumulative impact on the setting of this asset will be of Low Magnitude leading to a **Moderate** effect and therefore not significant for the purposes of this assessment.

Crail Airfield, Pillbox, Foreland Head (Index no. 6461)

105 The photograph and wireline visualisations in Figure 12.57b show that the Michelin Tyre Factory WTGs are visible to the north-west; however other existing and consented WTGs to the north of Fife Ness are unlikely to be seen due to the intervening distance. The existing wind farms at Aikengall and Crystal Rig may be visible in conditions of good visibility, arrayed on the distant skyline of the Lammermuir Hills at distances of over 39 km. These onshore developments are not seen in the same field of view as the Inch Cape WTGs and OSPs and occupying a small proportion of the view.

106 Seagreen will be located to the north-east of the Development Area, over 49 km from the viewpoint with only blade tips being visible. NnG will be closer, at around 16 km distance and occupying a greater extent of the view, although will not affect the immediate setting or key views of the receptor.

107 It is considered that the cumulative effect is not deemed to alter the understanding and appreciation of the pillbox and the impact will be of Low Magnitude leading to a **minor / moderate** effect and therefore not significant for the purposes of this assessment.

Summary of Cumulative Setting

108 Summary of the cumulative effects on the setting of cultural heritage assets is provided below in Table 13.14.

Table 13.14: Summary of cumulative effects on the setting of cultural heritage assets

Name	Sensitivity	Magnitude of Change	Effect	SLVIA Viewpoint
Bell Rock Lighthouse Signal Tower, Ladyloan	High	Low	Moderate	11
Bell Rock Lighthouse	High	Low	Moderate	Figure 13.1 (of this assessment)
Tentsmuir Coastal Defences	High	Low	Moderate	16

St Andrews Cathedral and adjacent ecclesiastical remains	High	Low	Moderate	18
St Andrews Castle	High	Low	Moderate	18
Crail Airfield, pillbox, Foreland Head	Moderate	Low	Minor/ Moderate	23

13.9.2 Effects of Decommissioning

109 No cumulative impacts have been identified with regards to decommissioning.

13.10 Impact Interactions

110 The potential for individual impacts identified through the impact assessment above to interact and create new, or more significant impacts on cultural heritage receptor has been reviewed and no such interactions have been identified.

111 This chapter has identified linkages between different areas or disciplines covered in this EIA Report. Potential impacts on SLVIA receptors within the SLVIA Study Area have been fully assessed in *Chapter 16: Socio-economic* and are also referenced where appropriate.

112 The cumulative effects of the Development, in conjunction with other schemes are separately addressed within the cumulative section above (*Section 13.9*).

13.11 Additional Mitigation

113 The cultural heritage and archaeology assessment has assessed worst-case scenario impacts of the Development in isolation and cumulatively. This assessment has concluded that impacts on receptors within the Development Area and Offshore Export Cable Corridor from some Development related activities will be of **minor / moderate** effect and therefore not significant for the purposes of this assessment.

114 Based on the outputs from this impact assessment, it has been concluded that the Embedded Mitigation detailed in *Section 13.5* would be sufficient with respect to archaeology and cultural heritage and no further mitigation is recommended.

13.12 Conclusion and Residual Effects

13.12.1 Development Area

115 It is expected that the residual effects of the development on the setting of cultural heritage receptors will be **Minor** to **Moderate** (see Table 13.15 for summary of effects and mitigation).

Table 13.15: Summary of effects

Impact	Receptor	Effect
Operation and Maintenance		
Setting changes	Bell Rock Lighthouse Signal Tower, Ladyloan	Minor
	Bell Rock Lighthouse	Minor
	Tentsmuir Coastal Defences	Moderate
	St Andrews Cathedral and adjacent ecclesiastical remains	Moderate
	St Andrews Castle	Moderate
	Crail Airfield, pillbox, Foreland Head	Minor/ Moderate

116 Setting impacts have been considered for a number of designated coastal heritage assets, with a total of six receptors assessed through the use of site visits, wirelines and visualisations. Effects on setting have been established in the case of Bell Rock Lighthouse and Bell Rock Lighthouse Signal Tower; in each case these are considered to be **Minor**. Effects on setting have been established in the case of Crail Airfield pillbox as **Minor/Moderate**. Effects' on setting have been assessed for Tentsmuir Coastal Defences, St Andrews Cathedral and adjacent ecclesiastical remains, and St Andrews Castle and in each case considered to be **Moderate**. In all of these cases the impacts to the setting of these receptors is considered to be not significant with regard to the methodology presented above. Although intervisibility with the Inch Cape Wind Farm is possible in each case, no significant impacts have been identified on their settings. No mitigation has been proposed for indirect setting impacts. The effect of decommissioning on the setting of cultural heritage sites will be to remove all impacts arising from the Development.

13.12.2 Cumulative Impacts

The Development and OnTW (as defined)

117 Cumulative setting impacts for the Development and OnTW would be no greater that that assessed for the Development alone, and thus not considered to be significant.

The Development with Other Projects

118 An assessment has been made of the potential for impacts of the Development on cultural heritage assets in combination with other projects. A non-significant impact has been identified in the case of cumulative setting impacts on cultural heritage receptors (Table 13.16 below); no mitigation has been proposed.

119 The visualisations demonstrate, in all cases where other developments are considered to have a potential to combine setting impacts with the Inch Cape Wind Farm, these developments will appear either behind the WTGs and OSPs and will be obscured by it or will appear on the horizon adjacent to it. It is considered that in all cases the increased presence of the Development together with adjacent wind farms will lead to an effect of Low Magnitude on receptors of High Sensitivity leading to **Moderate** effects and for the purposes of this assessment therefore not significant. All assessed receptors are deemed be of High Sensitivity, with the exception of Crail Airfield pillbox.

120 Cumulative effects on Crail Airfield pillbox are considered to be of Low Magnitude on a receptor of Moderate Sensitivity leading to **minor / moderate** effects and for the purposes of this assessment therefore not significant.

121 In all cases the resulting impacts are considered to be not significant with regard to the methodology presented above.

Table 13.16: Summary of significance of cumulative impacts on cultural heritage assets

Impact	Receptor	Effect
Operation and Maintenance		
Setting changes	Bell Rock Lighthouse Signal Tower, Ladyloan	Moderate
	Bell Rock Lighthouse	Moderate
	Tentsmuir Coastal Defences	Moderate
	St Andrews Cathedral and adjacent ecclesiastical remains	Moderate
	St Andrews Castle	Moderate
	Crail Airfield, pillbox, Foreland Head	Minor/ Moderate

References

CIfA (revised 2017). *Standard and Guidance for Archaeological Desk-Based Assessment*. Available at: http://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_3.pdf [Accessed 24/04/2018].

Historic Environment Scotland (2016a). *Historic Environment Scotland Policy Statement*. Available at: https://www.historicenvironment.scot/advice-and-support/planning-and-guidance/legislation-and-guidance/historic-environment-scotland-policy-statement/ [Accessed 24/04/2018].

Historic Environment Scotland (2016b). *Managing Change in the Historic Environment: Setting*. Available at: https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=80b7c0a0-584b-4625-b1fd-a60b009c2549 [Accessed 24/04/2018].

JNAPC (2006). *JNAPC Code of Practice for Seabed Development*. York, Joint Nautical Archaeology Policy Committee. Available at: http://www.jnapc.org.uk/jnapc_brochure_may_2006.pdf [Accessed 24/04/2018]

Oxford Archaeology (2008). *Guidance for Assessment of Cumulative Impact on the Historic Environment from Offshore Renewable Energy*. Commissioned by COWRIE Ltd (Project reference CIARCH-11-2008).

Scottish Government (2011). *Planning Advice Note 2/2011: Planning and Archaeology*. Scottish Government, 2010. Scottish Planning Policy, Crown copyright 2010.

Scottish Government (2014). *Scottish Planning Policy*.

Scottish Government (2016). *National Marine Plan*. Available at: http://www.gov.scot/Topics/marine/seamanagement/national [Accessed 24/04/2018]

The Crown Estate (2010). *Model Clauses for Archaeological Written Schemes of Investigation: Offshore Renewables Projects*. Published guidance by Wessex Archaeology Ref 73830.

The Crown Estate (2014). *Protocol for Archaeological Discoveries: Offshore Renewables Projects*. Available at: https://www.thecrownestate.co.uk/media/148964/ei-protocol-for-archaeological-discoveries-offshore-renewables-projects.pdf [Accessed 24/04/2018]

Wessex Archaeology (2007). *Historic Environment Guidance for the Offshore Renewable Energy Sector*. Commissioned by COWRIE (project reference: ARCH-11-05).

Wessex Archaeology (2015a). *Inch Cape Offshore Wind Farm: Archaeological Assessment of Offshore Geophysical Data* Unpublished client report 103971.03c

Wessex Archaeology (2015b). *Inch Cape Offshore Wind Farm and Offshore Transmission Works: Written Scheme of Investigation Archaeology and Cultural History (Offshore)* Unpublished client report.

Wessex Archaeology (2016a). *Inch Cape Offshore Limited Onshore Transmission Works by the former Cockenzie Power Station Cockenzie, East Lothian Archaeological Site Investigation Works Synthesis Report* Unpublished client report. Ref 103973.03

Wessex Archaeology (2016b). *Inch Cape Offshore Wind Farm: Development Area. Stage 3 Palaeoenvironmental Assessment* Unpublished client report. Ref 103974.01

Contents

List of Tables

List of Figures

Glossary

10 - 15 metre	Category of fishing vessels that is between 10 and 15 metres in length.
12 nm limit	Territorial waters of European Union (EU) Member States extend to 12 nm. The coastal Member State manages these waters exclusively within the limits.
6 nm limit	UK vessels have exclusive access to fish within 6 nm of the coast.
6 nm - 12 nm limit	Some access is allowed for certain EU Member States in identified areas around the UK coast, based upon historic access.
Baseline	Existing environmental conditions
Creeling	The Scottish designation for potting, also referred to as static gear. The use of small cages or baskets to capture shellfish such as crabs or lobster.
Demersal	Fishing activities or species located near or on the seabed.
Fisheries Liaison Officer (FLO)	An individual who works as an intermediary between a wind farm developer and the fishing communities ensuring good communication.
Fisheries Industry Representative	A member of the fishing community, who assists the Fisheries Liaison Officer in disseminating information to local skippers and gives feedback on the project.
ICES Rectangle	ICES rectangles create a grid dividing up the earth's surface. They are each aligned to 1° of longitude and 30' of latitude and, for the most part, cover an area of approximately 900 nm^2.
Over-15 metres	Category of fishing vessels that are greater than 15 metres in length.
Pelagic	Fishing activities or species located in the water column.
Quota	A measure of the quantity of a species that can legally be landed within a set period as determined through the Common Fisheries Policy.
Territorial water	0-12 nautical miles from the coast baseline
Under-10 metre	Category of fishing vessels that are less than 10 metres in length.

Abbreviations and Acronyms

Cefas	Centre for Environment, Fisheries and Aquaculture Science
CfD	Contract for Difference
CFWG	Commercial Fisheries Working Group
CIA	Cumulative Impact Assessment
CFMS	Commercial Fisheries Mitigation Strategy
CMP	Construction Management Plan
CMS	Construction Method Statement
CPA	Coastal Protection Act
Defra	Department for Environment, Food and Rural Affairs
DFO	District Fishery Office
ECoW	Ecological Clerk of Works
EIA	Environmental Impact Assessment
EMF	Electromagnetic Fields
EMP	Environmental Management Plan
ES	Environmental Statement
EU	European Union
FEPA	Food and Environmental Protection Act
FIR	Fishing Industry Representative
FLO	Fisheries Liaison Officer
FLOWW	Fisheries Liaison and Offshore Wind and Wet Renewables Group
FTOWDG	Forth and Tay Offshore Wind Developers Group
IALA	International Association of Lighthouse Authorities
ICES	International Council for the Exploration of the Sea
ICOL	Inch Cape Offshore Limited
IFG	Inshore Fisheries Group
LMP	Lighting Management Plan

m	metre
MASTs	Marine Alliance for Science and Technology for Scotland
MCA	Maritime and Coastguard Agency
MCEU	Marine Consents and Environment Unit
MMO	Marine Management Organisation
MS	Marine Scotland
MS-LOT	Marine Scotland Licensing Operations Team
MSS	Marine Scotland Science
NLB	Northern Lighthouse Board
nm	nautical mile
NRA	Navigation Risk Assessment
NSP	Navigational Safety Plan
OfTW	Offshore Transmission Works
OMP	Operations and Maintenance Plan
OnTW	Onshore Transmission Works
OSP	Offshore Substation Platforms
OSPAR	Convention for the Protection of the Marine Environment of the North East Atlantic
O&M	Operations and Maintenance
PEMP	Project Environmental Management Plan
SFF	Scottish Fishermen's Federation
SNH	Scottish Natural Heritage
SSC	Suspended Sediment Concentrations
TCE	The Crown Estate
TAC	Total Allowable Catch
UK	United Kingdom
UKFIM	UK Fisherman's Information Mapping Data
UKFEN	UK Fisheries Economic Network

VMP	Vessel Management Plan
VMS	Vessel Monitoring System (satellite tracking data)
WTG	Wind Turbine Generators

14 Commercial fisheries

14.1 Introduction

1 This chapter provides an assessment of the potential impacts of the construction, operation and decommissioning of the Inch Cape Wind Farm and Offshore Transmission Works (OfTW) (the Development) upon commercial fishing activities. An assessment of the potential cumulative impacts arising from the Development in conjunction with other projects is also included.

2 Commercial fishing is defined as any legal fishing activity undertaken for declared taxable profit.

3 The following appendices and chapters should be read in conjunction with this chapter and the introductory chapters 1-8:

- Appendix 14A: Commercial Fisheries baseline technical report;
- Appendix 14B: Salmon and Seatrout baseline technical report;
- Appendix 14C: Commercial Fisheries Baseline Development Area (from Inch Cape 2013 Environmental Statement (ES))
- Chapter 9: Natural Fish and Shellfish; and
- Chapter 15: Shipping and Navigation.

4 Salmon and seatrout fisheries are not considered in this chapter as they were scoped out of the assessment (Table 14.1) although the baseline information for these fisheries was updated *(Appendix 14B*).

14.1.1 Commercial Fisheries Working Group

5 At the time of writing, the Commercial Fisheries Working Group (CFWG), comprising of representatives from fishing organisations and fishing communities in the Forth and Tay area, Inch Cape Offshore Limited (ICOL), Seagreen, Neart na Gaoithe, and Marine Scotland Science (MSS), are scheduled to hold a CFWG meeting in August 2018. The reactivation of this group will offer developers in the Forth and Tay and the fishing industry a forum for collaborative discussions. Further information on ICOL's commitment to participate in the group is provided in *Section 14.5.2: Embedded Mitigation* below.

14.2 Consultation

14.2.1 Commercial Fisheries

6 ICOL has engaged with the local and wider fishing industry in order to ensure the baseline information for this assessment reflects current practices. In order to facilitate effective dialogue, ICOL will appoint a Fisheries Liaison Officer (FLO) and Fishing Industry Representatives (FIRs) with an understanding of fisheries in the region of the Development

Area. Regular consultation has been undertaken to date and is ongoing with the organisations listed below:

- Scottish Fishermen's Federation (SFF)[1];
- Marine Scotland Licensing Operations Team (MS-LOT);
- Marine Scotland Science (MSS);
- North & East Coast Regional Inshore Fisheries Group (IFG);
- Fife Fishermen's Mutual Association (Pittenweem) Ltd;
- Fife Creel Fishermen's Association;
- Arbroath and Montrose Static Gear Association;
- Dunbar Fishermen's Association;
- Anglo-Scottish Fishermen's Association (St Abbs Region);
- Scottish White Fish Producers Association;
- Ten Metre and Under Association (Pittenweem);
- Cockenzie and Port Seton Fishermen's Association;
- Eyemouth Fishermen's Representative;
- Mallaig and North West Fishermen's Mutual Association;
- Scallop Committee of Scottish White Fish Producers Association;
- Fife Fishermen's Mutual Association;
- Scottish Pelagic Fishermen's Association;
- Aberdeen District Fishery Office (DFO);
- Anstruther DFO;
- Eyemouth DFO;
- Individual fishermen.

7 Following submission of the Scoping Report in April 2017, a scoping meeting was held on 26 May 2017 to discuss the scope of the commercial fish assessment. The SFF, MS-LOT and MSS were in attendance at the meeting, minutes of which were agreed and sent to MS-LOT.

8 Table 14.1 below summarises issues that were highlighted by the consultees in the Scoping Opinion, and provides a response from ICOL on each of these, where relevant if addressed in the Environmental Impact Assessment (EIA) Report this has been noted. This table also

[1] SFF represent; Anglo-Scottish Fishermen's Association; Fife Fishermen's Association; Fishing Vessel Agents & Owners Association (Scotland) Limited; Scottish Pelagic Fishermen's Association Limited; Orkney Fisheries Association; Mallaig and North-West Fishermen's Association Limited; Shetland Fishermen's Association and Scottish White Fish Producers' Association

includes a summary of other consultation which has been undertaken in relation to the assessment of the impacts of the Inch Cape Wind Farm and OfTW with relevant stakeholders. Prior to the submission of the EIA a further meeting was held to discuss the outcomes of the assessments and to identify any gaps within the assessment ahead of submission. The outcomes of these discussions have also been summarised in the table below. Please note consultation information raised by commercial fisheries stakeholders relating to natural fish and shellfish receptors is provided in *Chapter 9, Section 9.2.*

Table 14.1: Scoping responses and actions for commercial fisheries

Consultees	Scoping Response	ICOL Response
Scottish Ministers & SFF	Both the SFF and Scottish Ministers agree that the EIA should only concentrate on those receptors which may be subject to significant effects from the Development. The Scottish Ministers recommend that ICOL consider in detail the points raised by SFF.	Noted. Continued engagement with SFF has occurred in order to deal with specific points. Please see responses below for details.
Scottish Ministers, MSS & SFF	1.Scottish Ministers noted they were satisfied with the proposal to update the commercial fish baseline and advise the inclusion of data from the UK Fishermen's Information Mapping Data (UKFIM) database at the Crown Estate (TCE) and any relevant data from Scotmap. 2.SFF recommend inclusion of 7-10 years of data for scallops to take account of fluctuations in the population. 3.The Scottish Ministers advise ICOL to obtain validation of the data from the fishing industry and to discuss with the SFF how this could best be done. SFF suggested, this could potentially be done through the CFWG. 4.MSS provided a series of references that could be used to update the baseline data. 5. The Scottish Ministers advise that the proposal to update the commercial fish baseline is acceptable and advise ICOL to take account of the detail of SFF's comments and the data sources listed above.	1.ICOL agreed that commercial fisheries baseline will be updated to cover the time period 2011-2016, and this updated baseline will be used to inform the assessment. The Commercial Fisheries Baseline Technical Report (*Appendix 14A*) for the Development will, therefore, follow on from the commercial fisheries baseline collected for the Inch Cape 2013 Application, which covered the time period 2001-2010. UKFIM database is not publicly available, however ICOL agreed that fishing distribution maps would be validated with the SFF who have access to the UKFIM. This approach was agreed with SFF as being appropriate. 2. ICOL agreed that data from the both the updated baseline (*Appendix 14A*) and the baseline for the Development (*Appendix 14C*), will be used in the assessment on scallop fishing to ensure 7-10 years' worth of data will be drawn upon. 3. Data collected will also be validated through consultation with the fishing industry. Through meetings with the SFF it was agreed this would be though validation meetings for the

Consultees	Scoping Response	ICOL Response
		under 15m fleet and through consultation with associations for the over 15m fleet. The re-establishment of the CFWG is due in August 2018, with the first meeting planned then. 4. References provided by MSS will be used to assist the assessment. 5. SFF comments have been taken into account and discussed with SFF in order to reach agreement over the scope of the assessment.
SFF	1.SSF disagree that all relevant receptors have been scoped into the EIA. This includes: The effect of smothering by suspended sediment has not been fully assessed for either *Nephrops* or scallops; 2.Further analysis of the new design being proposed will be required to ascertain that temporary or permanent loss of access to fishing grounds, safety issues for fishing vessels and displacement of fishing activity is significantly less than for the original design; 3.The SFF recommend a report prepared for TCE 'Changes to fishing practices around the United Kingdom (UK) as a result of the development of offshore windfarms'; 4.Interference with fishing vessels, in terms of vessel movements and queuing, will be a bigger issue and should be scoped in; 5.The SFF want to be consulted on the Construction Management Plan (CMP), particularly in relation to defined navigation routes; 6.The SFF do not accept that any of the worst case scenarios are Negligible or Minor or Moderate and want all the potential impacts scoped in until the baseline and projections can be shown to back up the claim; 7.The SFF also note that the export cable corridor was decided without considering fishing activity and recommend a rerouting exercise takes place or that this is scoped in and that the affected local industry is consulted properly.	1. Within the Scoping Report for the Development, ICOL proposed that ecological impacts on fishing receptors was assessed within the Natural Fish Chapter (9), rather than the this Chapter. ICOL had proposed that the effects of smothering by suspended sediment was scoped out of this EIA as these impacts were not expected to be significant. Scottish Ministers asked ICOL to evaluate the potential impact of suspended sediment on scallops and *Nephrops*, should gravity bases be used, through a literature review of impacts on different life stages of these species, suspended plume modelling and examination of fishing patterns. Agreement reached with MSS that this could take the form of a discussion paper. In addition, as there is no connectivity between *Nephrops* and increased suspended sediments from gravity basis, it was agreed with MS- LOT that no further assessment is required on this species. Details of this discussion paper are provided in *Chapter 9 (Appendix 9D*). 2. The Scoping Report for the Development included validation of any impacts scoped out and this has been agreed by MS-LOT. 3.ICOL agreed to take into

Consultees	Scoping Response	ICOL Response
		account the suggested Crown estate reference. 4. Interference to fishing vessels from construction vessels is scoped in to the assessment. 5. It is expected that the CMP would form part of the consent conditions, should the application receive consent. MS-LOT will advise at this time on which stakeholders they would require to consult on. 6. The Scoping Report for the Development included validation of any impacts scoped out and this has been agreed by MS-LOT 7. The impact of the cable route on fishing activity is scoped in to the assessment.
Scottish Ministers & SFF	1. SFF do not agree with what has been scoped out for the <u>CONSTRUCTION (& DECOMMISSIONING) PHASE:</u> Scottish Ministers suggest the following: *Direct temporary habitat disturbance:* The Scottish Ministers consider that the Original Development ES provided sufficient evidence for scoping out impacts which were considered not to be significant. The Scottish Ministers advise ICOL to discuss with SFF which data the SFF consider inadequate and update the baseline accordingly. *2.Indirect disturbance as a result of sediment deposition* *Temporary increases in suspended sediment concentrations (SSC)* The Scottish Ministers have suggested an approach for assessing the potential impact of smothering of *Nephrops* and scallops by suspended sediment in the Natural Fish and Shellfish chapter. *3.Barrier effects, disturbance or physical injury associated with construction noise* The Scottish Ministers have outlined an approach to assessing the impact of particle motion in the Natural Fish and Shellfish chapter. The impacts on hearing specialists will be scoped in and assessed for the Natural Fish and Shellfish receptor. The Scottish Ministers consider that the effects associated with construction noise are therefore dealt	1. ICOL has discussed *Direct temporary habitat disturbance* with SFF and agreement has been reached that this can be scoped out. 2. Impacts from suspended sediment and deposition have been addressed though the acceptance of a discussion papers submitted to MS (see above) as part of the *Chapter 9 ,Appendix 9D*. Therefore this can be scoped out of the Commercial Fisheries assessment. 3. Assessing the Impacts from barrier effects, disturbance or physical injury has been agreed with MS. It was agreed that any impact on ecological receptors should be dealt with within the Natural fish and shellfish chapter and its associated discussion papers, rather than in the Commercial fisheries chapter. Hence the Scope of commercial fisheries chapter assessment is agreed in full and will not consider these impacts. 4. It is expected that the VMP would form part of the consent conditions, should the application receive consent. MS-

Consultees	Scoping Response	ICOL Response
	with appropriately. *4.Safety issues for fishing vessels, obstacles on the seabed* *Obstacles on the seabed* *Interference to fishing activities arising from navigational conflict* The Scottish Ministers consider that these should be scoped out of the Commercial Fisheries chapter and included in the Shipping and Navigation chapter. The Scottish Ministers recommend that ICOL have ongoing consultation with the SFF to ensure their concerns are taken into account in Vessel Management Plans (VMP) and the Navigational Risk Assessment (NRA).	LOT will advise at this time on which stakeholders they would require to consult. A new Navigation Risk Assessment (NRA) is not required as a validation exercise was carried out, and it was agreed with Maritime and Coastguard Agency (MCA) and Northern Lighthouse Board (NLB) that the Inch Cape 2013 ES NRA remained valid following a validation exercise (discussed further in *Chapter 15*). Both the Marine Traffic Validation Study and the original NRA can be found in *Appendix 15A: Marine Traffic Validation Survey* and *15C.1: Navigational Risk Assessment (NRA)* respectively.
Scottish Ministers & SFF	1.SFF do not agree with what has been scoped out of the assessment for the <u>OPERATION AND MAINTENANCE PHASE:</u> Scottish Ministers suggest the following: *Long term loss of original habitat* SFF consider this impact should be scoped in as evidence from other developments indicates that this impact is significant (see Crown Estate reference above for more information). The Scottish Ministers advise ICOL to consider the reference and have further discussion with SFF as to whether this changes the effect of the potential impact. The Scottish Ministers agree that temporary or complete loss, or restricted access to fishing grounds should be scoped in as outlined in Table 9-29. The Scottish Ministers recommend that ICOL use TCE document as suggested by SFF to inform the scope of work on this. The Scottish Ministers agree that displacement of fishing activity and increased steaming times to fishing grounds should be scoped in as outlined in Table 9-29. 2.*Behavioural responses to Electromagnetic Fields (EMF) associated with cabling* *Disturbance or physical injury associated with operational noise* *Effect on fish and shellfish resources due to reduced fishing effort within Development Area* *Creation of new habitat due to presence of*	1.ICOL has discussed *Long term loss of original habitat* with SFF and agreement has been reached that this can be scoped out. TCE paper referred to relates to Displacement of fishing activity, rather than habitat loss, hence this report will be taken into account in the assessment of Displacement of Fishing Activity. Increased steaming times will be assessed. 2.Scope of assessment now agreed in full during subsequent consultation.

Consultees	Scoping Response	ICOL Response
	project specific infrastructure This was discussed further with SFF (telephone call 20 July 2017 and follow up email of 25 July 2017) and SFF agreed these could be scoped out as outlined in Table 9-29. SFF raised some concern about the effect of development impacts on fishing and suggested that to fully assess the effect on fish and shellfish resources there would need to be monitoring of all catches. The Scottish Ministers referred back to the Inch Cape 2013 ES and note that this potential impact is related to the effect on the fish and shellfish resource if there were a change in fishing pressure i.e. if there was a reduction in fishing activity within the Development Area due to the presence of infrastructure there may be an impact on existing fish and shellfish resources The Inch Cape 2013 ES suggested this would be negligible/minor (positive). The impact on the activity of fishing rather than the resource is scoped in (Complete or restricted access to fishing grounds) which would take into account SFF's concerns.	
Scottish Ministers & SFF	1.*Temporary habitat disturbance via Operations and Maintenance (O&M) activities* This was discussed further with SFF (telephone call 20 July 2017 and follow up email of 25 July 2017) and SFF noted that as long as the effects were temporary then this effect could be scoped out. The Scottish Ministers advise ICOL to have ongoing discussion with SFF to confirm the temporary nature of the disturbance. 2.*Safety issues for fishing vessels, obstacles on the seabed* *Interference to fishing activities arising from navigational conflict* As discussed above for construction. SFF noted that there had been issues at the Beatrice Offshore Wind Limited site in relation to vessels 'queuing' while waiting to undertake work on the site. The Scottish Ministers agree this effect can be scoped out and advise ICOL to discuss with SFF how this issue can be dealt with in the Shipping and Navigation chapter. The Scottish Ministers note that for the export cable the effects on anchoring operations and snagging risk for commercial fishing vessels are scoped in to the Development EIA for the Shipping and Navigation chapter. ICOL should note the concerns of the SFF and ensure that	1. Should the Development be constructed ICOL will continue to liaise with SFF over O&M activity. 2. Should the Development be consented, SFF will be consulted and their concerns taken into account within the VMPs, which take into account appropriate mitigation measure, and the NRA, that will be produced as part of the Marine Licence requirements. 3. ICOL will work with SFF and other relevant stakeholders to agree Marine Licence conditions. ICOL acknowledges the Scottish Ministers comment that the production of a Fisheries Management and Mitigation Plan /Strategy pre-application would save time post consent. As the detailed information on construction to meaningfully inform this is not yet known, ICOL commit to the strategy as part of a consent condition, which will be subject to

Consultees	Scoping Response	ICOL Response
	they are consulted. SFF provided detailed information on the relevance of the consent conditions but note that they do not accept that the potential impacts on fisheries would be less in the Development and would expect to see a full and proper assessment done. SFF notes the importance of consulting SFF and ensuring that mitigation measures are agreed. The SFF notes that the Fisheries Liaison Officer must fully understand and engage in the responsibilities outlined for their role. SFF also raises concerns regarding the route of the OfTW. 3. The Scottish Ministers advise ICOL to work with the SFF, other relevant stakeholders and the Scottish Ministers to agree the text of the consent conditions. The Scottish Ministers note that, where possible, agreeing e.g. the Fisheries Management and Mitigation Plan prior to submitting the application will save time post consent.	consultation at the Scottish Minister's discretion (see section 14.5.2).
Scottish Ministers & SFF	1.SFF recommend including the 2B Energy Development (included as Forthwind Offshore Wind Demonstration Array – Phase 1 and 2) and the Levenmouth demonstration turbine (now known as Offshore Renewable Energy Catapult). SFF want the displacement effect of other projects around the UK on the nomadic scallop fleet to be taken into account along with the impact of East coast projects on the wider squid fleet. The SFF note that the different restrictions imposed by Forth Ports which impact on the space needed for fishing activity need to be included. The Scottish Ministers recommend the following projects are included in the cumulative impact assessment (CIA): Worst case scenario of Neart na Gaoithe (2014 as consented) or Neart na Gaoithe (2017 scoping report) Worst case scenario of Seagreen Alpha and Bravo (2014 as consented) or Seagreen (2017 scoping report) • Kincardine Offshore Windfarm • Forthwind Offshore Windfarm (2016 consent) • Forthwind Offshore Wind Demonstration Project • Offshore Renewable Energy Catapult	1.The projects recommended by Scottish Ministers will be included in the CIA, (*Section 14.11*)

Consultees	Scoping Response	ICOL Response
	Levenmouth In addition the Scottish Ministers agree, with some additions, with the list of projects provided by ICOL for assessing the cumulative impact on the nomadic scallop fleet. The Scottish Ministers note that these projects may be relevant for assessment the cumulative impact on the squid fishery. • European Offshore Wind Deployment Centre • Hywind Scotland Pilot Park • Blyth Offshore Windfarm – 2 turbines • Blyth Offshore Wind Demonstration Project – 15 turbines • Beatrice Offshore Windfarm • Moray Offshore East Development • Moray East Offshore Windfarm – Alternative Design • Moray Firth Offshore Wind Western Development Area • Rampion Offshore Windfarm	
Scottish Ministers	The Scottish Ministers agree that the cumulative impacts on Commercial Fisheries of loss or restricted access to fishing grounds, increased steaming times to fishing grounds and displacement of fishing vessels into other areas should be scoped in and other impacts scoped out.	Noted
SFF	Table 5-4 in 5.7.4 needs to include the many different restrictions Forth Ports are imposing on their area which impact on the space needed for fishing activity.	These restrictions will be considered in the EIA Report as far as reasonably possible.

Table 14.2: Post-scoping consultation for commercial fisheries

Consultation	Consultees involved	Summary
SFF meeting, Aberdeen 21/7/2017	SFF	Information about the Development was presented by ICOL to the SFF. Information on approach to data collection was also presented, whereby existing data sources will be updated and validated with the industry, with the main focus of the validation being on under 15m fleet as there is less data available for this. Information was also provided on the scope

Consultation	Consultees involved	Summary
		of the assessment. SFF agreed with the approach to data collection. SFF raised concern on: • The location of the cable route, and issues for the *Nephrops* fleet, particularly in relation to clay berms left after cable installation. • Construction vessels 'queuing' while waiting to deliver infrastructure on other sites and the issues caused to fishing; • Ecological impacts arising from The Development.
Commercial Fisheries under 15 validation meeting 14/9/2017 - Montrose 15/9/2017 - Abroath 23/9/2017 - Pittenweem 27/9/2017 - Cockenzie / Port Seton	Invitations were sent to 42 organisations (for full details see Annex 18A.A), as well as individual fishermen known to be active fishermen in the area. Meetings were also advertised at local harbours, libraries and in the Kingfisher Bulletin. Attendees who could not attend meetings were provided with questionnaire. Attendees: • SFF • Marine Scotland (MS) - DFOs • Arbroath and Montrose Static Gear Association • 10m and Under Association • Fishermen's Mutual Association • Fife Creel Fisherman's Association • Eyemouth Fisheries Representative • Fisherman's Mutual	Information about the Development was presented. Data was then presented on the different data sources available for the assessment and consultees were invited to comment on the validity of the data, provide additional information and to raise any concerns: In terms of validation of data: Consultees generally agreed landings data provided an accurate representation of fishing in the region. In general attendees agreed that the most accurate representation of the spatial distribution of fishing effort was from: • Creeling Effort Study for creeling; • VMS for scallop dredging; • Scotmap and Vessel Monitoring System (VMS) for *Nephrops* trawling for the under 15 m fleet and over 15m fleet respectively; • Squid is unpredictable between years and landings are dependent upon both stock and effort with areas targeted varying between year. Consultees felt that no data source exactly reflected the distribution of effort as it varied so much, however the Scotmap 'Not *Nephrops* Trawls': No. of Vessels (MS, 2012) map did tally with areas known to be targeted for squid; and • Consultees also provided information on the distribution of other fisheries such as whelk fishing, clams and hand

Consultation	Consultees involved	Summary
	Association Port Seaton • Dunbar Fisherman Association • Cockenzie and Port Seton Fishermen's Association • Individual fishermen x 19	lining; Consultees also expressed concern over: • The location for the cable route for *Nephrops* fishing due to the direction of towing; • Ecological impacts of the Development to species they catch; • The impact of the loss of fishing area due to the Development. Consultees also provided information of trends in fishing, such as: • Increasing importance of creeling; • The general trend for creeling further offshore as larger vessels enter the fishery; • Changes in fishing gear types and how it's rigged; and • Potential new fisheries.
Commercial Fisheries over 15 m validation meeting 1/2/2018 – Edinburgh	Attendees: • SFF • Mallaig and North West Fishermen's Mutual Association • Fife Fishermen's Mutual Association • Scallop Committee of Scottish White Fish Producers Association Scottish White Fish Producers Association	Consultees generally agreed landings data provided an accurate representation of fishing in the region. Consultees agreed that the VMS data used for the assessment provided an accurate representation of the spatial distribution of fishing effort; Consultees expressed concern over: • The location for the cable route for *Nephrops* fishing due to the direction of towing; • The potential impact of clay berms left over after cable installation on the safety and loss of fishing ground for *Nephrops* trawler; • Ecological impacts of the Development to species they catch; • The impact of the loss of fishing area due to the Development; • The economic impact of the Development on fishing communities; and • The potential impact of queuing construction vessels on creeling. Attendees also provided changes in fishing

Consultation	Consultees involved	Summary
		practices. SFF explained how the UKFIM was currently being updated by TCE, hence was not available to validate the data, however they were satisfied that VMS data gave an accurate representation of fishing patterns.
Commercial Fisheries and Natural Fisheries Pre – submission meeting 14/2/2018 MS, Aberdeen	Attendees: • MS-LOT • MSS • Scottish Natural Heritage (SNH) • SFF • Scottish White Fish Producers Association	Information on information used in and the scope of the assessment for both the natural fish and commercial fisheries chapters was presented. All consultees agreed on the scope of assessment, remaining focused to those receptors and impacts that have the potential of a significant effect. It was agreed that the baseline validation exercise to inform the assessment was appropriate. MSS agreed to provide ICOL with data on recent average 10 year data sets for scallop fishing intensity. SFF raised concerns on: • CIA; • Commitments of contractors during the construction work and ensuring that commitments made now and within the EIA are filtered down appropriately; and • ICOL's commitment to safety zones was discussed.

14.3 Scope of Assessment

9 As part of this application ICOL have drawn on the details presented in the Scoping Report, MS-LOT's Scoping Opinion and subsequent correspondence (with SFF and MS-LOT) refining the detail on the scope of the assessment. Therefore, this chapter focusses on those impacts on Commercial Fisheries that have been agreed throughout this process as being necessary to be assessed, detailed in Table 14.3. The reason for the potential impacts being scoped into the assessment are due to the need to have an up-to-date commercial fisheries baseline in order to properly assess the magnitude of the impact on the fisheries.

10 For clarity, those impacts that have been agreed to be scoped out of the EIA Report are included below (Table 14.4). For further information reference should be made to the Scoping Report and the Scoping Opinion which can be found on Marine Scotland's website[2].

Table 14.3: Scope of assessment covered in this chapter

Potential Impact	Scope of Assessment
Construction (& Decommissioning) Phase – Wind Farm	
Temporary loss or restricted access to fishing grounds	The impact will be assessed against the following fisheries: • Scallop fishery • Squid fishery • Creel fishery
Increased steaming times to fishing grounds	The impact will be assessed against the following fisheries: • Scallop fishery • Squid fishery • Creel fishery
Displacement of fishing vessels into other areas	The impact will be assessed against the following fisheries: • Scallop fishery • Squid fishery • Creel fishery
Construction (& Decommissioning) Phase – Offshore Export Cable Corridor	
Temporary loss or restricted access to fishing grounds	The impact will be assessed against the following fisheries: • Scallop fishery • *Nephrops* fishery • Squid fishery • Creel fishery
Increased steaming times to fishing grounds	The impact will be assessed against all fisheries.
Displacement of fishing activity into other areas	The impact will be assessed against the following fisheries: • Scallop fishery • *Nephrops* fishery • Squid fishery • Creel fishery

[2] At the time of writing these documents can be found at this link: http://www.gov.scot/Topics/marine/Licensing/marine/scoping/ICOLRevised-2017 [Accessed 17/04/2018].

Potential Impact	Scope of Assessment
Operation & Maintenance Phase – Wind Farm	
Complete Loss or Restricted access to fishing grounds	The impact will be assessed against the following fisheries: • Scallop fishery • Squid fishery • Creel fishery
Increased steaming times to fisheries grounds	The impact will be assessed against all fisheries.
Displacement of fishing vessels into other areas	The impact will be assessed against the following fisheries: • Scallop fishery • Squid fishery • Creel fishery
Operation & Maintenance Phase – Offshore Export Cable Corridor	
Complete loss or restricted access to fishing grounds	The impact will be assessed against all fisheries.
Increased steaming times to fishing grounds	The impact will be assessed against all fisheries.
Displacement of fishing activity into other areas	The impact will be assessed against all fisheries.

Table 14.4: Impacts scoped out of this chapter

Potential Impact	Scoped out of the EIA Report
Construction (& Decommissioning) Phase – Wind Farm	
Direct temporary habitat disturbance.	Agreed by MS-LOT in their Scoping Opinion that this potential impact does not need to be assessed in the EIA Report as it is unlikely to lead to significant effects.
Indirect disturbance as a result of sediment deposition and temporary increases in SSC.	Agreed by MS-LOT in their Scoping Opinion that this potential impact does not need to be assessed in the EIA Report as it is unlikely to lead to significant effects.
Barrier effects disturbance or physical injury associated with construction noise.	Agreed with consultees following further consultation post Scoping Opinion. Impacts on hearing specialists will be assessed in *Chapter 9*. As impacts on a single species which is not considered to be a major focus of the commercial fishery fleets in the area are unlikely to significantly impact commercial fishery receptors, it is recommended that 'Barrier effects disturbance or physical injury associated with construction noise be scoped out of the commercial fishery assessment.
Safety issues for fishing vessels.	Assessed and mitigated for in project safety and management documentation. Agreed with consultees following further consultation post

Potential Impact	Scoped out of the EIA Report
	Scoping Opinion. Taking into account embedded mitigation (Lighting Management Plan [LMP], Navigational Safety Plan [NSP], VMP, and Construction Method Statement [CMS]) the Development is considered unlikely to lead to significant effects and assessment of this potential impact is therefore scoped out of the EIA Report.
Obstacles on the seabed.	Assessed and mitigated for in project safety and management documentation. Agreed with consultees following further consultation post Scoping Opinion. Taking into account embedded mitigation (Project Environmental Management Plan [PEMP], Environmental Management Plan [EMP], and CMS) the Development is considered unlikely to lead to significant effects and assessment of this potential impact is therefore scoped out of the EIA Report.
Interference to fishing activities arising from navigational conflict.	Assessed and mitigated for in project safety and management documentation. Agreed with consultees following further consultation post Scoping Opinion. Taking into account embedded mitigation (NSP, VMP) the Development is considered unlikely to lead to significant effects and assessment of this potential impact is therefore scoped out of the EIA Report.
Construction (& Decommissioning) Phase – Offshore Export Cable Corridor	
Direct temporary habitat disturbance via Export Cable installation.	Agreed by MS-LOT in their Scoping Opinion that this potential impact does not need to be assessed in the EIA Report as it is unlikely to lead to significant effects.
Indirect disturbance as a result of sediment deposition and temporary increases in SSC via Export Cable installation.	Agreed by MS-LOT in their Scoping Opinion that this potential impact does not need to be assessed in the EIA Report as it is unlikely to lead to significant effects.
Disturbance or physical injury associated with construction noise (Export Cable installation).	Agreed by MS-LOT in their Scoping Opinion that this potential impact does not need to be assessed in the EIA Report as it is unlikely to lead to significant effects.
Safety issues for fishing vessels.	Assessed and mitigated for in project safety and management documentation. Agreed with consultees following further consultation post Scoping Opinion. Taking into account embedded mitigation (LMP, NSP, VMP, and CMS) the Development is considered unlikely to lead to significant effects and assessment of this potential impact is therefore scoped out of the EIA Report.
Obstacles on the seabed.	Assessed and mitigated for in project safety and management

Potential Impact	Scoped out of the EIA Report
	documentation. Agreed with consultees following further consultation post Scoping Opinion. Taking into account embedded mitigation (LMP, NSP, VMP, and CMS) the Development is considered unlikely to lead to significant effects and assessment of this potential impact is therefore scoped out of the EIA Report.
Interference with Fishing Vessels arising from Navigational Conflict.	Assessed and mitigated for in project safety and management documentation. Agreed with consultees following further consultation post Scoping Opinion. Taking into account embedded mitigation (NSP, VMP) the Development is considered unlikely to lead to significant effects and assessment of this potential impact is therefore scoped out of the EIA Report.
Operation & Maintenance Phase – Wind Farm	
Long term loss of original habitat.	Agreed by MS-LOT in their Scoping Opinion that this potential impact does not need to be assessed in the EIA as it is unlikely to lead to significant effects.
Behavioural responses to EMFassociated with cabling.	Agreed with consultees following further consultation post Scoping Opinion. Embedded mitigation measures will ensure cabling is suitable shielded and buried, or will be protected by other means. Further assessment of this potential impact is therefore scoped out of the EIA Report.
Disturbance or physical injury associated with operational noise	Agreed by MS-LOT in their Scoping Opinion that this potential impact does not need to be assessed in the EIA Report as it is unlikely to lead to significant effects.
Effect on fish and shellfish resources due to reduced fishing effort within Development Area.	Agreed by MS-LOT in their Scoping Opinion that this potential impact does not need to be assessed in the EIA Report as it is unlikely to lead to significant effects.
Creation of new habitat due to presence of project specific infrastructure.	Agreed by MS-LOT in their Scoping Opinion that this potential impact does not need to be assessed in the EIA Report as it is unlikely to lead to significant effects.
Temporary habitat disturbance via O&M activities.	Agreed by MS-LOT in their Scoping Opinion that this potential impact does not need to be assessed in the EIA Report as it is unlikely to lead to significant effects.
Safety issues for fishing vessels.	Assessed and mitigated for in project safety and management documentation. Agreed with consultees following further consultation post Scoping Opinion. Taking into account embedded mitigation (LMP, NSP, VMP, and CMS) the Development is considered unlikely to lead to significant effects and assessment of this potential impact is

Potential Impact	Scoped out of the EIA Report
	therefore scoped out of the EIA Report.
Obstacles on the seabed.	Assessed and mitigated for in project safety and management documentation. Agreed with consultees following further consultation post Scoping Opinion. Taking into account the embedded mitigation (LMP, NSP, VMP, CMS) the Development is considered unlikely to lead to significant effects and assessment of this potential impact is therefore scoped out of the EIA Report
Interference with fishing activities arising from navigational conflict.	Assessed and mitigated for in project safety and management documentation. Agreed with consultees following further consultation post Scoping Opinion. Taking into account the embedded mitigation (NSP, VMP) the Development is considered unlikely to lead to significant effects and assessment of this potential impact is therefore scoped out of the EIA Report.
Operation & Maintenance Phase – Offshore Export Cable Corridor	
Long term loss of original habitat (Export Cable).	Agreed by MS-LOT in their Scoping Opinion that this potential impact does not need to be assessed in the EIA Report as it is unlikely to lead to significant effects.
Behavioural responses to EMF associated with cabling (Export Cable).	Agreed with consultees following further consultation post Scoping Opinion. Embedded mitigation measures will ensure cabling is suitable shielded and buried, or will be protected by other means. Further assessment of this potential impact is therefore scoped out of the EIA Report.
Creation of new habitat due to presence of cable protection.	Agreed by MS-LOT in their Scoping Opinion that this potential impact does not need to be assessed in the EIA Report as it is unlikely to lead to significant effects.
Temporary habitat disturbance from O & M activities.	Agreed by MS-LOT in their Scoping Opinion that this potential impact does not need to be assessed in the EIA Report as it is unlikely to lead to significant effects.
Safety issues for fishing vessels.	Assessed and mitigated for in project safety and management documentation. Agreed with consultees following further consultation post Scoping Opinion. Taking into account the embedded mitigation (LMP, NSP, VMP, and CMS) the Development is considered unlikely to lead to significant effects and assessment of this potential impact is therefore scoped out of the EIA Report.
Obstacles on the seabed.	Assessed and mitigated for in project safety and management documentation. Agreed with consultees following further consultation post Scoping Opinion.

Potential Impact	Scoped out of the EIA Report
	Taking into account the embedded mitigation (LMP, NSP, VMP, and CMS) the Development is considered unlikely to lead to significant effects and assessment of this potential impact is therefore scoped out of the EIA Report.
Interference with fishing vessels arising from navigational conflict.	Assessed and mitigated for in project safety and management documentation. Agreed with consultees following further consultation post Scoping Opinion. Taking into account the embedded mitigation (NSP, VMP) the Development is considered unlikely to lead to significant effects and assessment of this potential impact is therefore scoped out of the EIA Report.

14.4 Regulation and Guidance

11 There is no specific legislation which covers the scope of an impact assessment on commercial fisheries. There is guidance which provides information on how to assess impacts to fisheries from offshore wind farms.

12 In order to provide a detailed and robust baseline description of fisheries operating within the site and the wider region surrounding the area, the following guidance has been considered:

- *Guidance note for Environmental Impact Assessment In respect of Food and Environmental Protection Act (FEPA) and Coastal Protection Act (CPA) requirements, Version 2* (Centre for Environment, Fisheries and Aquaculture Science, (Cefas), 2004));
- *Recommendations for Fisheries Liaison: FLOWW* (Fishing Liaison with Offshore Wind and Wet Renewables Group) (BERR, 2008);
- Best practice guidance for fishing industry financial and economic impact assessments Sea Fish Industry Authority and UK Fisheries Economic Network (UKFEN 2012);
- Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison (FLOWW, 2014);
- Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects. Cefas contract report: ME5403 – Module 15 submitted to Department for Environment, Food and Rural Affairs (Defra) and the MMO (Cefas, 2012);
- Guidance on Environmental Considerations for Offshore Wind Farm Development. Reference Number: 2008-3 (Convention for the Protection of the Marine Environment of the North East Atlantic (OSPAR), 2008); and
- Scoping Opinion responses (Table 14.1).

14.5 Design Envelope and Embedded Mitigation

13 As the design of the Development is not fixed and flexibility in the design envelope is required, the following key parameters, detailed in Tables 14.5 and 14.6, represent the worst case scenario for impacts on commercial fisheries interests.

14 Adverse effects arise from the potential for the Wind Farm and OfTW to constitute a physical obstacle and/or safety risk to the continuation of normal fishing activities as described in the baseline. Adverse effects may also arise from the potential for the Wind Farm and OfTW to impact on the fish and shellfish of commercial importance, however any impact on ecological receptors will be assessed within *Chapter 9*.

15 Commercial fishing will not be excluded from the Development Area or along the Offshore Export Cable Corridor entirely during the construction phase, however a rolling safety zones of 500 m will be in place around major construction vessels. It is possible that installed infrastructure will have safety zones of 50 m (or an appropriate size to incorporate infrastructure). In the case of the operational phase, it is expected that fishing activities will be able to be resumed to some degree within the Development Area, although it is recognised that certain fishing methods, by virtue of gear configuration and mode of deployment, may be restricted in their ability to operate as normal.

16 Taking into account the potential for fishing vessels to regain some degree of access in the operational phase, it is considered that the structures with the combined biggest footprint poses the worst case scenario to fishing activities. This includes the maximum duration of construction activities, and associated safety zones, the highest number of Wind Turbine Generators (WTGs) with the smallest spacing, and the maximum number of additional infrastructure such as OSPs and sub-sea cables, etc.

14.5.1 Design Envelope

17 Tables 14.5 and 14.6 gives the worst case design parameters for the relevant aspects of the Development during the construction, operational and decommissioning phases for commercial fisheries.

Table 14.5: Worst case scenario definition - Development Area

Potential Impact	Design Envelope Scenario Assessed
Construction (& Decommissioning) Phase – Wind Farm	
Temporary loss or restricted access to fishing grounds	Infrastructure and procedures resulting in the maximum loss of fishing grounds: • 24 months construction within a 3 year period; • Total Development Area: 150 km² (with 4.24 km² in total disturbed during construction); • Progressive installation of up to 72 WTGs and up to two Offshore

Potential Impact	Design Envelope Scenario Assessed
	Substation Platforms (OSPs); • Dimensions of infrastructure: WTG - gravity foundations of 90 m diameter per foundation with 125 m scour protection. Total area per foundation including scour protection 12,272 m^2. OSPs - foundations of up to 130 m diameter per foundation with 180 m scour protection. Total area per OSP including scour protection 70,650 m^2. Total area affected (two OSPs) – 0.14 km^2. • Nominal minimum spacing between WTGs: 1278 m; • Maximum inter-array cable length: 190 km (90-100% buried); • 500 m safety zones around construction works; • Consideration of 50 m safety zones around fully and partially installed infrastructure; • Progressive installation of inter-array cables across the Development Area for the duration of construction (i.e. fishing activities cannot be undertaken in the area of inter-array cable installation); • Ongoing cable burial and protection works throughout the construction phase (at this stage it is anticipated that the target burial depth for the array cables will be approximately one metre); and • Unburied inter-array cables, protected by other means (i.e. rock placement).
Increased steaming times to fishing grounds	Maximum number of construction safety zones and infrastructure in the Development Area resulting in the maximum disruption to established steaming routes and potential increases in operating costs. 24 months construction within a 3 year period.
Displacement of fishing vessels into other areas	See 'Temporary loss or restricted access to fishing grounds'. Infrastructure resulting in the maximum loss of fishing grounds.
Operational Phase	
Complete loss or restricted access to fishing grounds	Infrastructure resulting in the maximum loss of fishing ground. • Installation of 72 WTGs and up to two OSPs; • Dimensions of infrastructure: WTG - gravity foundations of 125 m diameter including scour protection. Total area per foundation 12,272 m^2. Total area affected 0.88 km^2; OSPs - foundations of up to 130 m diameter per foundation with 180 m scour protection. Total area per OSP 25,447 m^2. Total area affected (two OSPs) – 0.05 km^2. 50 m safety zones around fully and partially installed infrastructure (or an appropriate size to incorporate infrastructure); • Nominal minimum spacing between WTGs: 1,278 m;

Potential Impact	Design Envelope Scenario Assessed
	• Maximum inter-array cable length: 190 km • Approximate target cable burial depth one metre (90-100% buried); and • Unburied inter-array cables, protected by other means (i.e. rock placement).
Increased steaming times to fisheries grounds	Maximum number of infrastructure and associated safety zones in the Development Area resulting in the maximum disruption to established steaming routes.
Displacement of fishing vessels into other areas	See 'Complete loss or restricted access to fishing grounds'. Infrastructure resulting in the maximum loss of fishing grounds.

Table 14.6: Worst case scenario definition - Offshore Export Cable Corridor

Potential Impact	Design Envelope Scenario Assessed
Construction (and Decommissioning) Phase	
Temporary loss or restricted access to fishing grounds	Infrastructure resulting in the maximum loss of fishing ground. • Approximately nine month duration of installation over a three year period; • Total export cable length: 83.3 km; • Maximum number of export cable trenches: two; • Approximate target cable burial depth one to three metres, (80-100% buried); • Unburied cable length, protected by other means (i.e. rock placement), where burial is not feasible; • Safety zones around installation works; and • Progressive installation of cable for the duration of construction (i.e. fishing activities cannot be undertaken in the area of export cable installation until cable burial and protection operations have been completed)
Increased steaming times to fishing grounds	Maximum number of construction safety zones resulting in the maximum disruption to established steaming routes and potential increases in operating costs.
Displacement of fishing activity into other areas	See 'Temporary loss or restricted access to fishing grounds'. Infrastructure resulting in the maximum loss of fishing grounds.
Operational Phase	

Potential Impact	Design Envelope Scenario Assessed
Complete loss or restricted access to fishing grounds	Infrastructure resulting in the maximum loss of fishing ground. • Maximum length of export cable: 83.3 km; • 80-100% of operational target cable burial to approximately one to three metres where feasible.
Increased steaming times to fishing grounds	None
Displacement of fishing activity into other areas	See 'Complete loss or restricted access to fishing grounds'. Infrastructure resulting in the maximum loss of fishing grounds.

14.5.2 Embedded Mitigation

18 A range of embedded mitigation measures to minimise environmental effects are captured within the Design Envelope. Where relevant these may be secured through consent conditions. A summary of these and other embedded mitigation measures which have been taken into account during the assessment, are provided below:

- A Construction Management Plan (CMP) will be developed in consultation with FIRs which establishes a protocol for engagement between ICOL and the fishing industry. This will include details on:
  - Communication channels between the fishing community and ICOL through all phases;
  - Protocol for the navigation of construction and operation / maintenance vessels to and from the site (e.g. use of transit lanes that will reduce interaction with fishing activities); and
  - Procedures in the event of interactions between wind farm construction and operation and fishing activities.
- 500 m 'rolling' safety zones around working areas during construction, decommissioning and major maintenance activities will be applied for to prohibit vessels not associated with the works. Consultation will be undertaken with relevant stakeholders to ensure effective implementation and management of safety zones.
- Structures within the Development Area will be marked and lit in accordance with International Association of Lighthouse Authorities' (IALA) *Recommendation O-139 on the Marking of Man-Made Offshore Structures* (IALA, 2008). The final lighting and marking scheme will be agreed with the relevant stakeholders prior to construction.
- Cables will be suitably buried or will be protected by other means when burial is not practicable which will reduce the risk to fishing vessels from snagging.
- Cable burial plan, which will include monitoring and reporting of any exposures.
- Grid or offset grid layout of the WTG and OSPs.

- Commitment of use of concrete matting or rock dumping to reflect seabed conditions, where practical and appropriate.
- Commitment to picking up 'drop objects' from the seabed floor where possible[3].
- Commitment to an over-trawl-ability assessment.
- Promulgation of information and appropriate liaison will be carried out to ensure information on the works are circulated through agreed procedure e.g. Notices to Mariners, Kingfisher and other appropriate media to allow vessels to effectively and safely navigate around the proposed sites.
- Suitable and sufficient assessment will be undertaken to ensure that all safety risks are reduced as far as reasonably practicable.
- Modifications to bottom towed fishing gear are being investigated in consultation by the offshore renewables industry and the fishing industry which may better enable fishing activities within and around operational wind farms.
- Defined navigational routes will be used by vessels. This will reduce the risk of disturbance to static gear.
- Participation in a regional CFWG to provide a forum for collaborative discussion and action in relation to offshore wind farm developments in the Forth and Tay area and their interactions with commercial fishing activities. ICOL will ensure the principle of the commitments (as identified below) will be:
    - Provide regular contact for representatives of commercial fishermen and the Forth and Tay Offshore Wind Developers Group (FTOWDG) developers to promote communication and understanding;
    - Provide a forum to manage engagement through a project(s) lifecycle with particular focus on consenting, pre-construction planning and construction activities;
    - Provide input to general approaches, procedures and protocols with respect to CMPs and potential mitigation options, promoting standardisation where possible;
    - Agree specific offshore working practices relating to Marine Licence conditions where required;
    - Agree and maintain a current regional assessment of commercial fishing activities;
    - Identify and develop opportunities between the fishing/renewables industries in the Forth and Tay area; and
    - Establish a protocol for the removal of temporary works post-construction including appropriate verification.

[3] A protocol for cases where retrieval of dropped objects is not possible will be developed. It is expected this would take the form of a marine licence condition which would require the production of a dropped objects procedure which would agree reporting and retrieval requirements for dropped objects, in terms of length and weight. This would be carried out in line with the updated Dropped Objects Policy and Guidance being prepared by Marine Planning and Policy, once finalised.

Consent Conditions

19 As well as the embedded mitigation measures, ICOL proposes to commit to the purpose of the relevant consent conditions granted for the Inch Cape 2014 Consent, as they are still relevant to this application. This will provide reassurance to stakeholders that the relevant issues will be addressed and secured by way of appropriate conditions.

20 ICOL recognises that the wording and detail of the consent conditions will be at the discretion of the Scottish Ministers. For Commercial Fisheries interests, ICOL propose that the consent conditions address matters surrounding, but not limited to, the following;

- Production of a Vessel Management Plan (VMP);
- Production of a Navigational Safety Plan (NSP);
- Production of an Operations and Maintenance Plan (OMP);
- Production of a Cable Plan;
- Production of a Commercial Fisheries Mitigation Strategy (CFMS);
- Appointment of a Fisheries Liaison Officer (FLO);
- Appointment of an Environmental Clerk of Works (ECoW); and
- Participation in relevant groups (such as CFWG).

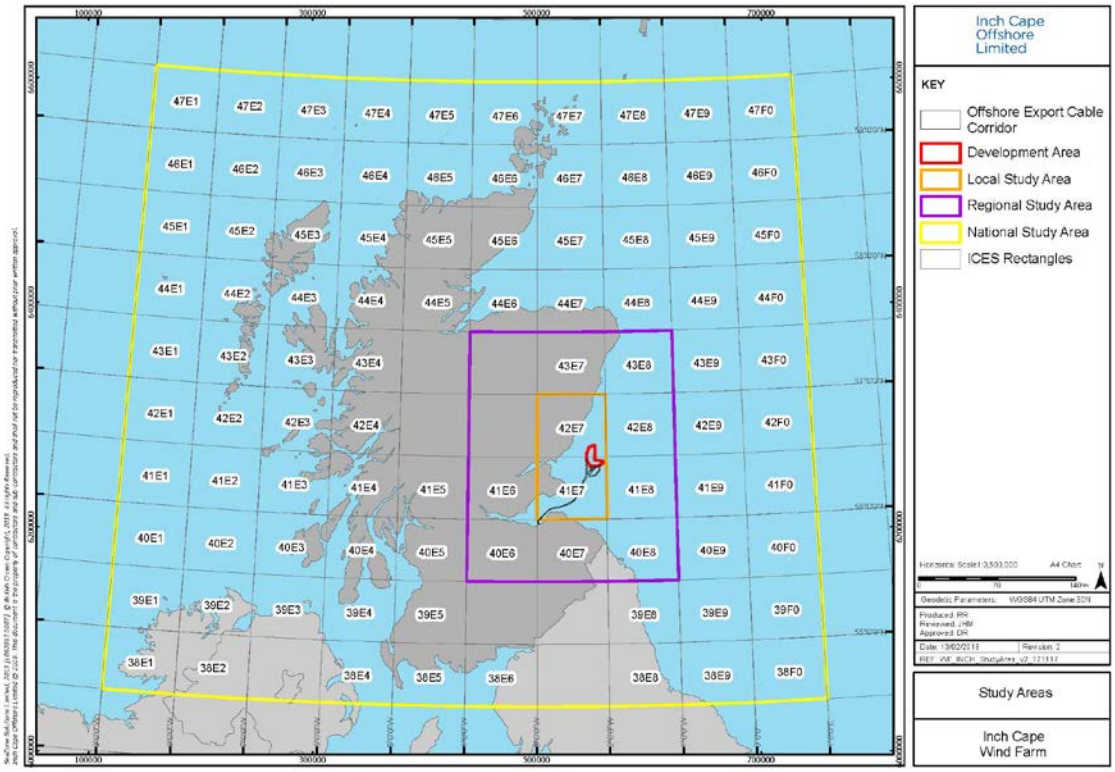
14.6 Baseline Environment

21 Baseline data was updated for both marine and freshwater fisheries at a national, regional and local level (*Appendix 14A*) for the period 2011 to 2016. This time duration was deemed appropriate for the purposes of categorising fishing activity for the EIA, with the exception of the scallop fishery, where 7-10 years' worth of data was required. Information for the previous 3 years is provided in the Inch Cape 2013 ES baseline (*Appendix 14C*). As marine commercial fisheries are the only fisheries for which a potential impact may exist it is only this type of fishery (and the range of fish species targeted) that will be considered in this chapter.

14.6.1 Definition of the Study Area

22 In line with the *Chapter 9*, the study area used for this assessment (and setting of the baseline) corresponds to relevant International Council for the Exploration of the Sea (ICES) statistical rectangles which overlap with the Development Area and the Offshore Export Cable Corridor i.e. ICES rectangles 42E7 and 41E7 (Figure 14.1), in addition to a 'Local Study Area' and 'Regional Study Area'.

Figure 14.1: Study Area



23 The study areas for the assessment of commercial fishing activity are shown in Figure 14.1 which also shows the location of the Development Area and Offshore Export Cable Corridor. ICES rectangles are also shown; these are the smallest spatial unit used for the collation of fisheries statistical information. The Development Area and Offshore Export Cable Corridor falls within ICES rectangles 41E7 and 42E7. The large majority of the Offshore Export Cable Corridor passes through 41E7, with a small proportion of the inshore section falling within rectangle 40E7.

24 ICES rectangle 40E7 has two separate areas of sea separated by land, a small section in the Firth of Forth where the Offshore Export Cable Corridor landfall is located and one larger area of sea along the coast of East Lothian and the Borders. Landings in 40E7, between 2011-2016, were predominantly made up of Nephrops and lobster (accounting for 85% of landings by value) and these are targeted most intensively along the North Sea coast (Figures 14A.32 *and 14A.33*). Hence figures for this rectangle are unlikely to be representative of the level of fishing which occurs around the landfall. For this reason this 40E7 has been included in the Regional Study Area rather than Local Study Area.

25 The approach has been to provide a national overview allowing fishing grounds in the Development Area and Offshore Export Cable Corridor to be described within a national context. The Regional Study Area has been defined to ensure sufficient coverage of those grounds surrounding the Development. The Local Study Area is the smallest area comprising

of ICES rectangles 41E7 and 42E7 which encapsulate the Development Area and Offshore Export Cable Corridor.

26 Fishing activities specific to the Development Area and Offshore Export Cable Corridor have been further described where possible.

14.6.2 Data Sources

27 Due to the requirement to review the most recent, available landings data (MSS and ICES, from 2011-2016) impacts on both the Development Area and the Offshore Export Cable Corridor during construction and operation was collated.

28 There is no single data source or recognised model for establishing commercial fisheries baselines. An approach is therefore required that incorporates a number of different data and information sources, each subject to varying sensitivities and limitations.

29 *Appendix 14A* describes commercial fishing activities in detail, building upon the data sources and analysis listed. The sensitivities and limitations of these data sources are also described. A summary of the data sources are provided below.

30 The principal sources of data and information used for the collation of the commercial fisheries baseline were:

- ICES;
- Marine Management Organisation (MMO);
- MS;
- MSS;
- The Crown Estate (TCE)
- DFOs;
- SFF; and
- Fishermen and their representatives.

31 The following datasets were analysed and/or reviewed for inclusion in the baseline:

- Fisheries Statistics (landings values and fishing effort data 2011 to 2016);
  - MMO and MS data;
- UK Satellite Tracking (VMS) Data;
  - MMO VMS data (2011 to 2015);
  - ICES VMS Data (2016 only);
  - MS Data Analysis (2009 to 2013) (Kafas *et al.*, 2013);
  - MS VMS data for scallop fishing intensity (pers. comm.).

- Scotmap;
- Creel Fishing Effort Study (MSS 2017); and
- Previous data collected as part of the Inch Cape 2013 ES (*Appendix 14C*).

32 All data collated to update the baseline was then validated through consultation with local fishermen, fishermen's organisations and other fisheries representatives. This involved both validation meetings, as well as email and telephone correspondence.

33 In order to validate under 15 m data, four consultation events were arranged at the following locations, namely Montrose; Arbroath; Pittenweem; and Port Seton in September 2017 (Table 14.2). A range of stakeholders, fishermen and industry representatives were invited to attend the events (*Appendix 14A, Annex A)* provides the list of organisations invited). In addition, meetings were advertised at local harbours and libraries via posters and an advert was placed in the Kingfisher Bulletin. The meetings served both to inform local fishermen about the Development as well as to allow validation of fishing data.

34 Attendees at the meetings were presented with data of fishing distribution for fisheries within the Local Study Area, regarding landings and distribution of fishing. Maps were presented on various fisheries known to occur in the area (namely, scallops, creeling, *Nephrops*, squid, mackerel) from various data sources including the original baseline (fishing distribution maps derived from fishermen's input in 2011), Scotmap, the Creeling Fishing Effort Study and VMS (Kafas *et al.* 2013, and MMO data). Attendees were then invited to comment on the validity of the maps and describe any inaccuracies in spatial patterns. Attendees were also asked to provide information on fisheries that are important in the area. This information was recorded at the meetings through a scribe or through questionnaires. Questionnaires were also made available to consultees unable to attend.

35 Validation of fisheries data for the over 15 m fleet was undertaken through a meeting with the SFF and key fishing representatives (invited by the SFF) in Edinburgh in February 2018 as well subsequent email correspondence (Table 14.2).

36 In addition to the above data sources, MS also provided a number of references to recent studies that could be used to assist in the gathering of the baseline:

- *Evidence Gathering in Support of Sustainable Scottish Inshore Fisheries* (2014-2015): A European Fisheries Fund funded project led by Seafish and managed by The Marine Alliance for Science and Technology for Scotland (MASTS) aimed to develop new methods for data acquisition and quality assurance within the Scottish fishery sector (particularly for small inshore fishing vessels), addressing knowledge gaps in IFG management plans and providing opportunities for fishermen to become more involved in the catch monitoring process (MASTS, 2018a).
- *Scottish Inshore Fisheries Integrated Data System Project* (2017-2019): A European Maritime and Fisheries Fund funded project led by The University of St Andrews to support research into the development of an integrated system for the collection, collation, analysis and interrogation of data from the Scottish inshore fishing fleet

(MASTS, 2018b). Aims to develop an On Board Central Data Collation System from the Scottish inshore fisheries fleet.

37 These studies are principally aimed at working out ways of improving fishing data collection in the future. As they do not provide information on current levels of fishing they have not been used in this baseline.

14.6.3 Overview of Commercial Fisheries baseline in the Study Area

38 The following information has been summarised from the data gathered for *Appendix 14A Commercial Fisheries Baseline Technical Report* and the data gathered for *Appendix 14C Commercial Fisheries Baseline Development Area* (from Inch Cape 2013 ES) for the scallop fishery.

Overview of landings data

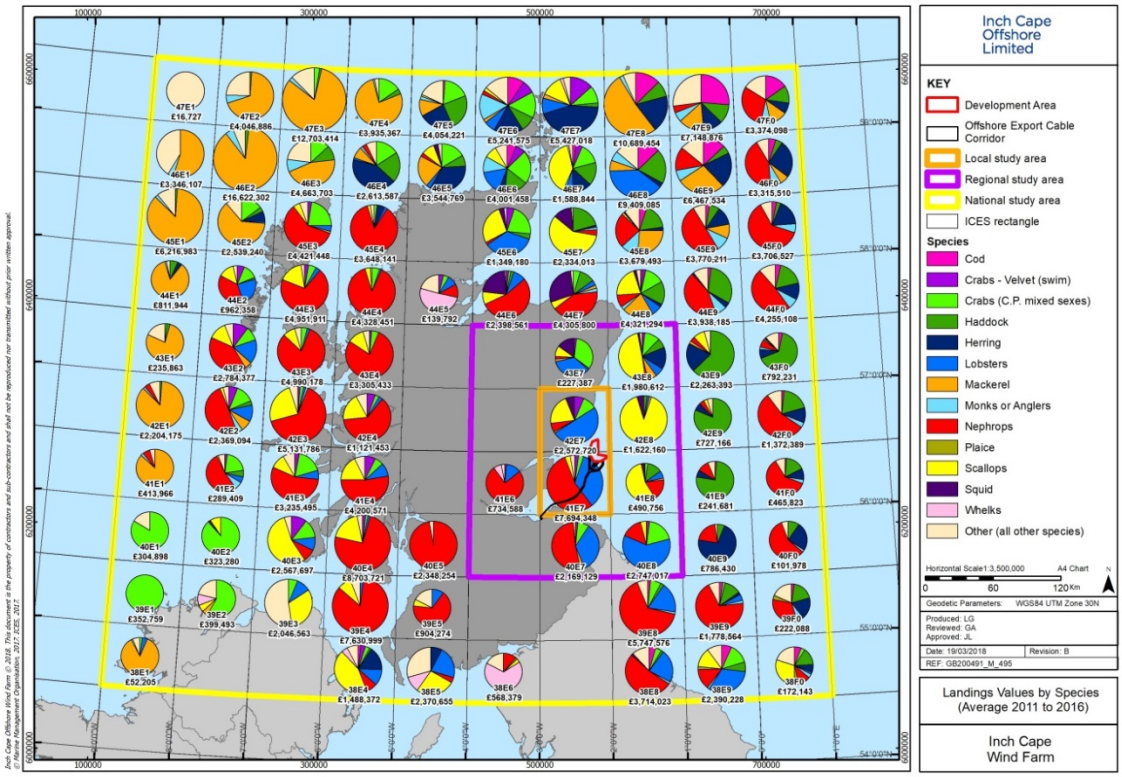
39 The Development Area and Offshore Export Cable Corridor are located in ICES rectangles 41E7 and 42E7 and these two rectangles contain valuable Scottish fishing grounds (Figure 14.2). The more southerly rectangle, 41E7, had the sixth highest average landings, by value, in the National Study Area during the period 2011-2016. In comparison, 42E7 had relatively moderate landings, placing 25th nationally, by value. On a regional scale, 41E7 recorded the highest, and 42E7 recorded third highest landings by value.

40 Overall landings in 41E7 (£7,694,348) were three times higher than in 42E7 (£2,572,720). This reflects the fact that a greater proportion of 42E7 is made up of land, not sea. There is also a difference in the fisheries targeted within each rectangle, with landings from 41E7 dominated by *Nephrops* and lobster and from 42E7 by lobster and scallops (Figure 14.2*)*.

41 Over the 6 year period between 2011 and 2016, the majority of landings in 41E7 were made up of *Nephrops* which accounted for 53% of all landings (by value) which equates to an annual average of £4,093,313. Landings of lobster were the second highest in this rectangle (34% - £2,602,308), with smaller quantities of crabs (edible and velvet crabs 5%), scallops (3%), razor clams (1%) and squid (1%) (Figure 14A.11; *Appendix 14A*). Other notable species captured in this rectangle include mackerel and whelks, although together they account for less than 1.2% of the average annual landings.

42 In rectangle 42E7 lobsters made up almost half the landings in the study period (49% which equates to an annual average £1,264,203), followed by scallops (21% - £529,645) and crabs (edible 10% and velvet swimming crabs 6%), squid (6%), *Nephrops* (6%) and mackerel (1%) and other species (Figure 14A.12; *Appendix 14A*).

Figure 14.2: Annual landings values by species (average 2011 to 2016) in National Study Area (MMO)



43 Within these ICES rectangles fishing methods used to target these species are dredging for scallops, creeling for lobster, edible crabs and velvet crabs, and demersal trawling for *Nephrops* and squid. This is reflected in the landing statistics which show these three fishing methods were responsible for 98.5% fishing activities in the Local Study Area between 2011-2016 (Table 14.7).

Table 14.7: Percentage contribution of fishing methods to local landings (by value; MMO)

Fishing method	% contribution to local landings	Target species include
Pots and traps	46.7	e.g. Lobster, edible crabs, velvet crabs, whelks, *Nephrops*
Demersal trawls/seine	43.4	e.g. *Nephrops*, squid, mackerel
Dredge	8.4	e.g. Scallops, razor clams
Gears using hooks	0.8	e.g. Mackerel
Other passive gears	0.7	e.g. Razor clams

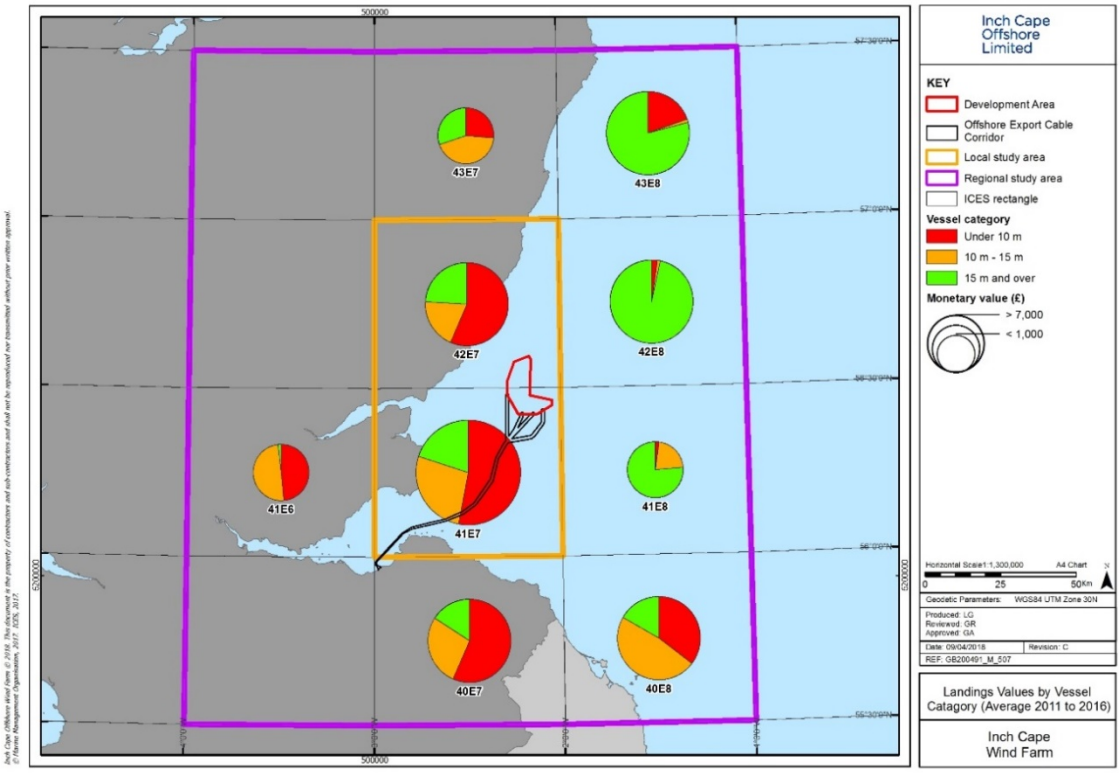
44 In the Regional Study Area, 57% landings by value was from vessels were over 10 m, while within the Local Study Area just over half the catch landed in 41E7 was caught by vessels of under 10 m in length, in 42E7 this proportion was slightly higher with 60% of landings being caught by vessels of 10 m and under (Figure 14.3). This would indicate that larger vessels native to local ports tend to fish further offshore outside the Local Study Area.

45 Although the highest landings tend to occur in the summer months, moderate landings values were recorded year-round in the Local Study Area (In both rectangles 41E7 and 42E7, average landings values were highest in August and lowest in February (Figures 14A.19 and 14A.20).

46 During the period 2011-2016, 39.5% of landings from rectangle 41E7 were landed to the port of Pittenweem, representing 95.7% of the port's total income. The second highest percentage of landings from this rectangle (14.7%) was to Dunbar, which represented 81.3% of the port's total income. Landings from 41E7 also accounted for 90% of the total income for the following 6 ports: Crail, St Andrews, Anstruther, St. Monans, North Berwick and Methil and Leven (Table 14A.2*; Appendix 14A*).

47 During the period 2011-2016, 36.8% of landings from rectangle 42E7 were landed to the port of Arbroath, representing 65% of the port's total income. The second highest percentage of landings from this rectangle (13.8%) was to Gourdon, which represented 95.6% of the port's total income. Landings from 42E7 also accounted for over 75% of the total income for the following three ports: Stonehaven; Johnshaven; and North Queensferry (Table 14A.3*; Appendix 14A*).

Figure 14.3: Annual landings values by vessel category (Average 2011 to 2016) in Regional Study Area (MMO)



Receptors

48 The overview of fisheries landings data, in conjunction with consultation with statutory and non-statutory consultees, has allowed the identification of fisheries receptors against which detailed impact assessment can be undertaken, these are as follows:

- The creel fishery; and
- The scallop fishery;
- The *Nephrops* fishery; and
- The squid fishery;

49 These four receptors were identified in the scoping document and they account for 96% of landings in ICES rectangle 41E7 and 97.8% in 42E7. Other fisheries of potential growing importance were identified through consultation, including both whelk and mackerel, however at present they each only contribute 1% to the total landings in the Regional Study Area, therefore these fisheries were not assessed as specific receptors in this assessment. It is however acknowledged that these fisheries may grow in the future.

50 Details on these four fisheries, in terms of their activity and distribution are presented below for both the Development Area and Offshore Export Cable Corridor.

14.6.4 Development Area Baseline

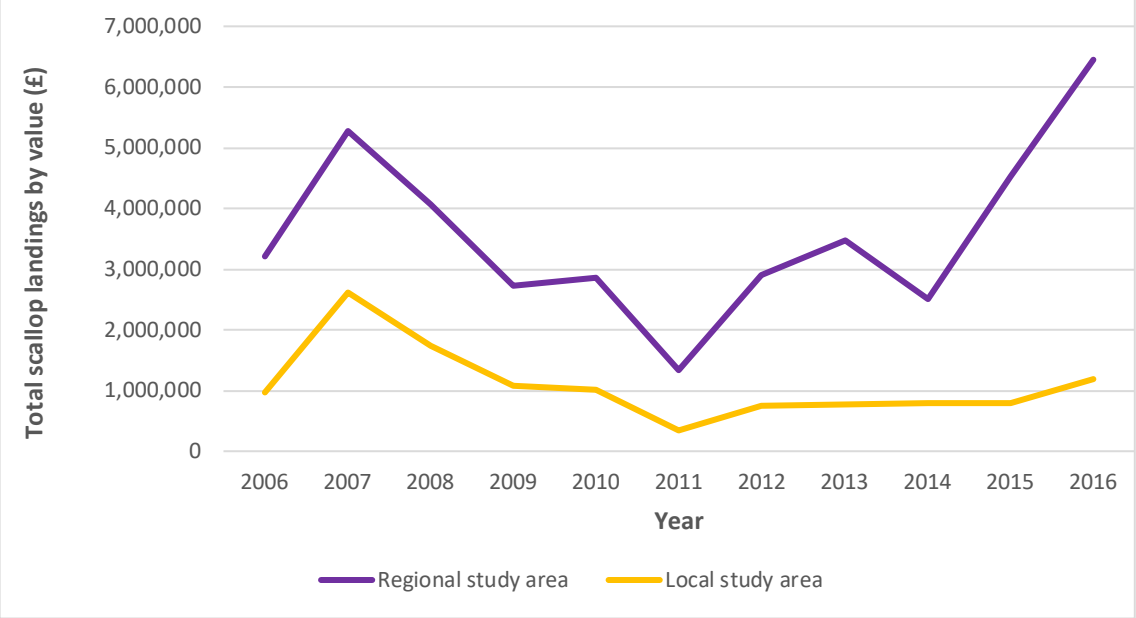
Scallop Fishery

51 The scallop fishery targets king scallops using scallop dredges operated from larger (generally over 15 m) vessels from all over the UK as well as some local ports.

52 Between 2011-2016, scallops accounted for 17.7% of the average landings of the Regional Study Area. During this time, the majority of these landings came from ICES squares to the north east of the Development Area, particularly rectangles 42E8 and 43E8, which are located further offshore (see Figure 14.1). Rectangle 42E8 alone landed over 39% (£1,418,659) scallops regionally and had the second highest average landings of scallops (by value) in Scotland between 2011-2016. Scallops were also targeted in 41E7 and 42E7 where the Development is located, accounting for 3% of all landings in 41E7 (£240,262) and 21% (£529,645) in 42E7.

53 Prior to this, scallop landings were higher in both the regional and Local Study Area (Figure 14.4). Scallop fishing in the Local Study Area underwent rapid expansion during the period 2001-2007 (Figures 18A.19 and 18A.20; *Appendix 14C*), before decreasing until 2011. Since 2011, landings have steadily increased, however remain less than half of their peak levels in 2007 (Figure 18A.20).

Figure 14.4. Total scallop landings values by year (£) in the Local Study Area and Regional Study Area from 2006 to 2016 (MMO)



54 The average landing figure for over the past 10 years indicate that scallop fishing has moved further offshore in recent years. This evidence is further substantiated by VMS data, which provides an accurate picture of scallop fishing distribution as the majority of scallop dredgers are of over 15 m. With dredge vessels over 15 m responsible for over 95.7% of landings in the Regional Study Area.

55 MS VMS data for the period 2007-2011 (Kafas *et al.,* 2012) shows that the location of the Development Area was subject to some of the highest intensity scallop dredging in the Regional Study Area (Figure 14.5). MS data from 2009-2013 (Kafas *et al.,* 2013) shows that the area intensively dredged for scallops expanded north east (Figure 14.6). More recent VMS data (2011 – 2016) shows the intensity of scallop dredging in the Development Area becoming less, with areas to the north east of the Development Area being more intensively fished during the period 2011-2015 (Figure 14.7). The most recent VMS data available from ICES shows that in 2016 within the Regional Study Area, scallop dredging principally targeted north east of the Development Area (ICES rectangle 42E8; Figure 14.9). It should be noted that the VMS for 2016 from ICES includes vessels of between 12-15m, hence while this increase in intensity may be due to the inclusion of smaller vessels, as most scallop dredgers are over 15m it is more likely that increase in activity is reflective of increased landings in 2016 particularly in 42E8.

56 While the landings and VMS data do point to the fact that scallop dredging has moved further offshore in recent years and is now less centred upon the Development Area, it should be noted that fluctuations in scallop dredging activity are subject to annual fluctuations due to the cyclical nature of the fishery, with nomadic vessels targeting different areas in different years. Thus, annual variations in fishing intensity can be somewhat dependant on productivity elsewhere. Hence it is possible that the Development Area may be targeted intensively in future years.

Figure 14.5: Distribution of scallops by intensity (Average 2007-2011) in Regional Study Area (MS; Kafas *et al.,* 2012)

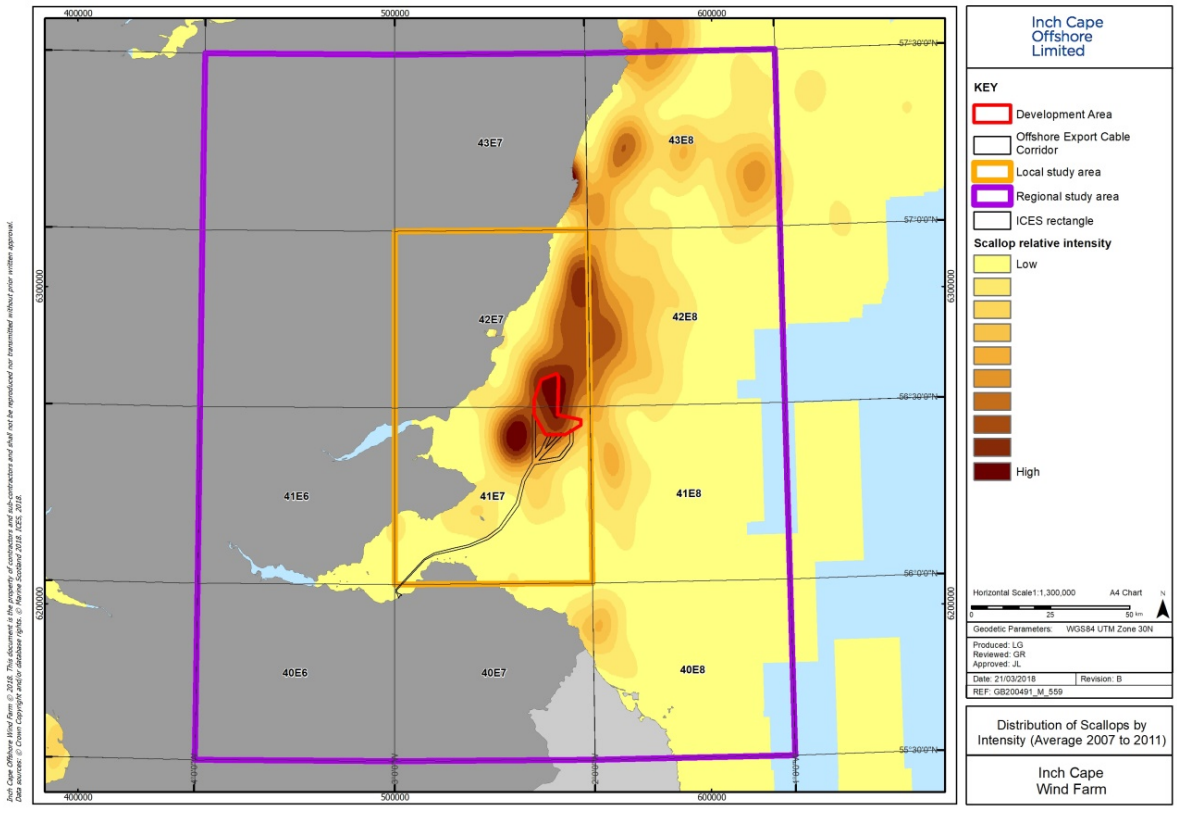


Figure 14.6: Distribution of scallops by intensity (Average 2009-2013) in Regional Study Area (MS; Kafas *et al.,* 2013)

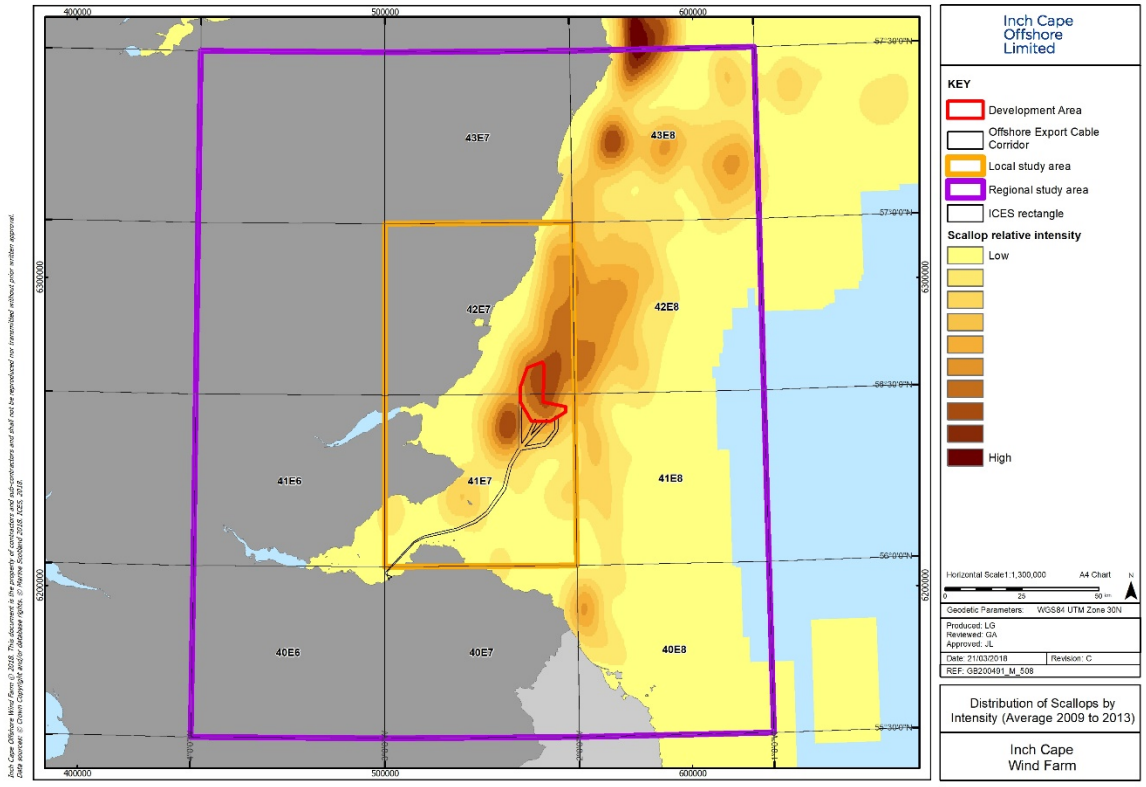


Figure 14.7: VMS density by fishing intensity for dredge (2011-2015) (MMO)

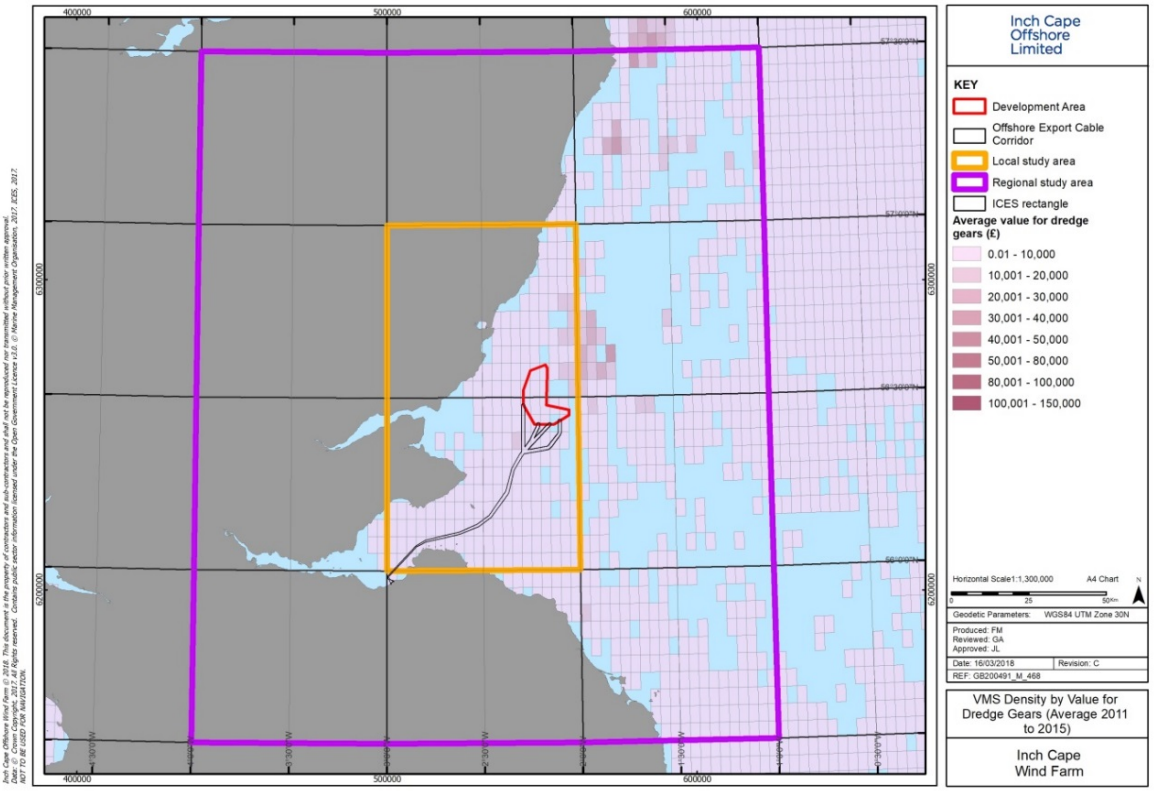
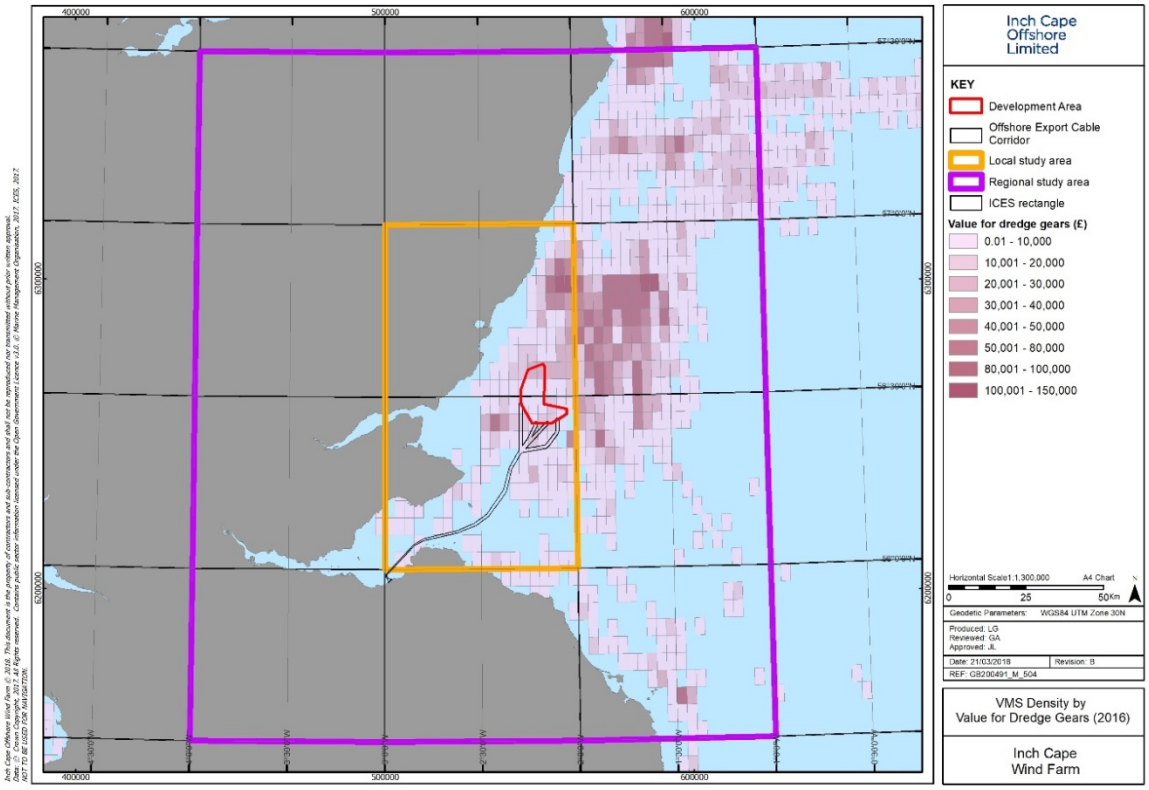
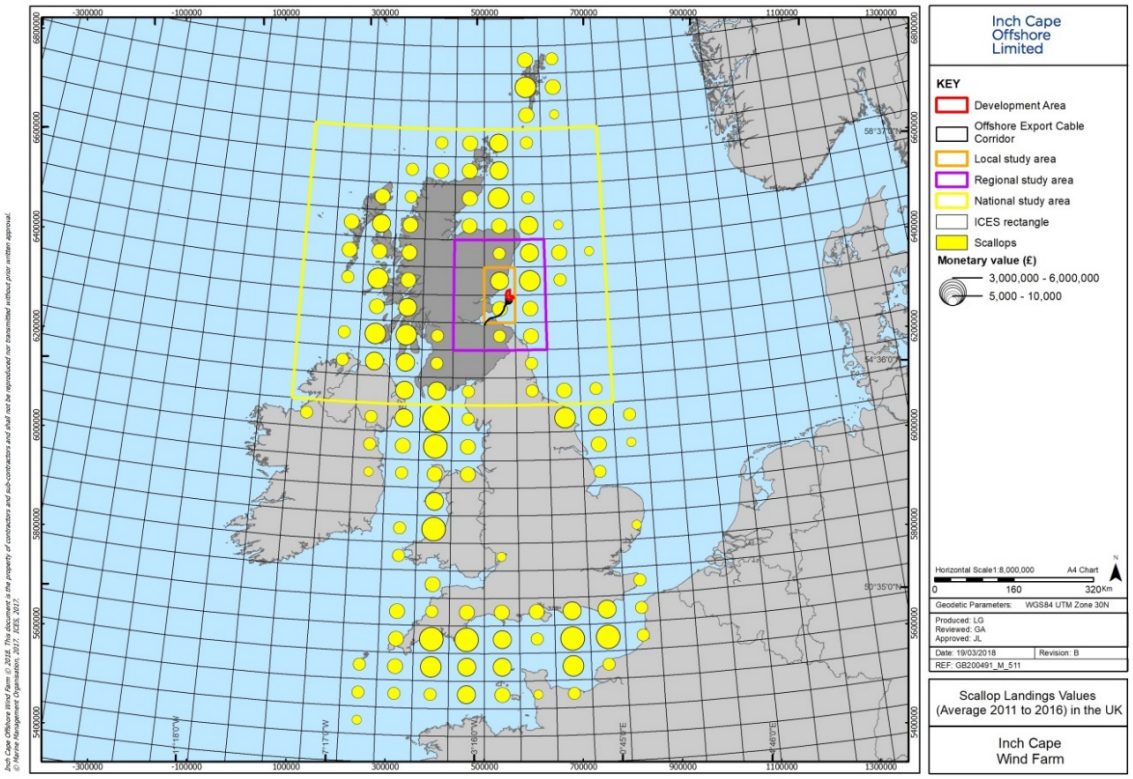


Figure 14.8: VMS density by fishing intensity for dredge (over 12 m vessels) in 2016 (ICES)



57 Many UK scallop vessels are nomadic in nature, targeting a range of different grounds before moving on to another area, while stocks recover. Scallop grounds are all around the UK, with major fisheries around the Isle of Man, Irish Sea, English Channel, and the Scottish east and west coasts (Figure 14.9). Between 2007 and 2016 the highest landings of scallops came from Isle of Man, off the Cardiganshire coast and English Channel (Figure 14.9; Figure 18A.7 *Appendix 14C*). Landings were lower in the Regional Study Area, however still of moderate importance on a national scale, reaching similar values to that in the Moray Firth.

Figure 14.9: Scallop annual landings values (Average 2011 to 2016) in the UK (MMO)



58 As a result of the nomadic nature of the scallop fishery, vessels from other regions (Oban; Girvan; Kirkcudbright; Annan; Burntisland; Fleetwood; Brixham) may visit scallop grounds located in the Regional Study Area. It is worth noting that while many vessels targeting scallops in the Regional Study Area are nomadic, some local vessels also are rigged for scallop dredging and some *Nephrops* vessels will occasionally target this fishery.

59 Within the Regional Study Area scallop dredging occurs year-round; however, values tend to be highest during April to October (Figures 14A.19 and 14A.20*; Appendix 14A*).

60 Scallop vessels generally tow either one or two beams, onto which a number of dredges are attached, depending upon vessel size, engine power and winch capacity. The principal type of dredge used is the English 'Springer' type, whereby the scallops are raked from the seabed by steel teeth that are attached along the leading edge of the dredges and which can penetrate the seabed to a depth of approximately 15 cm.

61 New Scallop Conservation Measures, which restrict dredge numbers and tow bar length in Scottish inshore waters, came into force on 1 June 2017 under *The Regulation of Scallop Fishing (Scotland) Order 2017*. Measure one increases King scallop minimum landing size from 100 mm to 105 mm in all areas bar the west coast of mainland Scotland south of 55°N and Shetland (UK Government, 2017). Measure two specifies that vessels fishing within 12 nm of the Scottish coast can deploy tow bars of no more than 7.5 m in length; tow bars should be capable of carrying no more than eight dredges per (vessel) side. Alternatively, should vessels employ a remote electronic monitoring system, they are permitted to use up

to eight dredges per side when fishing within 0-6 nm of the Scottish coast, and 10 dredges per side in the 6-12 nm area (Scottish Government, 2017). These restrictions will impact the Regional Study Area. Future implications of these regulations to the scallop fishery are unknown, however it is hoped that the alterations will achieve a more sustainable sector.

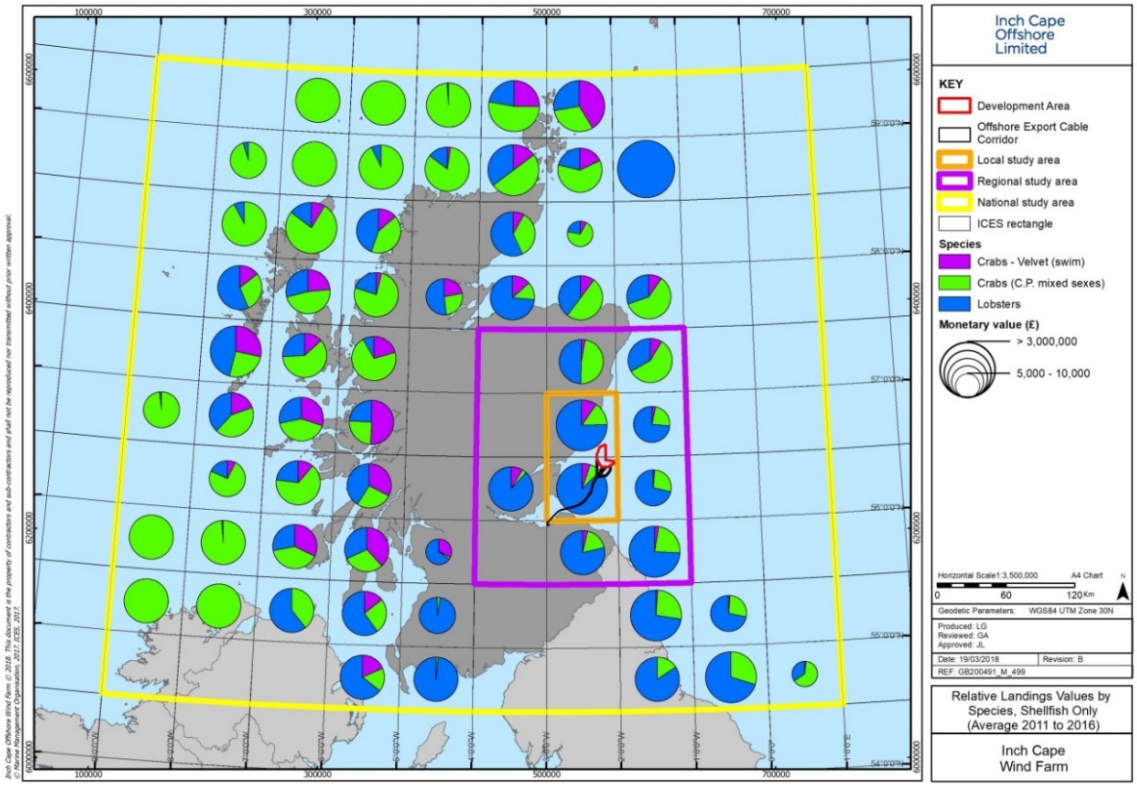
62 Although EU and Scottish legislation specify a minimum landing size for scallops, there are no limits in the form of Total Allowable Catch (TAC) or quotas (Scottish Government, 2017). Regional restrictions or closures may apply elsewhere, although there are none in place in the Regional Study Area at present.

Creel Fishery

63 The creel fishery targets crabs and lobster using static gear (baited creels) set from small vessels operating from harbours throughout the Regional Study Area (*Appendix 14A*). Creeling for crabs and lobsters tends to take place on rocky, uneven ground, predominantly by full time fishermen, although some part time fishermen may participate in the fishery in summer months.

64 The Local Study Area (in which the Development Area is located) contains a valuable creel fishery, with 41E7 recording the highest and 42E7 the fourth average landings of lobster for the period 2011-2016 in Scotland (Figure 14.10), worth £2,602,308 and £1,264,203 respectively. Lobsters made up almost half the catch in 42E7 (49%) and were the second most important species targeted in rectangle 41E7 contributing 34% to average annual landings over this period. Edible and velvet crabs were also caught in the Local Study Area, however contributed substantially less to total landings than lobster (Figure 14.10).

Figure 14.10: Relative annual landings values by species, shellfish only (Average 2011 to 2016) in the National Study Area (MMO)



65 Creeling vessels of under 10 m were responsible for landing the majority of this catch (81% of lobsters; 66.6% and 89.7% of edible and velvet crab landings, respectively). As the creeling fleet is principally made up of vessels of under 15 m, VMS data is not available. However, MS carried out a Creel Fishing Effort Study in 2016 (MS, 2017) which provides information on the distribution of creeling around Scotland. It should be noted that this study did not survey all creeling vessels and so may underestimate creel effort. This updates study information from the Scotmap (MS, 2014), which was collated data on the distribution of fishing by the under 15 m fleet in Scotland for several fisheries between 2007 and 2011.

66 The MS Creel Fishing Effort Study revealed intensive creel fishing effort in coastal areas of ICES rectangle 42E7 and 41E7, as well as activity to the east and north of the Development Area (Figure 14.11). While creeling activity is of low intensity within the Development Area itself, areas of particularly intensive creeling activity are located along the coasts of Fife, Arbroath and Johnshaven to Stonehaven. During the consultation events fishermen identified that the maps of fishing activity data from the recent MS Creel Fishing Effort Study provided a reasonable representation of the current distribution of creeling in the Regional Study Area, and was more accurate than the Scotmap (Figure 14.12).

Figure 14.11: Average number of crab/lobster hauls per day per cell (4 km^2) (MS, 2017)

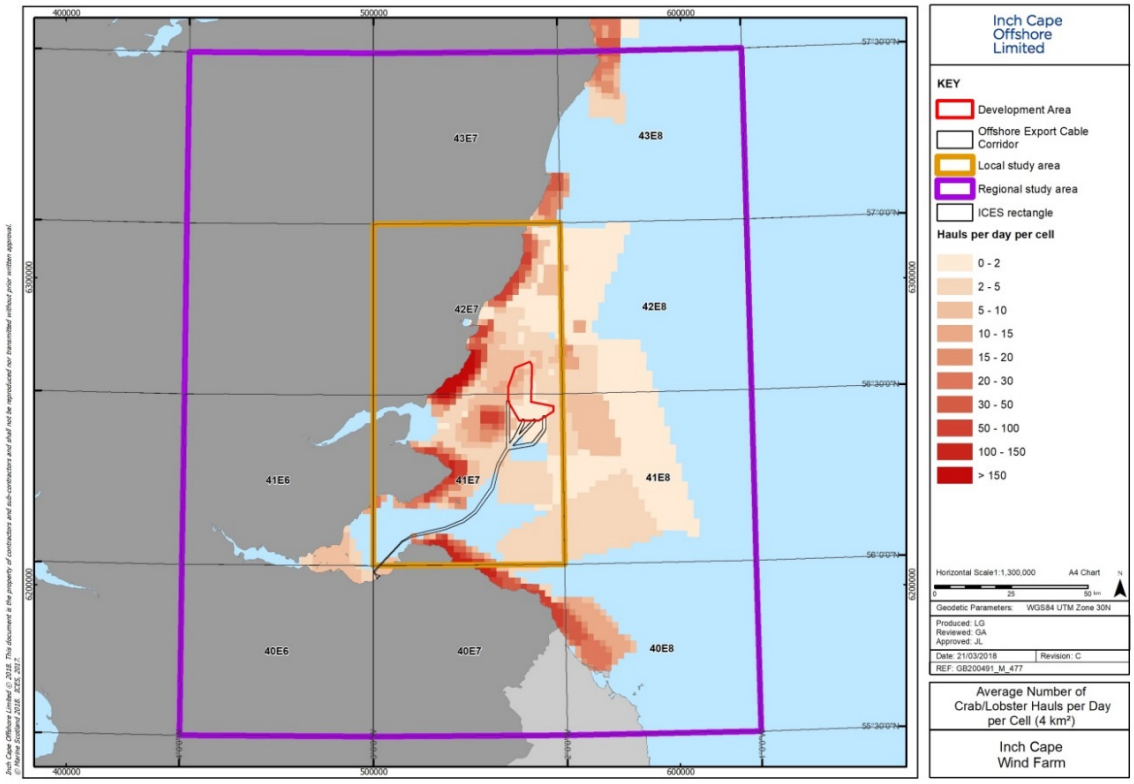
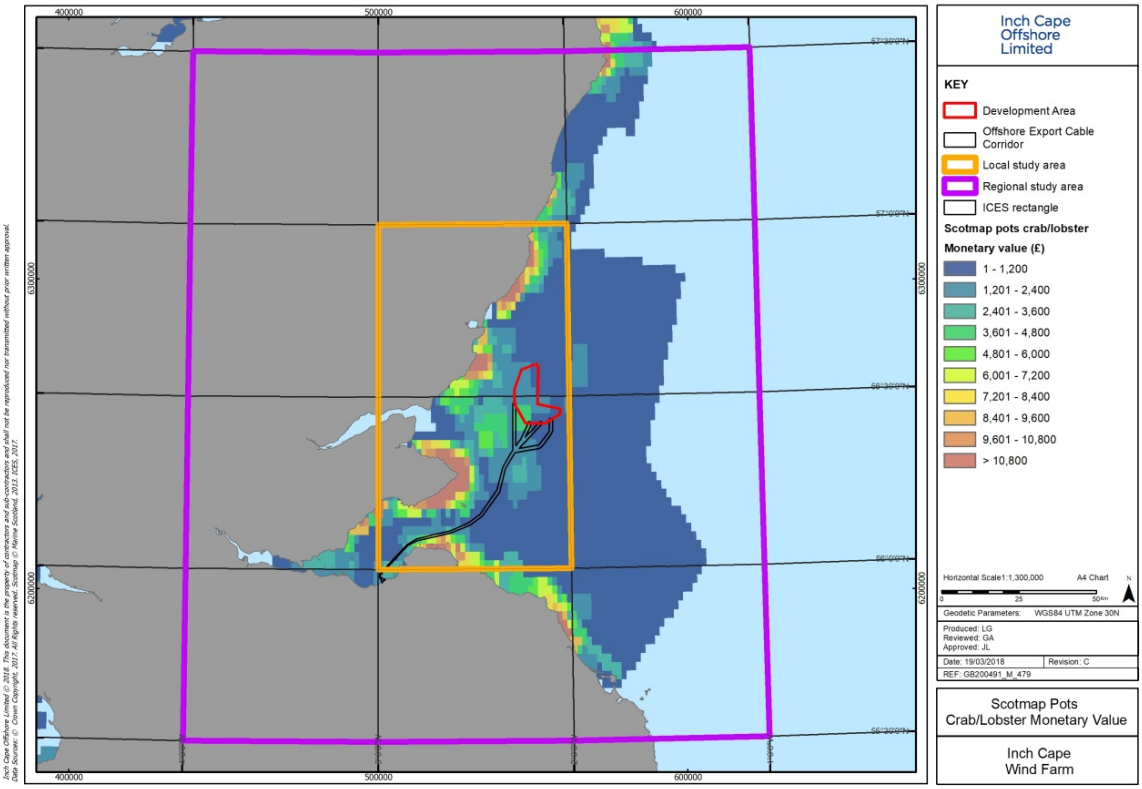


Figure 14.12: Scotmap pots crab/lobster: Monetary value, (MS, 2012)



67 Fishers commented that the industry is growing; new larger vessels capable of carrying more creels and steaming greater distances are entering the fishery and operating in deeper waters further offshore. This is reflected in the change in fishing patterns between Scotmap and the creeling study, which show more activity further offshore than before, particularly to the north and east of the Development. Fishermen also commented that even the recent creeling study may be an underestimation of effort as new vessels have entered the fishery since this study was undertaken.

68 This reported increase is reflected in the landings figures for the two ICES rectangles where the Development is located. In both 41E7 and 42E7, lobster landings have remained stable throughout study period, with slight increases in 42E7 in 2016. Edible crab landings in both rectangles have varied more over the years, however gradually increased to an all-time high in 2016. The razor clam fishery was fairly stable until 2015, when landings fell considerably. As of 2016 the fishery seems to be recovering. Velvet crabs have shown the greatest variation declining in 41E7, but increasing in 42E7.

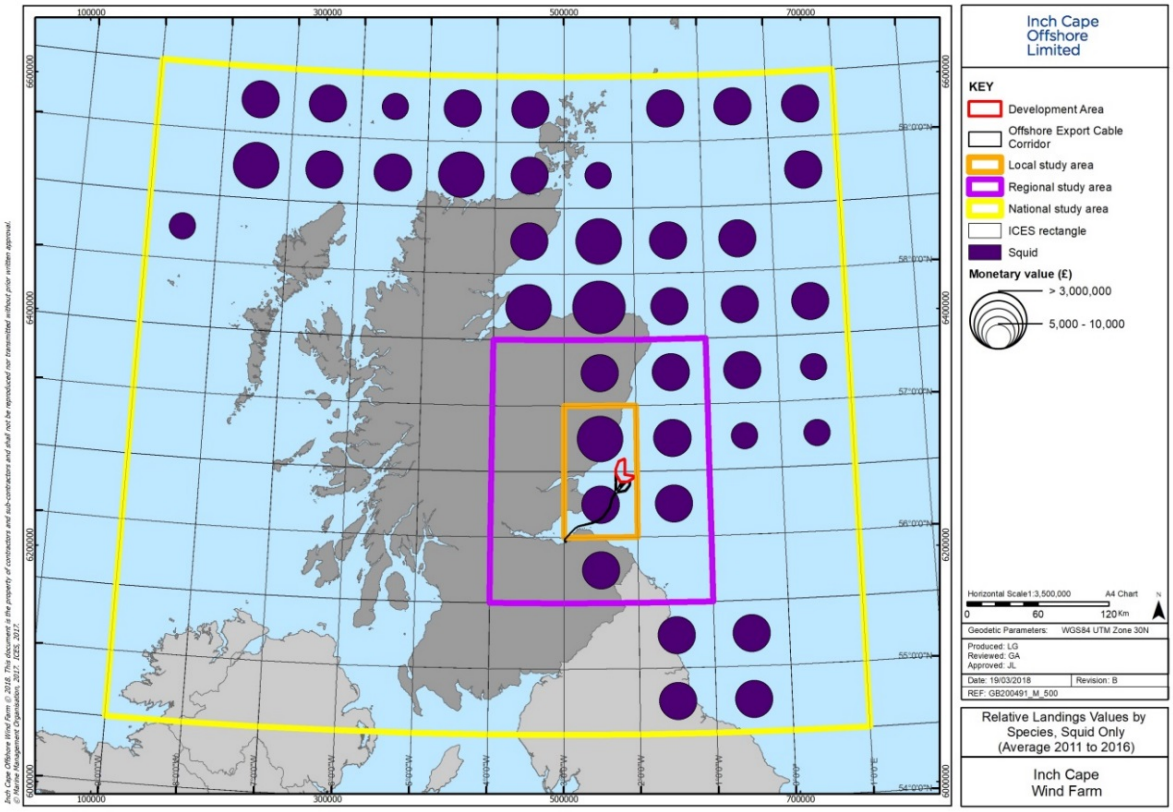
69 Creeling occurs year-round in the Local Study Area, however it is most active during summer (June-September). This is partly due to the movement of the species but also due to weather conditions, which are an important factor in determining levels of activity in the winter months. Lobster landings (by value) peaked in August and September (Figures 14A.19 and 14A.20; *Appendix 14A*), and velvet crab landings peaked in December. Edible crabs showed little seasonal variation.

Squid Fishery

70 The squid fishery is targeted by demersal trawlers, predominately *Nephrops* vessels with reconfigured otter trawls modified to capture squid. It is difficult to define what ground squid can be consistently targeted, with fishermen reporting catches over both hard and soft ground.

71 Over the period 2011-2016, values of landings for squid were relatively modest with the species accounting for only 2% of regional landings. While 58% of squid landings were from rectangles 41E7 and 42E7, where the Development Area is located, squid only accounted for 1% and 6% respectively. Nationally, highest squid landings values were recorded in the Moray Firth (£1,187,706 and £519,957 in rectangles 44E7 and 44E6, respectively) (Figure 14.13). Although relatively low compared to landings in the Moray Firth, rectangles 41E7 (£159,030) and 42E7 (£71,804) both recorded values in the top ten nationally.

Figure 14.13: Relative annual landings values by species, squid only (Average 2011 to 2016), in the National Study Area (MMO)



72 It was widely commented by fisherman that fishing for squid in the local and Regional Study Area is unpredictable between years and landings are dependent upon both stock and effort. *Nephrops* vessels may switch to squid at certain times of year, should squid stocks become high enough. Squid may also be targeted by visiting vessels from the Moray Firth if fishing in their area is poor. This fluctuation in annual catches was confirmed by the landings statistics (Figures 14A.17 and 14A.18; *Appendix 14A*) which showed no obvious trend. In rectangle 41E7, highest landings values were recorded in 2013 (£169,115) and lowest values in 2014 (£3,804). Landings values then increased in 2015 (£83,775) but declined again in 2016 (£6,340). In 42E7, highest landings values were recorded in 2013 (£299,065) and lowest in 2016 (£40,974), with marked fluctuations in between (£69,239 in 2014; £297,812 in 2015). Fishermen reported that 2017 was a good year, although no statistics are yet available.

73 The fishery is seasonal; in the Local Study Area, peak season occurs at various times between July-October (Figures 14A.19 and 14A.20*; Appendix 14A*) however this is variable and fishermen reported the squid fishery unpredictable. Stakeholders confirmed that squid catches are highest over the summer months and also September and October, with catches seemingly dependant on water temperature.

74 Landings data shows that vessels over 10 m contributed 93.8% to squid landings (by value) in the Regional Study Area between 2011-2016. Fishermen commented that local vessels

which target squid are generally under 15 m in length, hence it is assumed that squid fishing vessels are generally in the 10-15 m size category.

75 Data is limited on the distribution of fishing activity for squid. VMS data from Kafas *et al.* (2013) identified low intensity of fishing throughout the Regional Study Area (Figure 14.14), however this is limited to vessels over 15 m and to the period 2009-2013. Scotmap provides information on the distribution of 'not *Nephrops* trawls' for the under 15 m fleet (Figure 14.15). Given the low levels of whitefish catches in the Regional Study Area, this data is likely to reflect patterns of squid fishing, however this also dates from 2007-2011. Both data sources do provide evidence of a widely distributed low intensity fishery across the Regional Study Area, which overlaps with the Development Area. Fishermen confirmed this wide distribution commenting that this was due to the unpredictable nature of the squid fishery, and the fact that squid don't appear to have a preferred area. Despite this, fishermen have identified areas off Stonehaven, East of Bell Rock, east of the Development Area (as well as Pittenweem at the mouth of the Forth, and Port Seton), as areas targeted for squid. This is supported by evidence from both VMS and Scotmap data (Figures 14.13 and 14.14, respectively).

Figure 14.14: Distribution of squid by intensity (Average 2009 to 2013) in the Regional Study Area (MS; Kafas *et al.*, 2013)

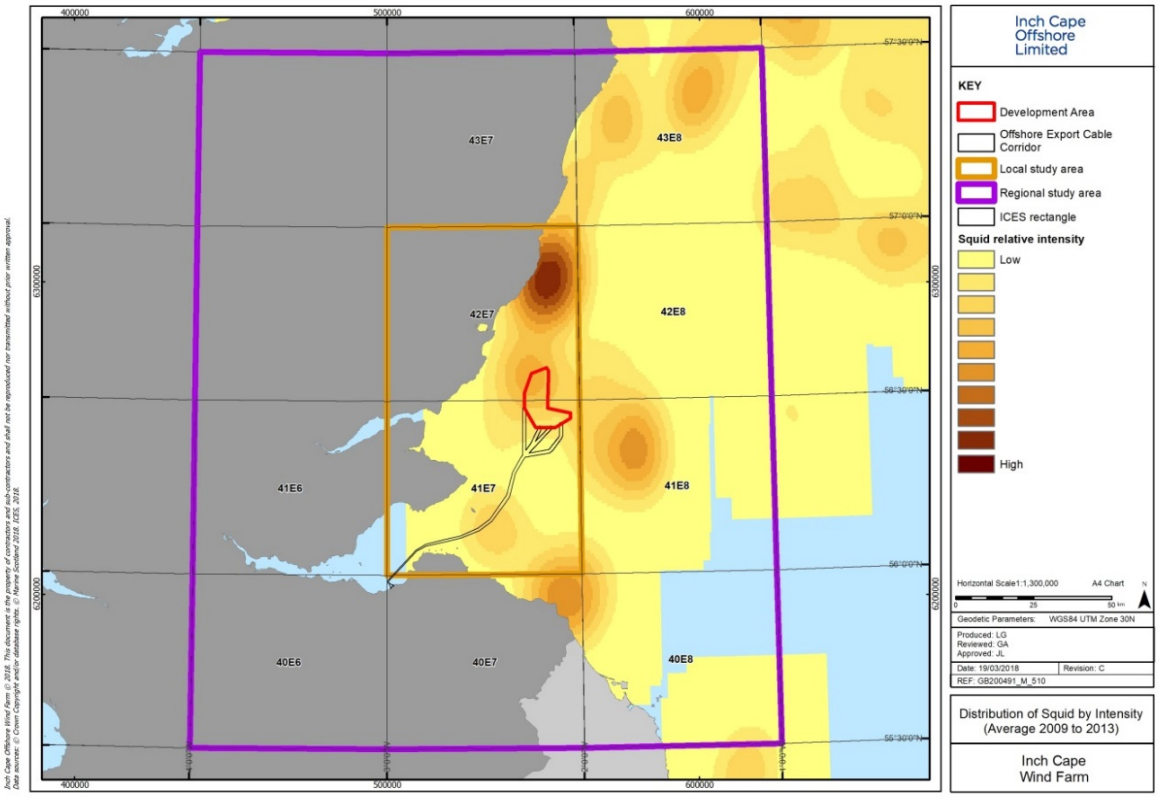
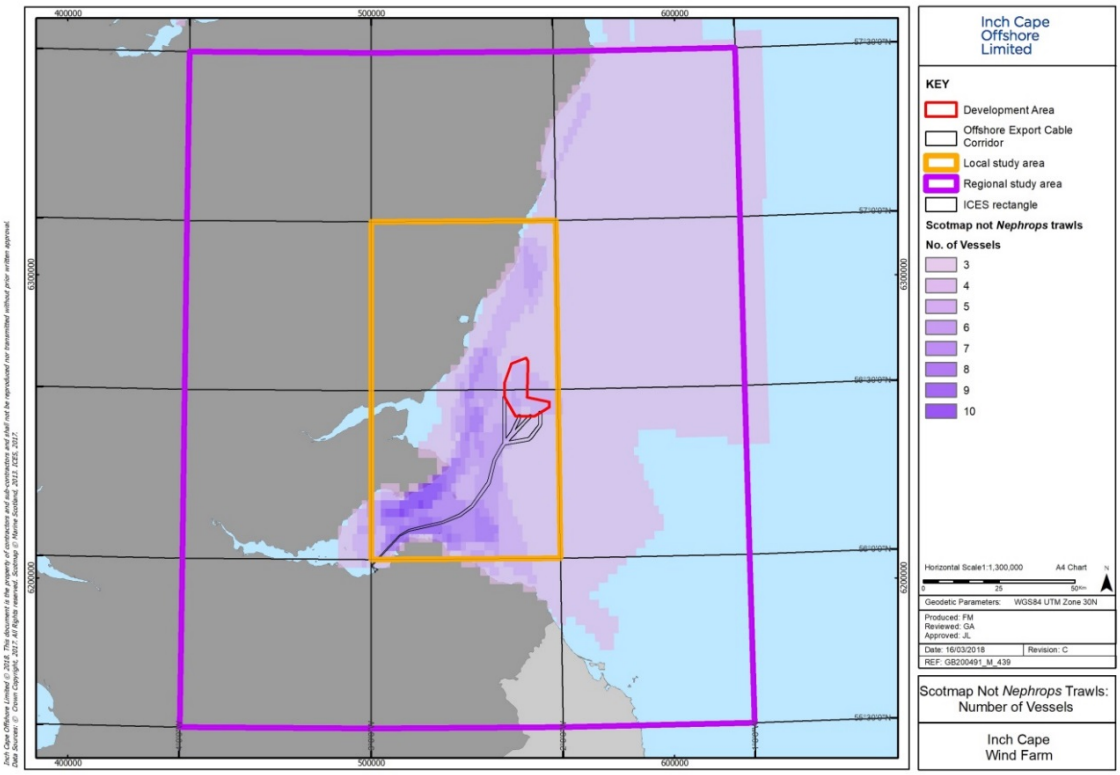


Figure 14.15: Scotmap 'not *Nephrops* trawls': No. of vessels (MS, 2012)



76 The squid fishery is both unpredictable in terms of annual landings and patterns of fishing distribution. None the less, it remains an important fishery in this region due the lack of licence restrictions, therefore allowing fishermen to reduce pressure on stocks with catch limits (such as *Nephrops*). Thus, it is likely that the fishery will continue to increase in importance.

14.6.5 Offshore Export Cable Corridor Baseline

77 The Offshore Export Cable Corridor is located in ICES rectangle 41E7, which recorded the highest average landings values in the Regional Study Area, and sixth highest nationally (Figure 14.2).

78 The fisheries that occur in the area of the Offshore Export Cable Corridor are primarily demersal otter trawling for *Nephrops* (which accounted for 52% of landings in 41E7 between 2011-2016), creeling (40.3%), and a small proportion of scallop dredging near the Development Area (3.1%) (Figure 14.A11*; Appendix 14A*).

79 As previously noted (*Section 14.6.3*) 39.5%, 14.7%, 11.1%, 5.8% and 4.9% of landings (2011-2016) from rectangle 41E7 were landed to the ports of Pittenweem, Dunbar, Eyemouth, Arbroath and Port Seton, respectively.

80 A summary of the level of fishing activity and its distribution within the Offshore Export Cable Corridor is provided below.

***Nephrops* Fishery**

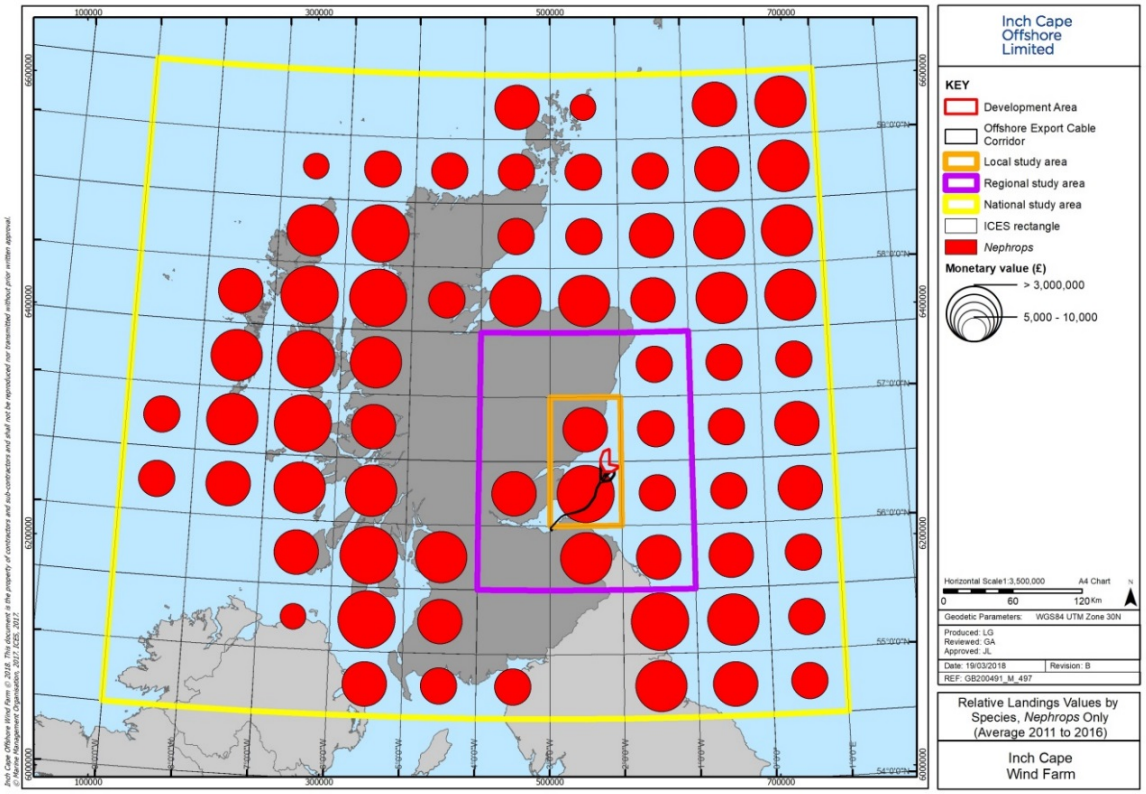
81 The *Nephrops* fishery is targeted by demersal trawlers of both under and over 15 m fleets; the under 15 m vessels generally target grounds in proximity to their home ports and the larger over 15 m fleet utilise grounds further offshore (*Appendix 14A*). *Nephrops* favour muddy or soft substrates and inhabit burrows. As this species is dependent on a particular type of habitat, their distribution and therefore the fisheries targeting them is substrate specific. These vessels principally use single or twin rig demersal otter trawls. *Nephrops* gear is configured similarly to standard demersal otter trawling although a smaller mesh is used with a minimum of 70 mm diameter.

82 ICES rectangle 41E7, through which the Offshore Export Cable Corridor passes, contains valuable *Nephrops* fishing grounds. *Nephrops* is the most important fishery in 41E7, making up 53%, with average annual landings of £4,093,313 between 2011 and 2016. This represented the third highest landings value in Scotland (Figure 14.16).

83 *Nephrops* landings have shown a degree of variation over the data series. The lowest recorded *Nephrops* landings value was in 2013 (£2,648,685) with the highest landings value in the following year (£5,195,466). Despite a decline from 2014 to 2015, landings recovered in 2016 to £4,419,722. Catches are reported throughout the year but peak in the summer months (Figures 14A.19 and 14A.20). Fishermen commented that the Nephrops fishery was declining, with some vessels that previously fished *Nephrops* have turned to creeling, however the landing figures do not support this up until 2016.

84 Fishing for *Nephrops* in rectangle 41E7 occurs year-round, however it peaks in July (Figure 14A.19).

Figure 14.16: Relative annual landings values by species, *Nephrops* only (Average 2011 to 2016), in the National Study area (MMO)



85 The *Nephrops* fleet is targeted by both the over and under 15 m fleet, with over 30% *Nephrops* landings (by value) in 41E7 (in the Regional Study Area) captured by vessels over 10 m (30%. The under 15 m fleet is generally comprised of the local fleet and concentrates on grounds closer to their home port, particularly in the Firth of Forth (and along the Montrose-Stonehaven coast near to the Development Area). The over 15 m fleet predominantly fish grounds further offshore in the North Sea. The vessel restriction in the Firth of Forth restricts demersal trawlers of over 16.77 m from inshore of the line drawn between Fife Ness Lighthouse and North Ness on the Isle of May, along the coast of the Isle of May to South Ness and on to the mainland at Tantallon Castle. Larger vessels from outside the Regional Study Area occasionally visit the *Nephrops* grounds within the Regional Study Area, but only when fishing in their own region is poor.

86 Due to the diverse nature of the fleet, VMS data and data sources which provide information on the under 15 m fleet were examined. VMS data from the MMO is not broken down by species, however given that most of the demersal trawling in this region is for *Nephrops*, this provides a good indication of fishing patterns within the area. VMS data shows both a similar pattern of fishing, with effort concentrated offshore of the Firth of Forth, extending down the east coast of as far as Eyemouth (Figure 14.17).

Figure 14.17: VMS density by value for demersal gears (Average 2011 – 2015) (MMO)

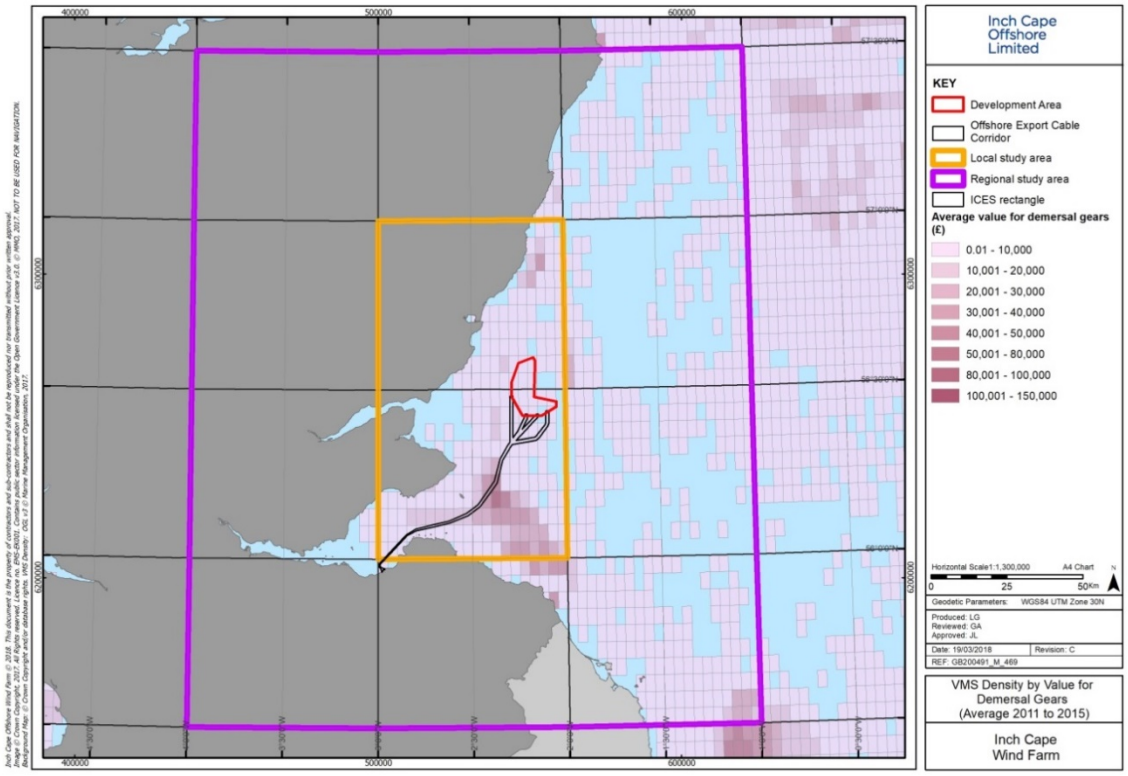
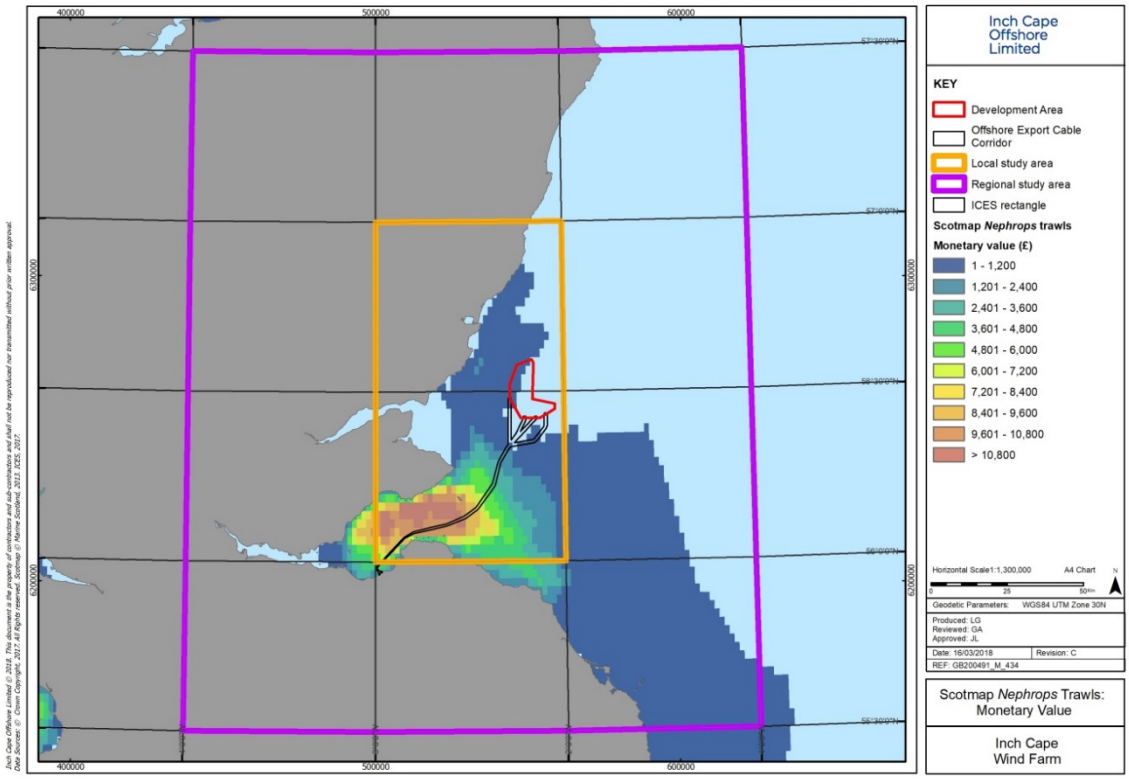


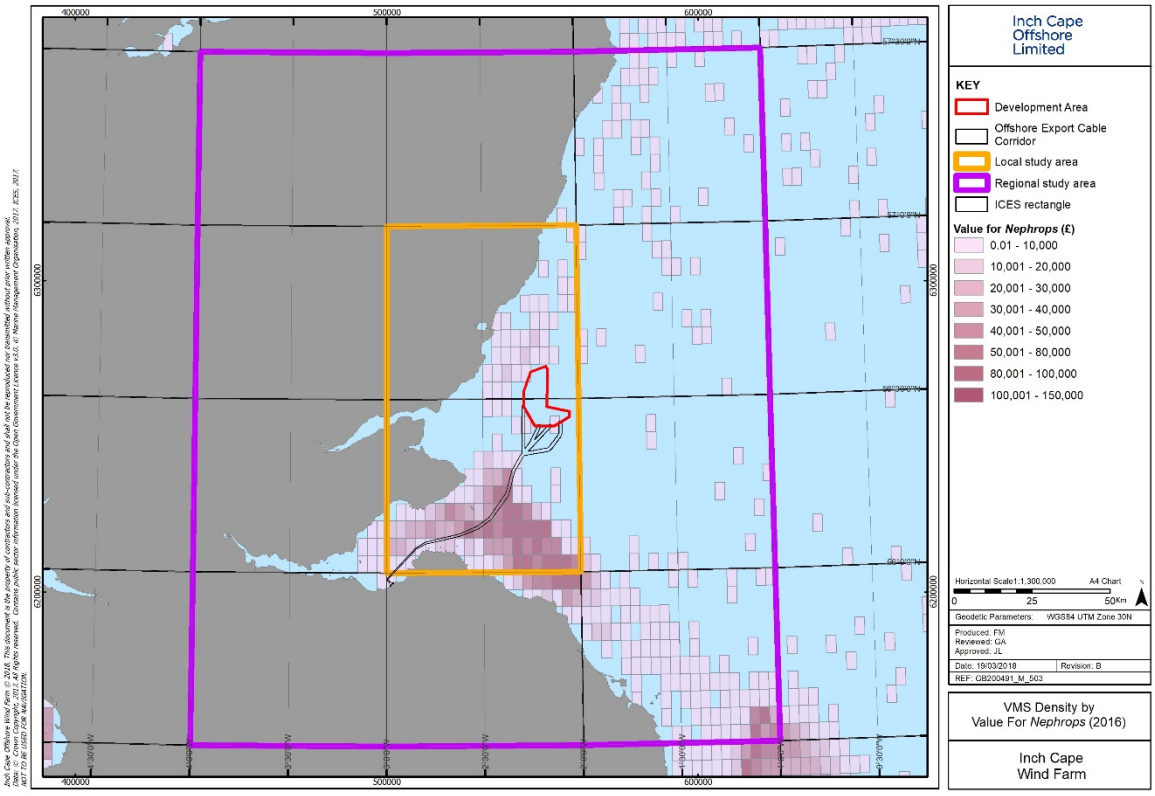
Figure 14.18: Scotmap *Nephrops* trawls: Monetary value (MS, 2012)



87 Fishermen at the consultation events agreed that the MMO VMS data for 2011-2015 was the most accurate representation of fishing patterns for *Nephrops* for the over 15 m fleet and was more representative than the MS VMS data for 2009-2013 (Kafas *et al.,* 2013). They also commented that Scotmap data was an accurate representation of fishing patterns for the under 15 m vessels (Figure 14.17), although some fishermen commented that since the Scotmap exercise, the under 15 m fleet has started to move offshore within the Firth of Forth, while larger vessels have started fishing further north, primarily due to restrictions over gears and horsepower. Fishermen recommended that using both VMS and Scotmap data combined would give the most accurate representation of *Nephrops* fishing.

88 Although not validated with local fishermen as the data was not available at the time, ICES data for *Nephrop*s trawling for vessels of 12 m and over (Figure 14.19) also provides data on the distribution of *Nephrops* trawling. This data is similar to the combined pattern of MMO VMS and Scotmap data, however with less fishing in the Firth of Forth as this is mainly targeted by vessels not fitted with VMS.

Figure 14.19: VMS density by fishing intensity for *Nephrops* for vessels of over 12 m (2016) (ICES)



Scallop Fishery

89 VMS data shows that fishing predominately occurs on the northern most part of the Offshore Export Cable Corridor, near to where it meets the Development Area; elsewhere along the Offshore Export Cable Corridor, scallop fishing intensity is relatively low (Figures 14.6-14.8). This is substantiated by the landings data for rectangle 41E7. During the period

2011-2016, scallop landings averaged only £240,262 per year compared to £1,418,659 in 42E8. As with the Development site, the value of the scallop fishery in the region of the Offshore Export Cable Corridor (41E7) has declined in recent years, reducing from £564,905 in 2007-2011.

90 All other details in terms of the makeup of the fleet, fishing methodologies and seasonality is the same as per the Development Area

Creel Fishery

91 Creeling is an important fishery in 41E7, with crabs and lobsters being targeted predominantly by vessels under 10 m operated from local ports Vessels of less than 10m accounted for 80.2% of all lobsters and crabs landings, with the remaining from other vessels of between 10 and 15m in length. Lobsters were the second most important species targeted in rectangle 41E7 contributing 34% (£2,602,308) to average annual landings, with less quantities of edible crabs and velvet lobsters, accounting for 3% (£219,839) and 2% (£152,751) respectively.

92 During the consultation events fishermen identified that the maps of fishing activity data from the recent MS Creel Fishing Effort Study provided a reasonable representation of the current distribution of creeling in the Regional Study Area (Figure 14.11), and believed was more accurate than the Scotmap (Figure 14.12). This study revealed intensive creel fishing effort in coastal 41E7.

93 Creeling activity is of relatively low intensity along the Offshore Export Cable Corridor itself. This is because the Offshore Export Cable Corridor has been routed to areas of sediment wherever possible in order to allow burial of the cable, and creelers predominantly target harder rocky ground, as this is where lobsters and crabs are more common. There are however areas of particularly intensive creeling activity located along the coastlines adjacent to the Offshore Export Cable Corridor, particularly along the coasts of Fife, and on the south side of the Firth between Port Seton and Dunbar, and Kirkcaldy on the north side of the Firth of Forth.

94 All other details in terms of the makeup of the fleet, fishing methodologies and seasonality are the same as per the Development Area.

Squid Fishery

95 The Offshore Export Cable Corridor passes through squid fishing grounds of low intensity, with slightly higher intensity within the Firth of Forth (Figures 14.13 and 14.4). Average annual squid landings in 41E7 were only £71,804; which did not rank in the national top ten, and was third highest regionally (Figure 14.12).

96 Fishers consulted considered the squid fishery to be particularly inconsistent and unpredictable, which is backed up by landing figures. In this area, as in the rest of the Regional Study Area, landings for squid fluctuate substantially year-on-year.

97 All other details in terms of the makeup of the fleet, fishing methodologies and seasonality is the same as per the Development Area

14.6.6 Baseline without Development

98 In the event of the Development not being developed, and no other developments occurring in the North Sea (including ICOL's consented Development) the fisheries within the Regional and Local Study Area are unlikely to remain constant, as fisheries change from year to year. Future trends in commercial fisheries activity are difficult to predict. Numerous factors can influence the spatial extent, movement and profitability of fisheries. These factors may include alterations in species distribution, market forces, productivity of fisheries in other areas, fuel costs, introduction of marine conservation areas and changes in legislation and policy. This uncertainty may cause fisheries in the future to change from that outlined in the baseline provided.

14.7 Assessment Methodology

99 The Scoping Report and Scoping Opinion identified a range of impacts with potential to effect commercial fisheries near to the Development. These potential impacts (Table 14.2) have been assessed separately for the Development Area and Offshore Export Cable Corridor, using significance criteria provided in Tables 14.8, 14.9 and 14.10. As a standardised methodology for assessing the impacts of offshore wind farm developments on commercial fishing activities is unavailable at present, expert judgement and best practice guidance (*Section 14.4*) have also been used.

14.7.1 Sensitivity of Receptor

100 Sensitivity can vary between fishery receptors for any given impact. For each fishery, information is provided about its sensitivity to each impact at each stage of the development. The criteria used in this assessment to define the sensitivity of the fishery receptor are provided below (Table 14.8).

101 There are four characteristics (adaptability, tolerance, recoverability and value) from which overall sensitivity is derived.

Table 14.8: Criteria to define the sensitivity of the receptor

Characteristic	Sensitivity	Definition
Adaptability	Low	Fishing vessels are required to amend fishing practices slightly, but no significant change
	Moderate	Fishing vessels are limited in their ability to adapt
	High	Fishing vessels cannot adapt
Tolerance	Low	Outwith of peak fishing period or low change in fishing practices

Characteristic	Sensitivity	Definition
	Moderate	During peak fishing periods and discernible change in fishing practices
	High	Fishing activities cannot be undertaken
Recoverability	Low	Fishing activities can resume with little effect
	Moderate	Fishing activities resume but with a discernible effect
	High	Fishing activities cannot be resumed
Value	Low	Low loss of economic value of fishery affected
	Moderate	Moderate loss of economic value of fishery affected
	High	High loss of economic value of fishery affected

14.7.2 Magnitude of Impact

102 There are four characteristics (spatial extent, duration, frequency and severity) (Table 14.9*)* for which magnitude is measured, from these an overall magnitude for a given impact is defined.

Table 14.9: Criteria to define the magnitude of an Impact

Characteristic	Category	Definition
Spatial Extent	Negligible	Not in the proximity of fishing grounds, or very low intensity fishing grounds
	Low	In the proximity of low intensity fishing grounds
	Moderate	In the proximity of frequently targeted fishing grounds which comprise a proportion of receptor fishing grounds
	High	In the proximity of high intensity fishing grounds which comprise the majority of fishing grounds for the receptor
Duration	Negligible	Very short term, or in periods of very low intensity fishing activities
	Low	Short term, or outwith of principal fishing periods
	Moderate	Temporary (i.e. during construction period, or peak fishing period)
	High	Permanent (i.e. during operation phase)

Characteristic	Category	Definition
Frequency	Does not apply to commercial fishing because it is assumed that works will be consistent throughout the construction/decommissioning periods. In the case of operation, the assessment considers the Wind Farm and OfTW.	
Severity	Negligible	No discernible, or very low change to fishing practices
	Low	Some amendment to fishing practices but no significant change
	Moderate	Fishing activities have limited opportunity to adapt and there is a discernible reduction in the Development Area and Offshore Export Cable Corridor
	High	Fishing activities cannot be undertaken in the Development Area and Offshore Export Cable Corridor

14.7.3 Method for Assigning Significance of Effect

103 The magnitude of any impact will be used to determine whether the predicted effect has the potential to be significant. A matrix which combines the magnitude of impact with receptor sensitivity (Table 14.10), was used as a guide to evaluate the significance of effect, however the final assignment of significance was based on expert opinion. Those effects assessed as being of Moderate/Major or Major significance are considered significant for the purposes of this assessment. Embedded migration measures were taken into account during the impact assessment and where any significant effects reached, additional mitigation measures may be proposed to reduce the residual effects.

Table 14.10: Significance of effects

Magnitude of Impact	Sensitivity of resource/receptor		
	Low	Moderate	High
Negligible	Negligible/Minor	Minor	Minor/Moderate
Low	Minor	Minor/Moderate	Moderate
Moderate	Minor/Moderate	Moderate	Moderate/Major
High	Moderate	Moderate/Major	Major

14.8 Impact Assessment- Development Area

14.8.1 Effects on Construction

Temporary Loss or Restricted Access to Fishing Grounds

104 The principal reasons construction of the Development Area could result in the temporary loss or restricted access to fishing grounds arise as a result of:

- Safety zones around construction vessels (500 m); and
- Infrastructure that has been installed in addition to that within construction safety zones (500 m), including WTGs, OSPs and sub-sea cables.

105 500 m safety zones will be applied for around major construction works or vessels within the Development Area. These zones will prohibit all vessels (with the exception of construction vessels). The potential for increasing number of safety zones as the construction period progresses will have the effect of limiting normal fishing practices. These will occur for the duration of the construction phase (24 months within a three year period) at locations throughout the Development Area. The sensitivity of individual fisheries to the safety zones will be affected by the times of year that they are in place. For the purposes of this assessment, the most sensitive period for each fishery has been considered.

106 Approximately 190 km of inter-array cabling will be installed within the Development Area during the construction period. The inter-array cable will be buried to approximately one metre. Where burial is unachievable, the cable will be protected by other means, such as rock placement. It is considered that fishing vessels will not be able to safely operate in the vicinity of these cables until their safe burial or protection has been confirmed. Corrective measures may be required to ensure that the seabed is at an acceptable status for fishing activities to be safely resumed. Inter-array cables could potentially be installed throughout the Development Area and at any stage throughout the construction period, it is therefore considered that access to fishing grounds within the Development Area will be increasingly restricted as the construction schedule advances.

107 Fishing stakeholders have also identified the potential for construction vessels outside the Development Area causing issues for fishermen that could result in temporary loss or restricted access to fishing grounds. This issue has been reported on other Scottish wind farms where construction vessels (eg tugs towing transport barges) were sailing holding patterns while awaiting the opportunity to access the site, thereby restricting access to fishing grounds. Interference with fishing vessels arising from navigational conflict was scoped out of the commercial fisheries assessment. It is considered this impact will be mitigated through the implementation of the licence conditions to produce NSPs which include Vessel monitoring systems, as well as through the CFMS. The concerns of the fishermen will be taken into account through consultation in the development of these, and other plans (such as CMPs), and routes agreed and communicated widely with fishermen to minimise disruption to fishing outside the Development Area. ICOL will commit to investigating suitable mitigation such as setting up of 'no go zones' in areas of importance to

local fishing, whereby construction vessels over a certain size will not be allowed to enter (apart from for safety reasons). Consultation over the suitable mitigation will be undertaken as part of the NSP and CMP process.

108 The Development Area is located in an area targeted by scallop dredgers. As fishing intensity for scallops is known to fluctuate over time, due to the nomadic nature of much of the fleet, landings and fishing patterns were examined over a 10 year period. Total landings by value for 41E7 and 42E7 (Local Study Area), peaked in 2007 at £2,614,386 then declined to their lowest values of £342,378 in 2011. Landings from these rectangles increased slightly in 2013, and remained stable through to 2015 (Figure 14.4), 2016 saw an increase in landings from this area, however these amount to only half the value of 2007. This pattern is reflected in the landings within the Regional Study Area, however since 2011, landings in this wider area have increased at far greater rate than those in 42E7 and 41E7 and in 2016 landings in the Regional Study Area exceeded landings in 2007 by over £1,000,000. Hence the proportion of scallops from 42E7 and 41E7 has declined from 39.8% 2001-2010, to 21.5% 2011-2016. This is principally due to a rise in landings to the north east of the Development Area in 42E8 and 43E8. VMS data also confirms that the majority of landings in the Regional Study Area are from further north east corresponding to 42E8 and 43E8.

109 One possible reason for the decline at the Development Area, and one sited by some fishermen during the validation meetings, could be the introduction scallop dredging restrictions, which came into force into force on 1 June 2017 under the Regulation of Scallop Fishing (Scotland) Order 2017. This order places restriction on scallop dredging whereby the total length of any tow bar deployed cannot exceed 7.5 m, no more than two tow bars can be deployed at any time by a vessel, and no more than eight scallop dredges per side can be towed (i.e. no more than 16 in total) within territorial waters (0-12 nm from the coast) unless they are fitted with remote electronic monitoring (REM) equipment. These restrictions apply to vessels that wish to fish both inside and outside 12 nm during the same trip. Fishing with 10 dredges per side in the six to 12 nm zone is still permitted only if a vessel has REM equipment fitted (at their own expenses), however this is needed to have been fitted (and verified by MS) prior to 1 June 2017. These restrictions effectively mean that larger vessels which predominantly work outside the territorial waters, and carry more than 16 dredges to maximise catches, which have not had REM equipment fitted, cannot work within the 12nm limit. While it is accepted that more vessels may decide to fit REM equipment, at present this Fishing Order would appear to be reducing scallop fishing activity in territorial waters where the Development Area is located.

110 While it is accepted that the value of the scallop fishery within the Development Area may increase in the future, the sensitivity of the fishery takes into account the current value of fishing intensity within the Development Area as well as the wider availability of scallop grounds and the nomadic nature of a large proportion of the fleet. The sensitivity of the scallop fishery is therefore Moderate.

111 The creel fishery within the Development Area is limited with low numbers of crab / lobster hauls identified in the Creel Fishing Effort Study and Scotmap with the creel fishery (crab and lobster) value ranging from low to low / medium value. The majority of creel fishing takes

place in coastal areas, although there is a gradual increase in creeling vessels' working further offshore, north east of the Development Area. While construction work in the Development Area is unlikely to result in much disruption to creel fishing as a result of the low level of creeling activity on the site, it is accepted that there is the potential for impacts on creel fisheries from construction vessels outside the Development Area, however embedded mitigation such as the NSP and CFMS will minimise this. The sensitivity of the creel fishery is therefore Low.

112 The sensitivity of squid fishery takes into account the low value recorded within the Development Area as identified through landing figures, MS VMS and Scotmap data but recognises the year on year variations in landings values from ICES rectangles within the Local Study Area (*Appendix 14A*). The sensitivity of the squid fishery is therefore Low.

113 The magnitude of impact takes into account the temporary duration of total construction activities (24 months within a three year period) and the special extent of the safety zones. The magnitude of impact is therefore Low for creeling and squid fishing as the safety zones are located in low intensity fishing grounds, and Moderate for scallop fishing.

114 The significance of the effect of temporary loss or restricted access to fishing grounds during the construction and decommissioning phase is Moderate for the scallop fishery and Minor for the creel and squid fishery.

Increased Steaming Time to Fishing Grounds

115 The implementation of safety zones around major construction works during the construction phase could result in some short term increases in steaming distances and times, and therefore higher operational costs for fishing vessels.

116 The sensitivity of the scallop fishery in the Development Area is considered in the context of both the nomadic nature, operational range of scallop vessels and value of the scallop fishery in Development Area and the Regional Study Area. Vessels wishing to access the scallop grounds within the Development Area will be subject to increased steaming around safety zones. There may be some increase in steaming times for vessels wishing to access grounds in 42E8 and 43E8, from ports south of the Development Area, however it is expected that most of these vessels would use ports further north to avoid any increase in steaming times. The sensitivity is therefore considered to be Low.

117 The sensitivity of the creel fishery takes into account the higher intensity of fishing in the coastal areas inshore of the Development Area which will be unaffected. The number of larger vessels utilising fishing grounds offshore to the east of the Development Area may encounter safety zones as they steam to offshore fishing grounds. The low value of the offshore fishery is considered. The sensitivity of the creel fishery is Low.

118 The sensitivity of the squid fishery takes into account the low value recorded within the Development Area but recognises the significant year on year variations in landings values from ICES rectangles within the Local Study Area. The sensitivity of the squid fishery is therefore Low.

119 The magnitude of impact has taken into account the temporary duration of construction, the limited special extent of the safety zones across the Development Area in comparison with the fishing grounds for scallop, squid and creels. The magnitude of impact is therefore Low.

120 The significance of the effect of increased steaming times to fishing grounds during the construction and decommissioning phase is Minor for the scallop fishery, squid and creel fishery.

Displacement of Fishing Vessels into other Areas

121 Displacement of fishing vessels into other areas as a result of the Development Area can potentially result in either conflict between vessels competing for the same resource, or between different fishing methods (i.e. static and towed gear vessels).

122 The extent of displacement will be a direct function of the temporary loss or restricted access to fishing grounds during the construction period, for which the sensitivity for scallops, squid and creel fisheries is Low and the magnitude for all three is Moderate.

123 The significance of the effect displacement of fishing vessels into other areas during the construction and decommissioning phase is Minor/Moderate for the scallop, fishery creel and squid fishery.

14.8.2 Effects of Operation and Maintenance

Complete Loss or Restricted Access to Fishing Grounds

124 Fishing will not be excluded from the Development Area, however, it is possible that operational safety zones (50 m) will apply around structures, from which fishing vessels will be prohibited. This safety zone is likely to apply to installed and part installed infrastructure such as WTGs (maximum of 72) and OSPs (maximum of two OSPs). This equates to a total of 0.88 km^2 for WTGs and 0.05 km^2 for the OSPs. Given that the total area of the Development Area is 150 km^2, this accounts for a relatively small proportion of the total area available.

125 The Design Envelope has identified the nominal minimum separation distance between WTGs as 1278 m. According to fishermen the scallop gear used in the Regional Study Area has a maximum gear width of 60 m, while squid trawls have gear 92 m between trawl doors. It is considered that this spacing will allow fishing practices to continue to some extent during the operational phase.

126 Inter-array cables will be buried to a target burial depth of approximately one metre or will be protected by other means (i.e. rock placement) when burial is not practicable. The penetration depth of otter trawl boards into muddy sediment are reported to be up to 30 cm (Szostek *et al.,* 2017) whereas the teeth on a scallop dredge will penetrate as deep as the teeth are long (e.g. 15 cm penetration for 15 cm teeth) into the sediment. It is therefore, considered that were feasible fishing activities will be able to resume in these areas once the cables are operational subject to post installation surveys.

127 Ultimately the decision to fish within an operational wind farm is down to the individual vessels. VMS data from the Eastern Irish Sea collated as part of a Crown Estate study provides evidence of reduced fishing activity within constructed offshore wind farms, only with 18% of those vessels interviewed returning post construction (Gray *et al.,* 2016). Reasons provided by fishermen interviewed for this study for not wishing to fish within the wind farms were; fear of gear snagging caused by debris, the possibility of collision with turbines and the implications of this on their vessel insurance. For vessels not wanting to fish within the operational wind farm this would result in the complete loss of the Development Area for these vessels.

128 The sensitivity of the scallop fishery takes into account the current value of fishing within the Development Area as well as the wider availability of scallop grounds and the nomadic nature of a large proportion of the fleet. It also takes into account the spacing of the turbines and the fact that fishing could continue once the Development Area infrastructure is in place, however the reluctance of some vessels to fish within an operational wind farm is also taken into account. These fishermen may not fish within the Development Area for the duration of operation. For these vessels the sensitivity is high, but when considered in conjunction with the reduced value, nomadic nature, availability of alternative scallop grounds, distance between turbines and movement of the scallop fishery a Moderate sensitivity has been assigned.

129 The creel fishery within the Development Area is of low intensity and value. Creeling grounds are located in coastal areas inshore of the Development Area, as well as areas targeted further offshore to the north and east of the Development Area. It was observed in the eastern Irish Sea that static gear was used within operational wind farms (Gray *et al.,* 2016). Given the low value of creel fishing within the Development Area and the fact that creel fishing can continue within the Development Area the sensitivity of the creel fishery is therefore Low.

130 The sensitivity of the squid fishery takes into account the low value recorded within the Development Area but recognises the significant year on year variations in landings values from ICES rectangles within the Local Study Area. The sensitivity of the squid fishery is therefore Low.

131 The magnitude of impact takes into account the operational life of the Wind Farm (up to 50 years) and OSPs, but also considers the low spatial extent of the impact due to the relatively small area of fishing grounds permanently lost as a result of infrastructure. The associated safety zones are also considered but it is likely that a degree of access will be regained to fishing grounds within the Development Area. The magnitude of impact is Moderate.

132 The significance of the effect of complete loss or restricted access to fishing grounds during the operation and maintenance phase is Moderate for the scallop fishery and Minor/Moderate for both the creel and squid fishery.

Increased Steaming Times to Fishing Grounds

133 It is possible that 50 m safety zones will be used around installed infrastructure and that all vessels except O&M vessels will be prohibited from these zones. It is however considered that due to the distance between turbines (1,278 m) fishing vessels will be able to navigate through the Development Area when operational. It is expected that the discrete nature of the safety zones will require minimal deviation from steaming routes. Due to the low spatial extent of the safety zones and ability to navigate through the wind farm the sensitivity for all fisheries is considered to be low, the magnitude of impact is considered to be Low.

134 The significance of the effect of increased steaming times to fishing grounds during the operation and maintenance phase is Minor for all fisheries.

Displacement of Fishing Activity into other Areas

135 The extent of displacement will be a direct function of the complete loss or restricted access to fishing grounds during operation, as assessed previously. The sensitivity of the scallop fishery is Moderate, the squid fishery is Low and the creel fishery is also Low. The magnitude of impact for all fisheries assessed is Moderate.

136 The significance of the effect of displacement of fishing vessels into other areas during the operation and maintenance phase is Moderate for the scallop fishery, and Minor/Moderate for both the creel and squid fishery.

14.8.3 Effects of Decommissioning

137 The potential effects of decommissioning are considered to be equivalent to, or potentially lower than the worst case effects assessed for the construction phase.

14.9 Impact Assessment- Offshore Export Cable Corridor

14.9.1 Effects on Construction

Temporary Loss or Restricted Access to Fishing Grounds

138 The implementation of safety zones of 500 m from which all vessels will be prohibited is the principle effect for temporary loss or restricted access to fishing grounds in the Offshore Export Cable Corridor during construction. The safety zones will be in place until the area is confirmed safe for vessels to return.

139 The safety zones will prevent vessels from actively fishing or steaming within their boundaries. Due to the seasonal nature of fisheries in the vicinity of the Offshore Export Cable Corridor the sensitivity of the safety zones will depend on the time of year. To ensure that the most sensitive time of year is assessed it is proposed that the safety zones will be active during peak periods of fishing activity.

140 The Offshore Export Cable Corridor is approximately 83.3 km in length and 1.4 km at its widest point. A maximum of two cables will be laid in two trenches within the Offshore

Export Cable Corridor with the area of the seabed that may experience some level of compaction or disturbance due to the footprint of the cable laying equipment being 12-15 m in width per cable (where trench depth is much deeper e.g. three metres, the affected width may be up to 40 m per cable). The cables will be buried to a target cable burial depth of approximately one to three metres, where this depth cannot be attained suitable cable protection will be used (i.e. rock placement or other suitable means, such as concrete matrasses). Due to the potential safety risks associated with fishing in the vicinity of installed Offshore Export Cables (e.g. snagging) it is considered that a temporary loss of access to fishing grounds will occur. Fishing vessels will be subject to exclusion from specific areas until post-installation surveys are undertaken.

141 ICES rectangle 41E7, through which the Offshore Export Cable Corridor passes, currently contains valuable *Nephrops* fishing grounds. *Nephrops* is the most important fishery in 41E7, making up 53%, with average annual landings of £4,093,313 between 2011 and 2016, which represented the third highest landings value in Scotland. The *Nephrops* fishery is targeted by demersal trawlers of both under and over 15 m fleets. The under 15 m fleet is generally comprised of the local fleet and concentrates on grounds closer to their home port, particularly in the Firth of Forth. The vessel restriction in the Firth of Forth restricts demersal trawlers of over 16.77 m, hence the over 15 m fleet predominantly fish grounds further offshore.

142 *Nephrops* trawling in this region tends to be undertaken from east to west, therefore fishermen have raised concerns that trawl lines may be interrupted and gear hauled prematurely due to the presence of safety zones. Fishermen interviewed for a study in the eastern Irish Sea identified that excessive restrictions on fishing during cable installation was one of the main hindrances (Gray *et al.*, 2016). Due to the location of the Offshore Export Cable Corridor in proximity to the fishery a number of vessels may experience temporary loss or restricted access to fishing grounds as a result. The sensitivity for the *Nephrops* fishery is Moderate.

143 It is also noted that scallop fishing along the Offshore Export Cable Corridor is of a low value, and only occurs in the north of 41E7, where the Offshore Export Cable Corridor meets the Development Area. These vessels have a wide range and therefore the ability to utilise the fishing resource outside of the Local Study Area. The sensitivity of the scallop fishery is therefore Low.

144 Creeling is an important fishery in 41E7, with crabs and lobsters being targeted predominantly by vessels under 10 m operated from local ports. Creeling activity is of relatively low intensity along the Offshore Export Cable Corridor itself, as it has been routed through areas of sediment wherever possible in order to allow burial of the cable. As creelers predominantly target harder rocky ground the Offshore Export Cable Corridor has generally not been targeted. As a result of the location of the Offshore Export Cable Corridor and the static nature of creeling gear, this fishery has a Low sensitivity.

145 The sensitivity of the squid fishery takes into account the low value of landings recorded within the Offshore Export Cable Corridor and lack of consistently targeted grounds but

recognises the significant year on year variations in landings values from ICES rectangles within the Local Study Area. The sensitivity of the squid fishery is therefore Low.

146 The magnitude of impact considers the temporary nature of the impact (i.e. limited to the installation phase) and the spatial extent (Offshore Export Cable Corridor of 83 km in length and with an affected footprint width of 40 m per cable (80 m in total). It has also been assumed that the installation period and associated temporary loss of fishing grounds throughout the Offshore Export Cable Corridor will encompass the peak seasonal periods for all of the affected fisheries. The magnitude is therefore Moderate.

147 The significance of the effect of temporary loss or restricted access to fishing grounds during the Offshore Export Cable Corridor construction phase is Moderate for the *Nephrops* fishery and Minor/Moderate for the scallop fishery, squid fishery and creel fishery.

Increased Steaming Times to Fishing Grounds

148 The implementation of 500 m safety zones during the installation phase of the Offshore Export Cable, from which all vessels will be prohibited, could result in increased steaming distances / times and as such increased operational costs for vessels wishing to transit the area. It is expected, however that the discrete and transitory nature of the safety zones will require minimal deviation from steaming routes. As a result the safety zones will result in minimal spatial extent and duration of effect so the magnitude is Low.

149 The sensitivity of all fisheries is expected to be Low due to discrete and short term nature of the safety zones.

150 The significance of the effect of increased steaming times to fishing grounds during the construction phase of the Offshore Export Cable is Minor for all fisheries

Displacement of Fishing Vessels into Other Areas

151 The extent of displacement will be a direct function of the complete loss or restricted access to fishing grounds during operation, as assessed previously. The sensitivity of the *Nephrops* fishery is Moderate and the scallop, squid and creel fishery are Low. The magnitude is of this impact is Moderate.

152 The significance of the effect of displacement of fishing vessels into other areas during the Offshore Export Cable construction phase is Moderate for the *Nephrops* fishery and Minor / Moderate for the scallop, squid and creel fishery.

14.9.2 Effects of Operation and Maintenance

Complete Loss or Restricted Access to Fishing Grounds

153 It is expected that the Offshore Export Cables will be buried to a cable target burial depth of approximately one to three metres where feasible. Where burial is unachievable cable protection will be used where practicable (i.e. rock placement or other suitable means). Areas of cable protection will be subject to an over-trawl-ability assessment which will

ensure the risk of snagging is reduced. It is expected that fishing vessels will be able to resume fishing activity within the Offshore Export Cable Corridor subject to post installation survey.

154 While it is generally accepted that trawling can resume once the cable is installed, concern was raised by fishermen about the impact of clay from beneath the seabed being brought to the surface creating clay berms by the action of ploughing the cable in producing clay berms along the length of the cable. These clay berms can create a snagging hazard, particularly for *Nephrops* trawlers, as well as cause damage to the net and catch. *Nephrops* trawling in this region tends to be undertaken from east to west, hence concerns have been raised about clay berms along the cable route which will either create a snagging hazard, or that fishermen will have to interrupted their tows and haul gear prematurely to avoid them, hence constituting a loss of fishing area.

155 The presence of clay berms or any other hazardous material brought to the surface during cable installation will be detected by post backfill surveys following each stage of cable installation. As this would constitute a seabed obstacle to demersal fishing, the appropriate liaison would be undertaken, and notices circulated, to make fishermen aware of the locations and the risks associated with such obstacles. Remedial work would be undertaken as soon as practically possible to level berms and remove such material. The commitment to an over-trawl-ability assessment would further mitigate this impact. As fishing practices will be able to resume within the Offshore Export Cable Corridor during the operational phase with a low loss of economic value the sensitivity for the *Nephrops* fishery is Low.

156 As a result of the embedded mitigation combined with the lower intensity of other fisheries along the Offshore Export Cable Corridor the sensitivity of all other fisheries (scallops, squid and creeling) is Low.

157 The magnitude is Low for *Nephrops* and Negligible for all other fisheries as a result of their spatial distribution.

158 The significance of the effect of complete loss or restricted access to fishing grounds during the Offshore Export Cable operation and maintenance phase will be Minor for the *Nephrops* fishery, Negligible / Minor for scallop, squid and creel fisheries.

Increased Steaming Times to Fishing Grounds

159 The Offshore Export Cables are not considered to have an effect on the increased steaming times to fishing grounds as they will be buried in the sea bed or placed on the sea bed and protected. It is considered that the sensitivity to this effect is Low for all fisheries.

160 During the operation and maintenance phase of the Offshore Export Cable it is expected that fisheries will not be effected due to the limited temporal and spatial nature of any potential maintenance work. It is therefore considered that the magnitude is Negligible.

161 The significance of the effect of increased steaming times to fishing grounds during the Offshore Export Cable operation and maintenance phase is Negligible/Minor for all fisheries.

Displacement of Fishing Activities into other Areas

162 The potential displacement of fishing vessels is a function of the complete loss or restricted access to fishing grounds incurred during the operational phase of the Offshore Export Cables. This might result in either conflict between vessels competing for the same resource, or between different fishing methods (i.e. static and towed gear vessels).

163 The sensitivity is considered to be Low for the *Nephrops*, scallop, creel and squid fisheries for this impact, with a Negligible magnitude.

164 The significance of the effect of displacement of fishing activities into other areas during the Offshore Export Cable Corridor operation and maintenance phase is Negligible / Minor for *Nephrops*, scallop, creel and squid fisheries.

14.9.3 Effects of Decommissioning

165 The potential effects of decommissioning are considered to be equivalent to, or potentially lower than the worst case effects assessed for the construction phase.

14.10 Impact Assessment- Development (Wind Farm and OfTW)

166 The cumulative impact of both the Development Area and Offshore Export Cable Corridor combined during construction/decommissioning and operation is considered below. A fishery is considered to have the potential to sustain a cumulative impact only if it is affected by the Development components (Table 14.1).

167 The principle fishery operating within the Offshore Export Cable Corridor is for *Nephrops* with negligible fishing activity recorded for them within the Development Area. Therefore the Development assessment (Wind Farm and OfTW) will be no worse than that assessed individually.

168 Scallop fishing along the Offshore Export Cable Corridor only occurs in the north of 41E7, where the Offshore Export Cable Corridor meets the Development Area. As a result of the relatively low value of the scallop fishery on the Offshore Export Cable Corridor, there is only a small increase in effect relating to temporary / restricted access to fishing grounds during construction, complete loss or restricted access to fishing grounds during operation and any subsequent displacement of fishing into other areas loss of fishing, which does not increase the significance of the effect assessed for the wind farm alone.

169 Due to the coastal nature of the creel fishery with limited fishing grounds within both the Development Area and to a lesser degree along the Offshore Export Cable Corridor the effect of the Development is only likely to occur where both elements of the Development meet. Given the limited range of the majority of creeling vessels, relatively low value of the fishery in the area where the Development Area meets the Offshore Export Cable Corridor the effect of the Development will not increase the significance of those effects assessed.

170 Due to the year on year fluctuations in squid landings, transient nature of the fishery and the low landings values within both the Development Area and Offshore Export Cable Corridor it is considered that the cumulative effect of both elements combined will not increase the significance of those effects assessed.

171 For increased steaming time to fishing grounds the discrete nature of the safety zones during construction and operation will not have a discernible increase in effect of the Development.

Table 14.11: Effects of the development during construction (and decommissioning) and operation (and maintenance)

Impact	Receptor	Development Area	Offshore Export Cable Corridor	The Development
Construction (and decommissioning)				
Temporary loss or restricted access to fishing grounds	Scallop fishery	Moderate	Minor/Moderate	Moderate
	Creel fishery	Minor	Minor/Moderate	Minor/Moderate
	Squid fishery	Minor	Minor/Moderate	Minor/Moderate
	Nephrops fishery	n/a	Moderate	Moderate
Increased steaming times to fishing grounds	Scallop fishery	Minor	Minor	Minor
	Creel fishery	Minor	Minor	Minor
	Squid fishery	Minor	Minor	Minor
	Nephrops fishery	n/a	Minor	Minor
Displacement of fishing vessels into other areas	Scallop fishery	Minor/Moderate	Minor/Moderate	Minor/Moderate
	Creel fishery	Minor/Moderate	Minor/Moderate	Minor/Moderate
	Squid fishery	Minor/Moderate	Minor/ Moderate	Minor/Moderate
	Nephrops fishery	n/a	Moderate	Moderate
Operation (and maintenance)				
Complete Loss or Restricted access to fishing	Scallop fishery	Moderate	Negligible/Minor	Moderate
	Creel fishery	Minor /Moderate	Negligible/Minor	Minor/Moderate

Impact	Receptor	Development Area	Offshore Export Cable Corridor	The Development
grounds	Squid fishery	Minor/ Moderate	Negligible/Minor	Minor/Moderate
	Nephrops fishery	n/a	Minor	Minor
Increased Steaming Times to Fishing Grounds	Scallop fishery	Minor	Negligible/Minor	Minor
	Creel Fishery	Minor	Negligible/Minor	Minor
	Squid Fishery	Minor	Negligible/Minor	Minor
	Nephrops fishery	n/a	Negligible/Minor	Negligible/Minor
Displacement of Fishing Activity into other Areas	Scallop fishery	Moderate	Negligible/Minor	Moderate
	Creel fishery	Minor/Moderate	Negligible/Minor	Minor/Moderate
	Squid fishery	Minor/Moderate	Negligible/Minor	Minor/Moderate
	Nephrops fishery	n/a	Negligible/Minor	Negligible/Minor
Decommissioning				
The potential effects of decommissioning are considered to be equivalent to, or potentially lower than the worst case effects assessed for the construction phase.				

14.11 Cumulative Impact Assessment (CIA)

172 The following section describes the cumulative impacts arising from the Development and Onshore Transmission Works (OnTW). It should be noted that for Commercial Fisheries there are no likely interactions between the OnTW and the Development, therefore the conclusions of the Development assessment alone remain valid for this CIA.

173 The CIA therefore assesses other relevant marine developments which have the potential to interact with the Development and fisheries in the area.

174 The following projects were identified by Scottish Ministers in the Scoping Opinion to be included in the CIA for all fisheries:

- Neart Na-Gaoithe Offshore Wind Farm (2017 Scoping Report);
- Seagreen Alpha and Bravo Offshore Wind Farms (2017 Scoping report);
- Kincardine Offshore Wind Farm;
- Forthwind Offshore Wind Demonstration Project; and

- Offshore Renewable Energy Catapult Levenmouth.

175 As the baseline and status for cumulative projects are ever evolving a cut-off date of November 2017 was used to allow the EIA and CIA to progress. ICOL appreciates and acknowledges that the status of some of these projects may have changed since this date and note however that the individual status of projects has not been updated in the EIA Report due to the time restrictions associated with the assessment.

176 The two fully commissioned turbines of the Forthwind Offshore Wind Demonstrator Project are located 1.5 km from the shore at Buckhaven on the south coast of Fife. As this site is fully commissioned only impacts from the operation of this site have the potential to interact with the Development. The fisheries in this site are confined to creeling, with some *Nephrops* and squid trawling further offshore. The ES for this site concluded that as the value of the commercial fishing in the area is low (amounting to only £3,738.67 per year) and the spatial extent is small (0.293 km^2) the significance of operation is minor. Therefore this project will not be considered in this CIA.

177 The Offshore Renewable Energy Catapult Levenmouth is a single fully constructed turbine in close proximity to the shore. Due to its location commercial fisheries were not assessed in the EIA as no commercial fisheries occur on this site. This project will not be considered further in this assessment.

178 Details are presented for the three offshore windfarms that will be considered in the CIA below (Table 14.12). The Neart Na-Gaoithe and Seagreen Alpha and Bravo are consented, however both sites are in the process of submitting new assessment for revised developments of fewer turbines. For this cumulative assessment the worst-case scenario of either revised or original development has been assessed, as there is potential for either the original consents or any revised consents to be implemented. The worse-case scenario for both both Neart Na-Gaoithe and Seagreen Alpha and Bravo, for fishing, is the original developments as this involves more WTGs, inter-array cabling, and longer construction periods, therefore the original developments for these sites used in this assessment.

Table 14.12: Worst case design parameters of developments

Worst case Design Parameters	Neart Na-Gaoithe*	Seagreen Alpha and Bravo*	Kincardine Offshore Wind Farm
Location	Forth and Tay Region	Forth and Tay Region	Aberdeen coast
Maximum number of WTGs	Up to 125 (56)	150 (70 – 120)	eight (floating)
Minimum spacing between turbines	450 m (800m)	610 m (1,000 m)	500 m
Maximum number of OSPs	Two (two)	Up to five (five) – OfTW consented in 2014	0
Maximum number of	n/a	Up to six (three)	0

met masts			
Installation status of inter-array cables	Buried where feasible, protected elsewhere.	Buried where feasible, protected elsewhere.	Surface laid
Wind farm construction period	Two years (eight months)	Up to 36 months	Short in duration due to low construction requirements on site
Location of export cable	South of site in Thorntonloch	West of Project Alpha to Carnoustie	South of Nigg Bay
Maximum number of export cables	Two (Two)	Up to six - OfTW consented in 2014	Two
Installation status of export cables	Buried where feasible, protected elsewhere.	Buried where feasible, protected elsewhere.	Buried where feasible, protected elsewhere.
Export cable installation period	Several months (Five months)	Nine months within a two year period	n/a

*For Firth and Tay developments = original development information provided, revised development shown in brackets

179 Information on fishing activity at the Neart Na-Gaoithe and Seagreen Alpha and Bravo Developments has been taken from data collected from this assessment (on the Regional Study Area) as well as information presented in their respective Scoping Reports for their revised developments (both submitted in 2017) as these contain more up to date information on where fishing is located.

180 According to the 2017 Scoping Report for the Seagreen development scallop fishing is the predominant fishery at the Alpha and Bravo sites (more details provided below), with little *Nephrops*, squid or creeling activity (Seagreen, 2017). Scallops accounted to 86% of landings from ICES rectangle 42E8 (where the development is located), between 2011-2016. In contrast *Nephrops* only contributed 8% to the total value, while squid contributed 4.7% to total landings (by value) during this time. Creel fishing is limited on the development site itself and grounds are predominantly located inshore along the coasts adjacent to the landfall. The original development ES for this project concluded the potential impact of the development on the *Nephrops*, squid and creel fishery to be not significant, although significant impacts were predicted for creeling on the cable route, and cumulative affect with other projects were possible (Seagreen, 2012).

181 At the Neart na Gaoithe site, *Nephrops* fishing predominantly takes place along the cable corridor. Squid was targeted to a lesser degree however fishermen identified grounds within the development site, with more along the export cable corridor. Creel fishing is limited in the development area itself, generally occurring inshore along the north and south coasts of the Firth of Forth. The ES for this site (Mainstream, 2013) predicted that loss or restricted access to fishing grounds during construction, and displacement of fishing grounds would be of moderate significance to the *Nephrops*, squid and creel fisheries for the project and cumulatively, but all other impacts would be negligible.

182 During the assessment for the Kincardine project it was found that some squid fishing occurs but there is no *Nephrops* fishing at this site. Both the development area and cable corridor is targeted by creel fishing which accounted for £2,731,377 (average 2009-2013) in ICES rectangle 43E7 (inshore of the development area). Squid are also targeted with landings values of £72,267 for 42E8 and £28,620 for 43E7. The ES for this project predicted either no impact or a minor significance when considered cumulatively with other projects (Atkins, 2016).

183 It is recognised that the operational range of the nomadic scallop fleet means it will interact with projects outside of the Forth and Tay region. Scottish Ministers identified the following projects that should be included in the CIA, in addition to those identified for all fisheries, for the scallop fishery and possibly squid fishery:

- European Offshore Wind Deployment Centre;
- Hywind Scotland Pilot Park;
- Blyth Offshore Wind Farm (2 turbines)
- Blyth Offshore Demonstrator Project;
- Beatrice Offshore Wind Farm;
- Moray East Offshore Wind Farm;
- Moray East Offshore Wind Farm – Alternative Design;
- Moray West Offshore Wind Farm; and
- Rampion Offshore Wind Farm.

184 The squid fishery is not considered to be nomadic, with vessels within the Regional Study Area generally under 15 m, operating in areas close to their home port. It is therefore considered there will be no cumulative impact on the squid fishery from these projects. Consideration has however been given to these projects and their potential cumulative impact on the nomadic scallop fleet.

185 Details on these offshore wind farm developments, and the importance of the scallop fisheries within them was collated in order to inform this CIA.

- Scallop dredging is recorded in the Seagreen development area and along a proportion of its export cable route. During the period 2001-2010, dredging for king scallops was the principal fishing activity recorded in ICES rectangle 42E8 in which the development is located, accounting for 78.6% landings. When this development was considered alongside other offshore wind farms, significant cumulative effects on the scallop fishery during construction and operation were predicted (Seagreen, 2012). Since 2010 scallop fishing has increased in 42E8 considerably, and this ICES square now accounts for the highest proportion of scallop landings in the Regional Study Area. According to recent VMS data much of this activity overlaps the Seagreen development area.

- There is a low level of scallop activity recorded within the north of the Neart na Gaoithe offshore site and along the export cable route, with principal grounds being located outside of the development area. The ES (Mainstream, 2013) considered effects of loss of traditional fishing grounds and displacement of fishing vessels during offshore site construction and export cable installation to the scallop fishery to be of moderate significance for the project and cumulatively when considered alongside other wind farms. Despite this, it was noted that the site will have a limited contribution to such impacts due to its relatively low level and small proportion of scallop activity. All other impacts during construction, operation and decommissioning phases were considered minor to negligible.
- The Kincardine development is located in ICES rectangles 42E8 and 43E8 where the majority of landings (87.5% and 48.5%, respectively) were scallops during 2011-2016. The Kincardine development is small in area, and the scallop fishing grounds with the highest intensity are to the north and south of this site. Due to the wider availability of grounds, and the small scale of the project, effects to the scallop fishery were considered of negligible to minor significance in the ES for both the development and in combination with other relevant projects were concluded to be of minor significance (Atkins, 2016).
- The European Offshore Wind Deployment Centre, off the coast of Aberdeen, is an 11-turbine site covering an area of 19 km, which is currently under construction. It is situated within ICES rectangles 43E7 and 43E8 which had average annual (2011-2016) scallop landings of between £20,087 and £960,589, which accounted for 8.8% and 48.5% of all landings. Despite the high value of the scallop fishery in rectangle 43E8, it was recognised in the ES for this project that the nearest scallop grounds lie in deeper waters in 43E8 beyond Aberdeen Bay. All impacts to commercial fishery receptors, including scallops, were thus identified as negligible to minor in the ES for this project and cumulatively with other projects.
- The Blyth Offshore Wind Farm consists of two turbines covering an area of <1 km^2. The decommissioned site is situated one mile from the shore of Blyth; there is no scallop fishing in this area due to the substrate on which the foundations are sited.
- The Blyth Offshore Demonstrator Project is a five-turbine site, which has recently become operational. There is consent for ten additional turbines, however there are no current plans to install these. The development is sited in ICES rectangle 39E8; the total average (2011-2016) landings value for scallops was £35,769 (0.6%) in this rectangle. In the ES for this project, scallops were not regarded as a species of commercial importance in the vicinity to the site.
- Hywind Scotland Pilot Park, a fully commissioned 5 turbine floating wind farm covering an area of 15 km^2, is situated in ICES rectangle 43E8, with a portion of the 27.5 km export cable and landfall falling in rectangle 44E8. The average (2011-2016) scallop landings (by value) in rectangle 43E8 was £960,589 and £902,753 in 44E8, accounting for 48.5% and 20.9% of the total landings. Despite the high value of the scallop fishery in this area, due to the small size of the Hywind Project (15km^2 = 0.49% of an ICES

rectangle) the ES for this project concluded there would be a minor impact on the scallop fishery both for the project and cumulatively with other projects (Statoil, 2015).

- Beatrice Offshore Wind Farm is an 84-turbine site (under construction) covering an area of 131 km^2. It is located in ICES rectangle 44E6, where average annual scallop landings between 2011 and 2016 were £529,645, accounting for 20.6% for total landings. Although scallops are the principal species targeted in this ICES rectangle, the ES for this project concluded that any impacts to the scallop fishery would be of negligible or minor significance. This was attributed to the limited level of scallop dredging activity recorded within the wind farm relative to available grounds in the Moray Firth.
- The Moray Firth Offshore Wind Zone comprises two planned development areas: the Eastern Development Area (Moray East) of 295 km^2 and the Western Development Area (Moray West) of 226 km^2. Planning consent for up to 186 turbines has been granted for the Eastern site, however Contract for Difference (CfD) has been issued for an alternative design which takes advantage of new turbine technology available since its initial consent. This means less turbines (137) with a greater power generation capacity and greater turbine spacing. Construction is expected to begin in 2020-2021. The Western site has received a Scoping opinion, and ICOL understand that MORL are working towards an EIA submission in early 2018. There is also potential for construction schedules to overlap with those associated with the OfTW.
- Moray East sits in rectangles 45E7 and 44E7. Between 2011-2016 average scallop landings were £1,337,148 from 45E7 (57.3% of total landings) while in rectangle 44E7 only 5% (£219,000) of landings were scallops. The ES for this project concluded that effects to scallop fisheries during construction, operation and decommissioning of the wind farm would be of minor significance, however, this increased to moderate when including offshore transmission infrastructure in conjunction with other projects.
- The Moray West Offshore Wind Farm is located in three ICES rectangles; 45E7, 44E7 and 45E6. Rectangles 45E7 and 44E7 have been described above, and in 45E6 scallop landings accounted for 27% (£364,720). Fishing grounds surrounding The Moray Firth Offshore Wind Zone thus contain important scallop fisheries.
- Rampion Offshore Wind Farm is a 116 turbine site located on the south coast of England. The 226 km^2 development is in the final stages of construction. The development is located in ICES rectangle 30E9, where annual average scallop landings were £596,114 (accounting for 9.8% of all landings) for the period 2011-2016. While the project overlaps with scallop grounds, it occupies a relatively small area (e.g. the site accounts for only 7.2% of an ICES rectangle). The Rampion ES (E.ON, 2012) points out that due to restrictions placed on the number of dredges which can be operated within 12 nm under the Scallop Order 2012, the majority of the nomadic scallop dredge vessels cannot target grounds in the vicinity of the Rampion site or cable route, therefore the loss of fishing within the site will have a negligible effect on the nomadic scallop fleet.

186 It is not considered that the Blyth Demonstrator Project, Blyth offshore wind farm and Aberdeen Offshore Wind Farm contribute cumulatively to the impact of the scallop fishery

due to the low level of scallop fishing value of the scallop fisheries within their boundaries (pre-construction) and these have therefore been ruled out of the assessment.

187 All other projects mentioned above will be considered within the cumulative assessment for scallop fishing.

14.11.1 Effects on Construction

188 The magnitude of all construction impacts are dependent on the construction schedules for each project. Current estimates, based on the assumption that the Development will be consented and obtain a CfD, are that construction will commence between around 2021 and will take approximately 24 months within a three year period. There is potential for the construction schedule for the Forth and Tay wind farms to overlap and therefore affect the *Nephrops*, scallop, squid and creel fisheries. The construction schedule for Kincardine, is also unknown at present, however it is less likely to have a cumulative impact due to the short duration of the construction period for the eight floating turbines (much of the construction work can take place onshore).

189 Of the additional developments identified in the Scoping Opinion for consideration for the scallop fishery, the only one with the potential for overlapping construction schedules is Moray East Offshore Farm, and potentially Moray West Offshore Wind Farm (although not yet consented) as it is scheduled to be constructed between 2020-2021. All other projects are either already constructed, or will be constructed before the Development, or construction will not have begun.

Temporary loss or restricted access to fishing grounds

190 For the individual assessments the implementation of safety zones around construction vessels and installed and part installed infrastructure is the principle element which could contribute to this effect. The safety zones, however will be discrete in nature relative to the area of the site and available fishing area, however, during the construction phase, the safety risks associated with the installation of array and export cables would result in the progressive loss of access to fishing grounds in these areas as the construction schedule advances. Access to these areas will not resume until the appropriate post-construction surveys confirm that fishing activities can safely resume.

191 While trawling for *Nephrops* is confined to the Offshore Export Cable Corridor, it also occurs in the Seagreen and Neart na Gaoithe sites and along their respective export cable routes. There is no *Nephrops* fishing at the Kincardine site. Given the range of the *Nephrops* vessels within the Regional Study Area and their preference for working areas relatively close to their home ports, the greatest potential for a cumulative impact during construction is during the installation of the offshore export cables for both the Inch Cape Development and Neart na Gaoithe. Both cable corridors are relatively close to each other and pass through the heavily trawled area for *Nephrops* in 41E7. The sensitivity of this fishery is Moderate.

192 Squid trawling is recorded in the Seagreen, Neart na Gaoithe, and Kincardine site and along their respective export cable routes. The transient nature of the squid fishery, and the low

comparable landings values within the Regional Study Area have been considered and the sensitivity of this fishery is Low.

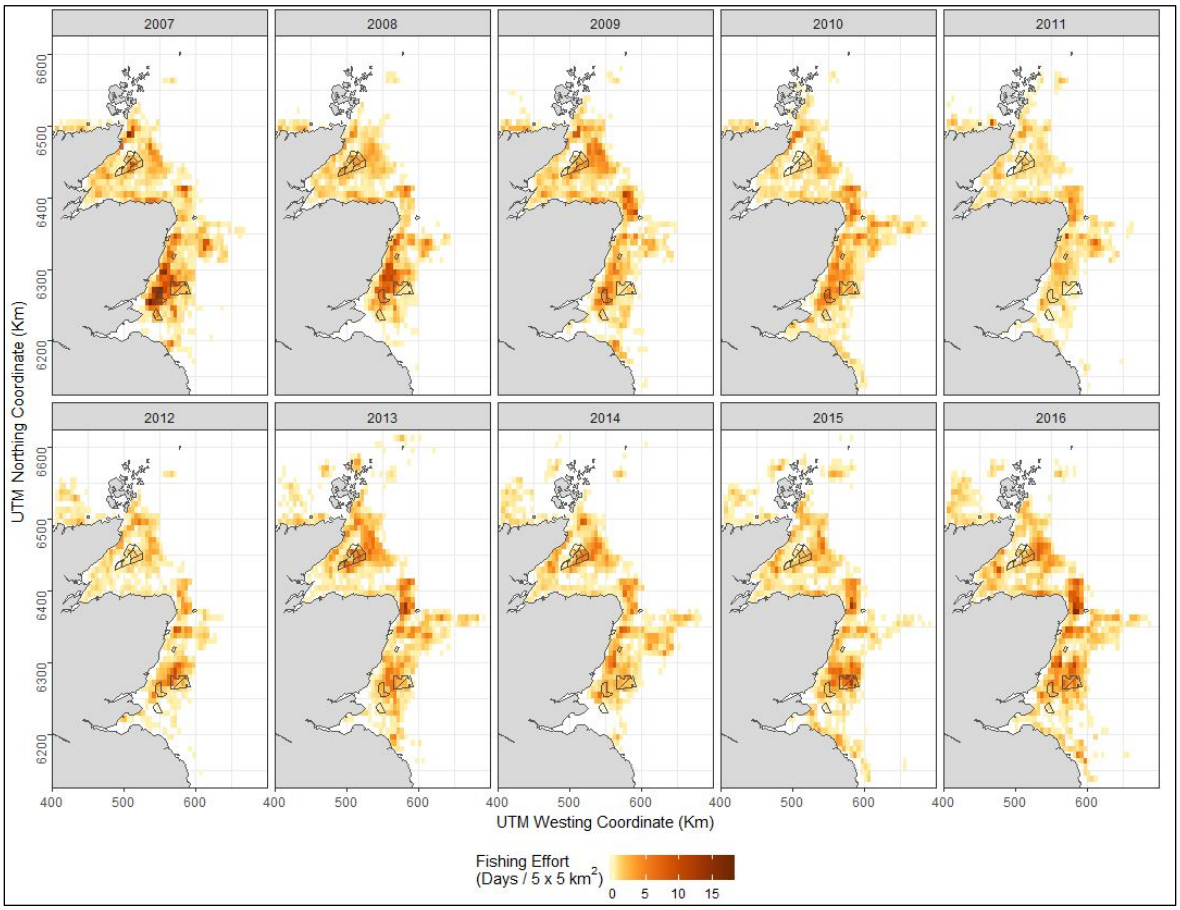
193 In the case of the creel fishing for crabs and lobster, this occurs in coastal areas throughout the Forth and Tay region, as well as the Aberdeenshire. Creel fishing is limited in the Development Area and also other sites in the Forth and Tay, however the offshore export cable corridors for these sites overlap to some extent with creel fisheries. Both the Kincardine site and cable corridor are targeted by creel fishing. While areas overlap, creeling activity tends to be of relatively low intensity along the offshore export cable corridors themselves, as they traverse through areas of sediment, and creelers predominantly target harder rocky ground. As a result of this and the static nature of creeling gear, this fishery is of Low sensitivity.

194 The magnitude of impact takes into account the increased spatial extent of the developments relative to the available fishing grounds and the increase in construction vessel activity when considered together. The magnitude is therefore Moderate for *Nephrops*, creeling and squid fisheries.

195 The significance of the cumulative impact from the construction of the Development with other projects is considered to be Moderate for *Nephrops* and Minor/Moderate for squid and creeling fisheries.

196 As identified by the scoping response the wide operational range of the nomadic scallop fleet may result in this portion of the fleet being affected by marine developments both within and outside the Forth and Tay and also Kincardine. Fishing intensity data for scallop dredging was provided by MS for the period 2007 – 2016 in relation to the Forth and Tay development *(*Figure 14.20) as well as for the UK (14A.43), which is useful to understand the cumulative impact to the scallop fishery.

Figure 14.20: Scallop dredging VMS intensity (2007-2016) in relation to the Forth and Tay Projects (MS pers. com)



197 For construction impacts this is limited to Moray East Offshore Farm as it is scheduled to be constructed between 2020-2021 and potently Moray West Offshore Wind Farm (although this is not yet consented). All other projects are either already constructed, or will be constructed before Inch Cape, or construction will not have begun. The sensitivity of the scallop fisheries is therefore Moderate.

198 Recent VMS data shows scallop fishing is less intensive in the Inch Cape Development Area, however it may be more intensive in the Seagreen development area, this is reflected in the landing figures for 42E7 and 42E8 where Seagreen is located, which show a large shift in peak landing figures from 42E7 and 42E8 over the last 10 years. The nomadic nature of the scallop fleet and the importance of fishing within the Moray Firth, as well as the availability of other scallop grounds is also recognised. The magnitude of this impact is Moderate. The significance of the cumulative effect of these projects on the nomadic scallop feet is therefore Moderate.

Increased Steaming Times to Fishing grounds

199 As previously described the implementation of safety zones applied during the construction phases of the proposed developments may result in increased steaming times for fishing vessels, particularly in the likely event that construction schedules overlap. Additional safety zones may be applied to partially installed or completed infrastructure within the sites.

200 The sensitivity of commercial fisheries recognises that there are limited fishing grounds in areas offshore of the sites, although transit in a north to south direction is recognised. In addition the discrete nature of safety zones relative to available fishing grounds is recognised. The sensitivity of all fisheries is therefore Low.

201 The magnitude of impact takes into account the temporary nature of the safety zones but recognises the likely overlap in construction schedules. The limited spatial extent of the safety zones is however recognised, although these will be proportionally increased. The magnitude of effect is therefore Moderate for all fisheries including scallops, as increased steaming times in the Moray Firth will not impact on fishing within the Forth and Tay region.

202 The effect of the Development in conjunction with other projects for all fisheries on increased steaming times to fishing grounds during construction is considered to be Minor/Moderate.

Displacement of Fishing Activity

203 As described in the individual assessments the extent of displacement will be a direct function of the temporary loss or restricted access to fishing grounds during the construction period. The cumulative impact, therefore from the construction of the Development in combination with the Neart Na-Gaoithe, Seagreen Alpha and Bravo and Kincardine projects is considered to be Moderate for scallop and *Nephrops* fisheries and minor moderate for creel and squid fishing.

14.11.2 Effects of Operation and Maintenance

Complete loss or restricted access to fishing grounds

204 It is considered that fishing vessels will regain some degree of access to fishing grounds within the operational wind farm sites and that subject to post installation surveys normal fishing activities will be able to recommence in the vicinity of export cables. As a result, it is considered that those fisheries identified in the vicinity of export cable routes will not be affected during their operation.

Creel and Nephrops

205 For creel and *Nephrops* fisheries there is considered to be little cumulative impact from other projects during operation, therefore the level of significance is not increased beyond that of the Development. As *Nephrops* fishing occurs predominantly along the cable routes of Inch Cape and Neart na Gaoithe and fishing can resume once the cables are installed the cumulative impact of the Development with other projects remains as minor. While creel fishing does occur within wind farm sites and on the offshore export cable, the majority of creel vessels are small and do not target different sites, therefore the cumulative impact remains the same as for the Development as Minor/Moderate.

Squid

206 Squid fishing is widely distributed and of low intensity across the developments within the regional study area. Its sensitivity is therefore low. The magnitude, however, is considered to be Moderate due to the operational life of the wind farm developments (up to 50 years), the significance of effect for squid is therefore Minor/Moderate.

Scallops

207 The fisheries most likely to be affected by the operation of the wind farms cumulatively will be the scallop fisheries.

208 For the scallop fishery, as stated previously, while fishing may resume within the Development Area of Inch Cape, it is recognised that a number of skippers of scallop dredge vessels may be reluctant to fish within operational wind farm sites. It therefore follows that these vessels will be unlikely to fish within the development areas in the Forth and Tay and Moray Firth region (Rampion is not included as this site tends not be targeted by the nomadic fleet as a result of gear restrictions).

209 The greatest impact on scallop fishing principally relates to the recent increase in scallop fishing in ICES 42E8, which accounts for the highest proportion of scallop landings in the Regional Study Area applied in this assessment. As this scallop fishing activity overlaps the Seagreen development area, the potential displacement to scallop fishing from this project alone is likely to have a significant effect. As noted in *section 14.6.5* above, scallop fishing in Inch Cape's Development Area has reduced in recent years, and the impact from the Development alone is not significant. ICOL recognises that there are however fluctuations in scallop dredging activity due to the cyclical nature of the fishery and thus it is possible that the Development Area may be targeted intensively in future years.

210 The cumulative assessment carried out is based on the worse case for the other Forth and Tay Developments, hence for Seagreen's Alpha and Bravo, where the original development design envelope specifies turbine spacing of only 610 m, it is assumed that a proportion of fishermen will be unlikely to fish within the site between WTGs.

211 For loss of scallop fishing areas, when considered in combination with other projects, the result of the moderate sensitivity and high magnitude assigned to the potential impact the resulting effect is of **Moderate/Major significance,** and thus significant for the purpose of this assessment.

212 As noted this significant impact is considered the worse-case assuming the original Seagreen's Alpha and Bravo developments are built out and assuming scallop fishermen do not fish in the site, however if the revised developments with fewer, wider spaced turbines are built it is likely over time that fishermen will try / become acclimatised to fishing within wind farms and the impact will lessen.

Mitigation measures

213 *Section 14.5.2* identifies ICOL's commitment to mitigation measures to minimise impacts to the fishing industry, both as a project alone and collectively with both Seagreen and NNG (through the CFWG). Commitments identified here, which will specifically help minimise the impacts on scallop fishing, e.g. those that will allow scallop fishing to return to the Development Area, are:

- Participation in the CFWG to provide a forum for collaborative discussion and action in relation to the cumulative interactions with the Forth and Tay developments and commercial fishing activities;
- ICOL's commitment to the cables being suitably buried, or protected by other means, when burial is not practicable to reduce the risk to scallop fishing vessels from snagging;
- The wind farm WTG and OSPs will be designed in a grid or offset grid layout, to minimise risk of collision. The layout of the wind farm will also be provided to the fishing industry, so it can be used in their navigation aids;
- A cable burial plan will be produced which will include monitoring and reporting of any exposures. The plan will be made available to the fishing industry to allow the location of the cables to be used in their navigation aids. Monitoring of the cables will be carried out regularly and this information, including the risk of any exposed cables, prior to remedial work, will also be disseminated to the fishing industry; and
- Commitment to an over-trawl-ability assessment to provide reassurance to the scallop fleet that fishing could continue over cables.

214 ICOL suggests that should the scallop fishing fleet return to fish for scallops within the wind farm areas of Seagreen or Inch Cape, the impacts on loss or restriction to fishing grounds will be reduced. However, as this assessment has been carried out on a worst case scenario, and on the consented Seagreen design, the assessment suggests that this may be unlikely. Therefore, regardless of the mitigation measures put in place, the residual cumulative impacts on scallop fishing could result in a significant effect.

Increased Steaming Times to Fishing Grounds

215 It is considered that fishing vessels will be able to navigate through the operational wind farms. The export cables for all projects will be buried in or protected on the sea bed and are not expected to have any effect of steaming times. The sensitivity for all fisheries is expected to be low and magnitude Low.

216 The cumulative impact from the operation of the Development in combination with the Neart Na-Gaoithe, Seagreen Alpha and Bravo and Kincardine projects is Minor for all fisheries.

Displacement of Fishing Activity

217 As described in the individual assessments the extent of displacement will be a direct function of the complete loss or restricted access to fishing grounds during the operation

period. The cumulative impact from the construction of the Development in combination with the Neart Na-Gaoithe, Seagreen Alpha and Bravo and Kincardine projects is considered to be Moderate for the scallop fishery, Minor/Moderate for creel and squid fisheries and minor for the *Nephrops* fishery.

218 This also applies to the nomadic scallop fleet with the cumulative impact being Moderate.

14.11.3 Effects of Decommissioning

219 The potential effects of decommissioning are considered to be equivalent to, or potentially lower than the worst case effects assessed for the construction phase.

14.12 Impact Interactions

220 There is potential for the individual impacts identified in the impact assessment to interact with each other and create new or more significant impacts on commercial fisheries or other receptors. Particularly when construction phase impacts and operational phase impacts combine to produce an impact which has a longer timescale.

221 The cumulative assessment on scallop fishery during the operation and maintenance phase of the Development has been considered significant. As the construction of Inch Cape alone does not assess a significant effect on scallop fishery, which is due to the level of scallop fishing in the Development footprint, the combination of both construction and operational effects would therefore be considered no greater than that assessed for the cumulative assessment. For all other fisheries no significant interaction through the accumulation of construction and operational impacts is considered.

222 The potential impact interactions with other receptors have also been considered, of which the two likely interactions would be on shipping and navigation and on potential impacts on natural fish.

223 For shipping and navigation, the embedded mitigation noted both in this chapter and in the *Chapter 15*, would mitigate against any impact interaction, such as conflict with other sea users (including commercial fisheries) and therefore not considered to lead to a significant interaction.

224 For potential interactions with natural fish, the only likely interaction would be in relation to the lack of fishing as a result of temporary or permanent safety zones (around construction infrastructure or WGT), will result in effectively no take zones where fishing cannot take place. This may have a small positive impact on benthic / fisheries ecology which then may increase the productivity of the fishery.

225 No other impact interactions have been noted.

14.12.1 Development Alone

226 The impacts on commercial fisheries associated with the construction and operation phases of the Development are:

- Temporary loss or restricted access to fishing grounds;
- Complete loss or restricted access to fishing grounds;
- Increased steaming times to fishing grounds; and
- Displacement of fishing activity into other areas.

227 As these impacts are a consequence of each other i.e. the temporary loss or restricted access to fishing grounds is linked to increased steaming times to fishing grounds and also displacement of fishing activity into other areas, they have already been considered within the impact assessment and the significance would not increase.

228 No potential for impact interactions would result from the construction and operational phases of the Development.

14.12.2 Cumulative with Other Projects

229 As discussed for the Development the potential impacts assessed for commercial fisheries are already connected. The potential for impact interactions to increase the significance or contribute to a greater long term effect has already been assessed. No additional impact interactions have been identified.

14.13 Additional Mitigation

230 A range of embedded mitigation measures have been proposed in and ICOL have committed to the purpose of the conditions set out for the Inch Cape 2014 Consent which are relevant to commercial fisheries *Section 14.5.2*.

231 Through pre-submission consultation with SFF one additional mitigation has been identified to minimise the potential impacts on the fishing industry during the construction phase (see *Section 14.8.1*). ICOL have recognised that there is the potential for construction vessels outside the Development Area to cause issues for fishermen and inadequate communication between ICOL (including contractors) and the fishing industry. There appropriate mitigation will be included as part of the CFMS and through the appointment of a suitable FLO.

14.14 Conclusion and Residual Effects

232 The following tables summarise the residual effects considered for the Development Area and the Offshore Export Cable Corridor.

Table 14.13: Summary of residual effects, which takes into account embedded mitigation– Development Area

Impact	Receptor	Residual Effect
Construction		
Temporary loss or restricted access to fishing grounds	Scallop fishery	Moderate
	Creel fishery	Minor
	Squid fishery	Minor
	Nephrops fishery	n/a
Increased steaming times to fishing grounds	Scallop fishery	Minor
	Creel fishery	Minor
	Squid fishery	Minor
	Nephrops fishery	n/a
Displacement of fishing activity into other areas	Scallop fishery	Minor/Moderate
	Creel fishery	Minor/Moderate
	Squid fishery	Minor/Moderate
	Nephrops fishery	n/a
Operation and Maintenance		
Complete loss or restricted access to fishing grounds	Scallop fishery	Moderate
	Creel fishing	Minor/Moderate
	Squid fishery	Minor/Moderate
	Nephrops fishery	n/a
Increased steaming times to fishing grounds	Scallop fishery	Minor
	Creel fishing	Minor
	Squid fishery	Minor
	Nephrops fishery	n/a

Impact	Receptor	Residual Effect
Displacement of fishing activity into other areas	Scallop fishery	Moderate
	Creel fishing	Minor/Moderate
	Squid fishery	Minor/Moderate
	Nephrops fishery	n/a
Decommissioning		
The potential effects of decommissioning are considered to be equivalent to, or potentially lower than the worst case effects assessed for the construction phase.		

Table 14.14: Summary of residual effects, which takes into account embedded mitigation – Offshore Export Cable Corridor

Impacts	Receptor	Residual Effect
Construction		
Temporary loss or restricted access to fishing grounds	*Nephrops* fishery	Moderate
	Scallop fishery	Minor/Moderate
	Creel fishing	Minor/Moderate
	Squid fishery	Minor/Moderate
Increased steaming times to fishing grounds	*Nephrops* fishery	Minor
	Scallop fishery	Minor
	Creel fishing	Minor
	Squid fishery	Minor
Displacement of fishing activity into other areas	*Nephrops* fishery	Moderate
	Scallop fishery	Minor/Moderate
	Creel fishing	Minor/Moderate
	Squid fishery	Minor/Moderate
Operation and Maintenance		
Complete loss or restricted	*Nephrops* fishery	Minor
	Scallop fishery	Negligible/Minor

Impacts	Receptor	Residual Effect
access to fishing grounds	Creel fishing	Negligible/Minor
	Squid fishery	Negligible/Minor
Increased steaming times to fishing grounds	*Nephrops* fishery	Negligible/Minor
	Scallop fishery	Negligible/Minor
	Creel fishing	Negligible/Minor
	Squid fishery	Negligible/Minor
Displacement of fishing activity into other areas	*Nephrops* fishery	Negligible/Minor
	Scallop fishery	Negligible/Minor
	Creel fishing	Negligible/Minor
	Squid fishery	Negligible/Minor
Decommissioning		
The potential effects of decommissioning are considered to be equivalent to, or potentially lower than the worst case effects assessed for the construction phase.		

14.14.1 Cumulative Impacts

233 The following tables summarise the residual effects considered for the Development and the Development with other projects.

Table 14.15: Summary of residual cumulative effects, which takes into account embedded mitigation – The Development (Development Area and the OfTW)

Impact	Receptor	Residual Effect
Construction		
Temporary loss or restricted access to fishing grounds	Scallop fishery	Moderate
	Squid fishery	Minor/Moderate
	Creel fishery	Minor/Moderate
	Nephrops fishery	Moderate
Increased steaming times to fishing grounds	Scallop fishery	Minor
	Squid fishery	Minor
	Creel fishery	Minor

Impact	Receptor	Residual Effect
	Nephrops fishery	Minor
Displacement of fishing activity into other areas	Scallop fishery	Minor/Moderate
	Squid fishery	Minor/Moderate
	Creel fishery	Minor/Moderate
	Nephrops fishery	Moderate
Operation and Maintenance		
Complete loss or restricted access to fishing grounds	Scallop fishery	Moderate
	Squid fishery	Minor/Moderate
	Creel fishing	Minor/Moderate
	Nephrops fishery	Minor
Increased steaming times to fishing grounds	Scallop fishery	Minor
	Squid fishery	Minor
	Creel fishing	Minor
	Nephrops fishery	Negligible/Minor
Displacement of fishing activity into other areas	Scallop fishery	Moderate
	Squid fishery	Minor/Moderate
	Creel fishing	Minor/Moderate
	Nephrops fishery	Negligible/Minor
Decommissioning		
The potential effects of decommissioning are considered to be equivalent to, or potentially lower than the worst case effects assessed for the construction phase.		

Table 14.16: Summary of residual cumulative effects, which takes into account embedded mitigation – The Development with other projects

Impact	Receptor	Residual Effect
Temporary loss or restricted access to fishing grounds	Scallop fishery	Moderate
	Squid fishery	Minor/Moderate
	Creel fishery	Minor/Moderate
	Nephrops fishery	Moderate
Increased steaming times to fishing grounds	Scallop fishery	Minor/Moderate
	Squid fishery	Minor/Moderate
	Creel fishery	Minor/Moderate
	Nephrops fishery	Minor/Moderate
Displacement of fishing activity into other areas	Scallop fishery	Moderate
	Squid fishery	Minor/Moderate
	Creel fishery	Minor/Moderate
	Nephrops fishery	Moderate
Operation and Maintenance		
Complete loss or restricted access to fishing grounds	Scallop fishery	Moderate/Major*
	Squid fishery	Minor/Moderate
	Creel fishing	Minor/Moderate
	Nephrops fishery	Minor
Increased steaming times to fishing grounds	Scallop fishery	Minor
	Squid fishery	Minor
	Creel fishing	Minor
	Nephrops fishery	Minor
Displacement of fishing activity into other areas	Scallop fishery	Moderate
	Squid fishery	Minor/Moderate

Impact	Receptor	Residual Effect
	Creel fishing	Minor/Moderate
	Nephrops fishery	Minor
Decommissioning		
The potential effects of decommissioning are considered to be equivalent to, or potentially lower than the worst case effects assessed for the construction phase.		

*this is based on a worst-case scenario assessment, and regardless ofmitigation measures being adopted, scallop fishing does not return to the wind farm development areas of in the Forth and Tay and Moray Firth region. Should fishing activity return the residual effects will be reduced to a non-significant effect.

References

Atkins (2016) *Kincardine Offshore Windfarm Environmental Statement*. Available from: http://pilot-renewables.com/pdf_docs/KOWL_EnvironmentalStatement_Issued_v2.pdf. [Accessed: 18/04/2018].

BERR (2008) *Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW) Recommendations for Fisheries Liaison. Best Practice Guidance for Offshore Renewables Developers*. Available from: https://www.scribd.com/document/152508381/FLOWW-Best-Practices-2008. [Accessed 18/04/2018].

Cefas, Marine Consents and Environment Unit (MCEU), Department for Environment, Food and Rural Affairs (Defra) and Department of Trade and Industry (DTI) (2004). *Offshore Wind Farms - Guidance note for Environmental Impact Assessment In respect of FEPA and CPA requirements, Version 2*. Available from: https://www.cefas.co.uk/publications/files/windfarm-guidance.pdf [Accessed 18/04/2018].

E.ON (2012) *Rampion Offshore Wind Farm. ES Section 18 – Commercial Fisheries*. Available from: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010032/EN010032-001505-6.1.18%20Commercial%20Fisheries.pdf. [Accessed: 18/01/2018].

Gray, M., Stromberg, P-L., Rodmell, D. 2016. '*Changes to fishing practices around the UK as a result of the development of offshore windfarms – Phase 1*.' The Crown Estate, 121pages. ISBN: 978-1-906410-64-3

FLOWW (2014) *Best Practice Guidance for Offshore Renewables Development: Recommendation for Fisheries Liaison*. Available from: http://www.thecrownestate.co.uk/media/5693/floww-best-practice-guidance-for-offshore-renewables-developments-recommendations-for-fisheries-liaison.pdf [Accessed 7/ 12/2017].

International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA). 2008. *Recommendation O-139 – The Marking of Man-made Offshore Structures, December 2008*. Available from: http://www.iala-aism.org/product/marking-of-man-made-offshore-structures-o-139/ [Accessed 18/04/2018].

Mainstream (2013) *Neart na Gaoithe Offshore Wind Farm Environmental Statement. Chapter 16: Commercial Fisheries.* Available from: http://nngoffshorewind.com/files/offshore-environmental-statement/Chapter-16---Commercial-Fisheries.pdf. [Accessed 18/01/2018].

MASTS (2018a) *Evidence Gathering in Support of Sustainable Scottish Inshore Fisheries: An EFF funded project led by Seafish and managed by MASTS*. Available from: http://www.masts.ac.uk/research/sustainable-scottish-inshore-fisheries/. [Accessed: 16/03/2018]

MASTS (2018b) *Scottish Inshore Fisheries Integrated Data System (SIFIDS) Project: An EMFF funded project led by the University of St Andrews (MASTS)*. Available from: http://www.masts.ac.uk/research/emff-sifids-project/. [Accessed: 16/03/2018]

Kafas, A., Jones, G., Watret, R., Davies, I., Scott, B., (2013) *.2009 - 2013 amalgamated VMS intensity layers, GIS Data. Marine Scotland, Scottish Government. doi: 10.7489/1706-1.* Available from: http://data.marine.gov.scot/dataset/2009-2013-amalgamated-vms-intensity-layers [Accessed 10/11/2017].

MSS (2017) *Creel Fishing Effort Study. Marine Analytical Unit*. Available from: http://www.gov.scot/Resource/0052/00523958.pdf [Accessed 13/12/2017].

OSPAR (2008) *Guidance on Environmental Considerations for Offshore Wind Farm Development. Reference Number: 2008-3*. Available from: https://www.scribd.com/document/262322916/08-03e-Consolidated-Guidance-for-Offshore-Windfarms [Accessed 7/12/2017].

Seagreen (2012) *Non-Technical Summary*. Available from: http://www.seagreenwindenergy.com/assets/seagreen-phase-1-offshore-nts.pdf. [Accessed: 18/01/2018]

Seagreen (2012) *Commercial fisheries. Chapter 14*

Inch Cape 2013 *Inch Cape Offshore Wind Farm Environmental Statement.* Available from http://www.inchcapewind.com/publications/environmental-statement/introduction Accessed [18/04/2018].

Seagreen (2017) *Seagreen Phase 1 Offshore Project Scoping Report Round 3: Firth of Forth.* Available from: http://www.seagreenwindenergy.com/assets/2017/A4MR-SEAG-AB-DEV230-SPR-311%20Seagreen%20Phase%201%20Scoping%202017.pdf. Accessed [18/01/2018].

Statoil (2015). *Chapter 14: Commercial Fisheries.* Available from: https://www.statoil.com/content/dam/statoil/documents/impact-assessment/Hywind/Statoil-Chapter%2014%20Commercial%20fisheries.pdf. [Accessed: 18/01/2018].

Szostek, C.L., Hiddink, J.G., Sciberras, M., Caveen, A., Lart, W., Rodmell, D., Kaiser, M.J. (2017). *Tools to estimate fishing gear penetration depth and benthic habitat impacts of fisheries at a regional scale*. Fisheries & Conservations report no. 68, Bangor University, pp. 87. Available from: http://fisheries-conservation.bangor.ac.uk/other/documents/68.pdf. [Accessed: 15/01/2017].

UKFEN (2012) *Best Practice Guidance for Fishing Industry Financial and Economic Impact Assessments*. Available from: http://www.seafish.org/media/634910/ukfen%20ia%20best%20practice%20guidance.pdf. [Accessed 13/12/2017].

UK Government (2017). *The Regulation of Scallop Fishing (Scotland) Order 2017*. Available at: http://www.legislation.gov.uk/ssi/2017/127/made. [Accessed: 15/12/2017]

Contents

List of Tables

List of Figures

Glossary

Allision	The act of striking or collision of a moving vessel against a stationary object.
Base Case	The assessment of risk based upon current shipping densities and traffic types as well as the marine environment.
Automatic Identification System (AIS)	A system by which vessels automatically broadcast their identity, key statistics (e.g. length), brief navigation details (e.g. location, destination, speed) and current status (e.g. under way). Most commercial vessels and EU fishing vessels over 15 m are required to carry AIS.
Collision	The act or process of colliding (crashing) between two moving objects.
Formal Safety Assessment (FSA)	A structured and systematic process for assessing the risks and costs (if applicable) associated with shipping activity.
Hazard Workshop	Meeting of local and national stakeholders relevant to a project to identify and discuss shipping and navigation hazards.
Future Case	The assessment of risk based upon the predicted growth in future shipping densities and traffic types as well as foreseeable changes to the marine environment.
Marine Environmental High Risk Area (MEHRA)	Areas in UK coastal waters where vessel masters are advised of the need to exercise more caution than usual, i.e. crossing areas of high environmental sensitivity where there is a risk of pollution from merchant shipping.
Marine Guidance Note (MGN)	A system of guidance notes issued by the Maritime and Coastguard Agency (MCA) which provide significant advice relating to the improvement of the safety of shipping and of life at sea, and to prevent or minimise pollution from shipping.
Offshore Renewable Energy Installation (OREI)	As defined by *MGN 543*. For the purpose of this report and in keeping with the consistency of the Environmental Impact Assessment (EIA), OREI refers to offshore surface structures associated with the Development.
Racon	Radar beacon which transmits a visible icon on a Radar screen to notify the user of a navigational hazard.
Radar	An object detection system which uses radio waves to determine the range, altitude, direction and speed of objects.
Safety Zone	A marine zone demarcated for the purposes of safety around a possibly hazardous installation or works/construction area under the *Energy Act 2004*.

Abbreviations and Acronyms

AIS	Automatic Identification System
ALB	All-Weather Lifeboat
AtoN	Aid to Navigation
BOWL	Beatrice Offshore Wind Limited
CIA	Cumulative Impact Assessment
CMS	Construction Method Statement
CoS	Chamber of Shipping
DfT	Department for Transport
DSC	Digital Selective Calling
DSLP	Development Specification and Layout Plan
EIA	Environmental Impact Assessment
ERCoP	Emergency Response Co-operation Plan
EU	European Union
FSA	Formal Safety Assessment
GT	Gross Tonnage
IALA	International Association of Lighthouse Authorities
ICOL	Inch Cape Offshore Limited
ILB	Inshore Lifeboat
IMO	International Maritime Organization
km	Kilometre
LMP	Lighting and Marking Plan
m	Metre
m/hr	Metres per Hour
MAIB	Marine Accident Investigation Branch
MCA	Maritime and Coastguard Agency
MEHRA	Marine Environmental High Risk Area

Met Mast	Meteorological Mast
MGN	Marine Guidance Note
MHWS	Mean High Water Spring
mph	Miles per Hour
MS-LOT	Marine Scotland Licensing Operations Team
NLB	Northern Lighthouse Board
nm	Nautical Mile
NnG	Neart na Gaoithe
NRA	Navigational Risk Assessment
NSP	Navigational Safety Plan
O&M	Operations & Maintenance
OfTW	Offshore Transmission Works
OMP	Operations and Maintenance Plan
OREI	Offshore Renewable Energy Installations
OSP	Offshore Substation Platform
Racon	Radar Beacon
Radar	Radio Detection and Ranging
RAF	Royal Air Force
REZ	Renewable Energy Zone
RNLI	Royal National Lifeboat Institution
RYA	Royal Yachting Association
SAR	Search and Rescue
SFF	Scottish Fishermen's Federation
STW	Scottish Territorial Waters
UK	United Kingdom
UKC	Under Keel Clearance
UKHO	United Kingdom Hydrographic Office

VHF	Very High Frequency
VMP	Vessel Management Plan
WTG	Wind Turbine Generator

15 Shipping and Navigation

15.1 Introduction

1 This chapter presents the assessment of potential impacts on shipping and navigation predicted to arise from the operation and decommissioning of the Inch Cape Wind Farm and associated Offshore Transmission Works (OfTW) (the Development) within the Firths of Forth and Tay.

2 The following appendices and chapters should be read, as well as the *introductory chapters (1-8)* in conjunction with this chapter:

- *Appendix 15A: Marine Traffic Validation Study*
- *Appendix 15B: Marine Guidance Note (MGN) 543 and Methodology Checklist;*
- *Appendix 15C: Supporting Documentation: and*
  - *Appendix 15C.1: Navigational Risk Assessment (NRA)*;
  - *Appendix 15C.2: Regular Operator Consultation*;
  - *Appendix 15C.3: Hazard Log*; *and*
  - *Appendix 15C.4: Consequences Assessment Report*.
- *Chapter 14: Commercial Fisheries.*

3 Reference to the Inch Cape Wind Farm structures within this chapter refers to Wind Turbine Generators (WTGs), Offshore Substation Platforms (OSPs) and Meteorological Mast Structure (met mast).

15.2 Consultation

4 Table 15.1 summaries all relevant points raised in the Scoping Opinion and during pre-application consultation that Inch Cape Offshore Limited (ICOL) has carried out with consultees.

Table 15.1: Scoping responses and actions

Consultees	Scoping Response	ICOL Response
Maritime and Coastguard Agency (MCA) (Scoping Opinion)	The Environmental Impact Assessment (EIA) Report should supply detail regarding the possible impact on navigational issues for both commercial and recreational craft, namely: • Collision risk; • Navigational safety; • Visual intrusion and noise; • Risk management and emergency response; • Marking and lighting of wind farm and information to mariners; • Effect on small craft navigational and communication equipment; • Risk to drifting recreational craft in adverse weather or tidal conditions; and • Likely squeeze of small craft into the routes of larger commercial vessels.	These impacts have been considered during the scope of assessment and those impacts which may lead to a significant effect, as agreed through consultation, included in the EIA Report (see *Section 15.3* and *Appendix 15A*).
	There is a requirement to complete traffic studies within 24 months prior to the EIA Report submission and a new traffic study would be expected. Open to discussions to agree the survey data requirements.	A Marine Traffic Validation Study (*Appendix 15A*) has been undertaken to compare the 2011 and 2012 marine traffic survey data with the current baseline. Discussions with the MCA regarding survey requirements have been undertaken and the process to ensure the traffic study was appropriate agreed, with no additional traffic surveys required (see below).
	A NRA update will need to be submitted in accordance with *MGN 543* and the *MCA Methodology for Assessing the Marine Navigational Safety & Emergency Response Risks of Offshore Renewable Energy Installations (OREI)*.	A Formal Safety Assessment (FSA) has been carried out in line with the International Maritime Organization (IMO) FSA process. Following further consultation (see below) it was agreed that the NRA undertaken in 2012 would not require an update. The application satisfies the requirements of the two documents, with a *MGN 543* checklist undertaken to verify that the NRA remains compliant (see *Appendix 15B*).

Consultees	Scoping Response	ICOL Response
	Particular attention should be paid to cabling routes and, where appropriate, burial depths for which a Burial Protection Index study should be completed and subject to the traffic volumes, an anchor penetration study may be necessary. If cable protection is required a 5% reduction in surrounding depths referenced to Chart Datum would be acceptable.	Burial or protection of cables and a monitoring plan to ensure maintenance of appropriate cable protection and burial has been included as embedded mitigation (see *Section 15.5.2*). ICOL propose and anticipates a consent condition that deals with this matter.
	Any application for Safety Zones will need to be carefully assessed and additionally supported by experience from the development and construction stages.	The 2013 ICOL NRA, which has been validated and submitted as part of this application, assessed 500 m 'rolling' safety zones during the construction, decommissioning and any major maintenance events. Therefore an application for Safety Zones is included as embedded mitigation. Consultation will be undertaken with relevant stakeholders to ensure effective implementation and management of Safety Zones (see *Section 15.5.2*).
	Particular consideration will need to be given to the implications of the Development Area size and location on Search and Rescue (SAR) resources and Emergency Response Co-operation Plans (ERCoPs). Attention should be paid to the level of Radio Detection and Ranging (Radar) surveillance, Automatic Identification System (AIS) and shore-based Very High Frequency (VHF) radio coverage and give due consideration for appropriate mitigation such as Radar, AIS receivers and in-field, Marine Band VHF radio communications aerial(s) (VHF voice with Digital Selective Calling (DSC)) that can cover entire wind farm sites and their surrounding areas.	MCA SAR capability has been taken into consideration, with SAR resources considered within the baseline environment. The establishment of an ERCoP is included as embedded mitigation (see *Section 15.5.2*) and will be secured through an appropriately worded consent condition.
Royal Yachting Association (RYA) (Scoping Opinion)	The new edition of the United Kingdom (UK) Coastal Atlas of Recreational Boating uses AIS to produce heat maps of recreational vessel activity and is considered to provide a better update of recreational traffic than a further 28 days of AIS data collection.	This data has been analysed within the baseline (see *Section 15.6.5)* in addition to analysis of the recreational vessel traffic recorded throughout a data validation study.

Consultees	Scoping Response	ICOL Response
	The NRA should only concentrate on those receptors which may be subject to significant effects from the Development.	Throughout the impact assessment, commercial vessels, commercial fishing vessels and recreational vessels have been considered. It is noted that the NRA (*Appendix 15C.1*) does consider all receptors as per the requirements of *MGN 543*.
	Agree with the impacts scoped in or out from the EIA Report and that the appropriate receptors and impacts have been included.	Noted.
	Agree that an updated Hazard Workshop is not required.	Noted.
Scottish Fishermen's Federation (SFF) (Scoping Opinion)	There is a need for anchorages/ laybys for construction vessels, particularly tugs with barges to be scoped in owing to their possible impacts on static fishing gears inshore of the Development.	This has been discussed with the SFF. Through the implementation of Fishing Industry Representative the Fishery Liaisons Officer and the approval and implementation of a Navigational Safety Plan (NSP), which has been considered as embedded mitigation, and likely to be secured through a post consent condition, navigational conflict will be dealt with through this means. The NSP will include known anchorages and areas of fishing activity to ensure construction traffic minimises negative interactions when selecting anchorage/ layby sites.
	Any potential impacts on SAR missions would also be expected to be taken into account.	The Development will follow guidance on SAR access contained within *MGN 543* and the layout will be agreed as part of the Development Specification and Layout Plan (DSLP). The DSLP will be secured through an appropriately worded consent condition, the content of which will be consulted upon.
	There should be industry involvement in agreeing the Construction Method Statement (CMS), DSLP, Vessel Management Plan (VMP) and NSP.	These documents will be prepared post consent and are likely to be subject to an appropriately worded consent condition, which is likely to require consultation requirements.

Consultees	Scoping Response	ICOL Response
Northern Lighthouse Board (NLB) (Scoping Opinion)	Content with the topics included in the EIA Report and those sections requiring updated data. Likewise, also content with the extension of the Development's operational life to 50 years.	Noted.
Scottish Ministers (Scoping Opinion)	As discussed above for construction. SFF noted that there had been issues at the Beatrice Offshore Wind Limited (BOWL) site in relation to vessels 'queuing' while waiting to undertake work on the site. The Scottish Ministers agree this effect can be scoped out and advise ICOL to discuss with SFF how this issue can be dealt with in the Shipping and Navigation section.	ICOL have discussed with SFF the concerns associated with 'queuing' and other impacts associated with vessel traffic interfering with the fishing industry. ICOL have noted the issues that have been experienced by some of the fishing industry during the construction of BOWL (and other developments). ICOL have discussed with SFF the post consent requirements that will include the need for a NSP as well as a VMP. The NSP will include known anchorages and areas of fishing activity to ensure construction traffic minimises negative interactions when selecting anchorage/ layby sites. Whilst the VMP will set out the types of vessels to be employed and the management and routing of those vessels. Both plans will ensure that appropriate marine co-ordination, anchorages and any need for queuing space, will be carried out with full consultation with the fishing industry.

5 Further to the formal scoping responses, consultations meetings were held with the MCA, NLB and CoS, details of which are provided below (Table 15.2). Further to this a pre-submission conference call was held with NLB and MCA (19 January 2018). The purpose of this call was to discuss the content of the EIA Report, and to provide the NLB and MCA with an overview of the submission and agree what should be included as part of it (details are provided in Table 15.2).

Table 15.2: Further consultations

Consultation	Consultees involved	Summary
Consultation meeting (23rd August 2017)	MCA and NLB	MCA noted that they were content that with the submission of the 2012 NRA, traffic validation study covering the Development Area, updated EIA Report and updated *MGN 543* checklist that neither a new NRA nor a new traffic study would be required. The validation study together with the updated RYA dataset was a suitable means of ensuring the marine traffic survey baseline has been properly considered. Additionally, no further modelling is required as part of the new application.
		Acknowledged that mitigation as per letter dated 29 April 2016 'Proposed Mitigation (Shipping & Navigation) for the Inch Cape Offshore Wind Farm and OfTW – ICOL' that had previously agreed remains valid for inclusion as part of the EIA Report, details have which have been incorporated
Consultation meeting (24th August 2017)	Chamber of Shipping (CoS)	CoS noted that the proposed approach and means of assessment for the new application seems appropriate, including data sources to be used within the assessment. CoS noted that the impact on steaming times and anchoring near the Offshore Export Cable route is assessed. Which ICOL confirmed that they are. CoS noted that a reduction in the size of the Development Area would be welcomed, which ICOL noted that the Development Area has not been reduced in size. The final site layout will be consulted on as part of the DSLP post consent.

Consultation	Consultees involved	Summary
Pre-submission meeting (19th January 2018)	MCA and NLB	An overview of the scope of the assessment, as described in *Section 15.3* was provided with MCA and NLB noting that they were content with the scope on the understanding it remains in line, where applicable, with *MGN 543*(as demonstrated in the MGN Checklist submitted as part of the application). The MGN checklist submitted as part of this application needs to identify where in the submission each requirement can be found.

15.3 Scope of Assessment

6 As part of this application, ICOL has drawn on the detail presented in the Scoping Report and subsequent Scoping Opinion from Marine Scotland Licensing Operations Team (MS-LOT) to agree on those impacts that may lead to a significant effect. Therefore, this chapter focusses on those impacts on shipping and navigation that have been agreed throughout this process as being necessary to be assessed, as detailed in Table 15.3 below. Table 15.4 outlines the scope of the Cumulative Impact Assessment (CIA).

7 For clarity, those impacts that have been agreed to be scoped out of this EIA Report are included in Table 15.5 below. For further information, reference should be made to the Scoping Report and the Scoping Opinion which can be found on Marine Scotland's website[1].

Table 15.3: Scope of assessment covered in this chapter

Potential Impact	Scope of Assessment	Reason
Operations & Maintenance (O&M) Phase		
Increased vessel to vessel collision risk	Commercial vessels, commercial fishing vessels and recreational vessels within the Development Area.	The presence of the Inch Cape Wind Farm reduces the available sea room and therefore may result in an increased vessel to vessel collision risk.
Creation of vessel to structure allision risk	Commercial vessels, commercial fishing vessels and recreational vessels within the Development Area.	The Inch Cape Wind Farm structures create a vessel to structure allision risk for both vessels under power and drifting in the vicinity of the Development Area.

[1] At the time of writing these documents can be found at this link: http://www.gov.scot/Topics/marine/Licensing/marine/scoping/ICOLRevised-2017 [Accessed 17/04/2018].

Potential Impact	Scope of Assessment	Reason
Effects on anchoring operations	Commercial vessels and recreational vessels within the Offshore Export Cable Corridor.	The Offshore Export Cables present a snagging risk for vessels anchoring including emergency anchoring in the vicinity.
Fishing gear snagging risk (navigational safety risk)	Commercial fishing vessels within the Offshore Export Cable Corridor.	The Offshore Export Cables present a gear snagging risk for commercial fishing vessels undertaking operations in the vicinity.

Table 15.4: Scope of CIA covered in this chapter

Potential Impact	Scope of Assessment	Reason
O&M Phase		
Increased transit times and distances	Commercial vessels	The presence of wind farms reduces the available sea room and therefore may result in increased transit times and distances.
Increase of vessel to vessel collision risk	Commercial vessels	The presence of wind farms reduces the available sea room and therefore may result in an increased vessel to vessel collision risk.
Vessel to structure allision risk	Commercial vessels, Commercial fishing vessels and Recreational vessels	The presence of wind farms reduces the available sea room and therefore may result in an increased vessel to structure allision risk.
Increase of visual confusion when navigating.	Commercial vessels	The presence of wind farms may increase visual confusion when navigating.
Deviations to avoid the wind farm areas	Commercial fishing vessels	The presence of wind farms may result in deviations to avoid wind farm areas.

Table 15.5: Impacts scoped out of this chapter

Potential Impact	Justification for Scoping out of the EIA
Construction (& Decommissioning) Phase	
Increased transit times and distances for commercial vessels.	Worst case parameters for the impact have already been assessed given that construction and decommissioning impacts consider the maximum development area and therefore maximum displacement (regardless of the number of structures within it). Agreed by MS-LOT in their Scoping Opinion that the impact does not need to be assessed in the EIA as it is unlikely to lead to significant effects. During consultation with the MCA they noted that they were content with the submission of the 2012 NRA, traffic validation study, updated EIA report (including impacts scoped out as per following paragraph) and updated *MGN 543* Checklist that neither a new NRA nor a new traffic study would be required. MCA also agreed that no further modelling was required as part of the new application. During construction and decommissioning, mitigation measures (notably construction buoyage) used to allow commercial vessels to re-route as part of their passage plans will form part of the embedded mitigation and be secured through the Section 36 consent conditions as part of the NSP and VMP.
Increased vessel to vessel collision risk for commercial vessels, commercial fishing vessels and recreational vessels.	Worst case parameters for the impacts scoped out have already been assessed given that construction and decommissioning impacts consider the maximum development area and therefore displacement (regardless of the number of structures). Allision and snagging risk assumes a maximum number of structures. Agreed by MS-LOT in their Scoping Opinion that the impact not required to be assessed in the EIA it is unlikely to lead to significant effects. During consultation the MCA noted that they were content with the submission of the 2012 NRA, traffic validation study, updated EIA report (including impacts scoped out as per following paragraph) and updated *MGN 543* Checklist that neither a new NRA nor a new traffic study would be required. MCA also agreed that no further modelling was required as part of the new application. During construction and decommissioning, mitigation measures (notably construction buoyage) used to allow commercial vessels to re-route as part of their passage plans will form part of the embedded mitigation and be secured through the Section 36 consent conditions as part of the NSP and VMP.
Creation of vessel to structure allision risk with partially constructed structures for commercial vessels, commercial fishing vessels and recreational vessels.	
Gear snagging risk on partially constructed structures or installed cables for commercial fishing vessels.	
O&M Phase	

Potential Impact	Justification for Scoping out of the EIA
Increased transit times and distances for commercial vessels.	Given that the worst case maximum build out (including maximum number of structures as well as maximum number of vessels and personnel) has been assessed there are not considered to be any perceptible change in the level of risk during the O&M phase Agreed by MS-LOT in their Scoping Opinion that the impact does not need to be assessed in the EIA as it is unlikely to lead to significant effects. During consultation the MCA noted they were content with the submission of the 2012 NRA, traffic validation study, updated EIA report (including impacts scoped out) and updated *MGN 543* Checklist that neither a new NRA nor a new traffic study would be required. MCA also agreed that no further modelling was required as part of the new application.
Increased need for emergency response activities and restricted access to casualties within the Development Area.	
Effectiveness of marine Radar systems.	

15.4 Regulation and Guidance

8 The primary guidance documents used during the assessment are as follows:

- *MGN 543 Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response* (MCA, 2016);
- *Methodology for Assessing the Marine Navigational Safety Risks of Offshore Wind Farms* (MCA, 2016); and
- *Guidelines for Formal Safety Assessment (FSA) – MSC/Circ. 1023* (IMO, 2002).

9 *MGN 543* highlights issues that will be taken into consideration when assessing the effect on navigational safety from offshore renewable energy developments within UK internal waters, territorial sea or Renewable Energy Zones (REZ).

10 The MCA require that the MCA methodology is used as a template for preparing NRAs. It is centred upon risk management and requires a submission that shows that sufficient controls are, or will be, in place for the assessed risk (base case and future case) to be judged as broadly acceptable or tolerable and not unacceptable.

11 As per MCA requirements the IMO FSA guidelines approved by the IMO in 2002 under *SC/Circ.1023/MEPC/Circ392* (IMO, 2002) has been applied within this assessment. This is a structured and systematic methodology based upon risk analysis and cost benefit analysis (if applicable).

12 Other guidance documents used during the assessment are as follows:

- *MGN 372 Offshore Renewable Energy Installations (OREIs) Guidance Operating in the Vicinity of UK OREIs* (MCA, 2008);
- *International Association of Marine Aids to Navigation and Lighthouse Authorities (*International Association of Lighthouse Authorities (*IALA)) – O-139 The Marking of Man-Made Offshore Structures, Edition 2* (IALA, 2013); and
- *The RYA's Position on Offshore Renewable Energy Developments Paper 1 – Wind Energy* (RYA, 2015).

15.5 Design Envelope and Embedded Mitigation

15.5.1 Design Envelope

13 As the design of the wind farm is not fixed and flexibility in the design envelope is required, the following key parameters, detailed in Table 15.6, represent the worst-case scenario for impacts on shipping and navigation interests. For the shipping and navigation impact assessment, it is considered that the worst-case scenario would represent the greatest number of WTGs being considered and the installation of the maximum number of OSPs all on the largest jacket foundation (i.e. maximum loss of navigable sea area), all located within the Development Area. This is based on the assumption that there will be increased potential for allisions and collisions when there are more and larger structures in place. The indicative worst case position of the WTGs and the other structures considered in the assessment is presented in Figure 15.1, which also includes the Inch Cape Offshore Met Mast currently installed within the Development Area.

Table 15.6: Worst-case scenario definition - Development Area

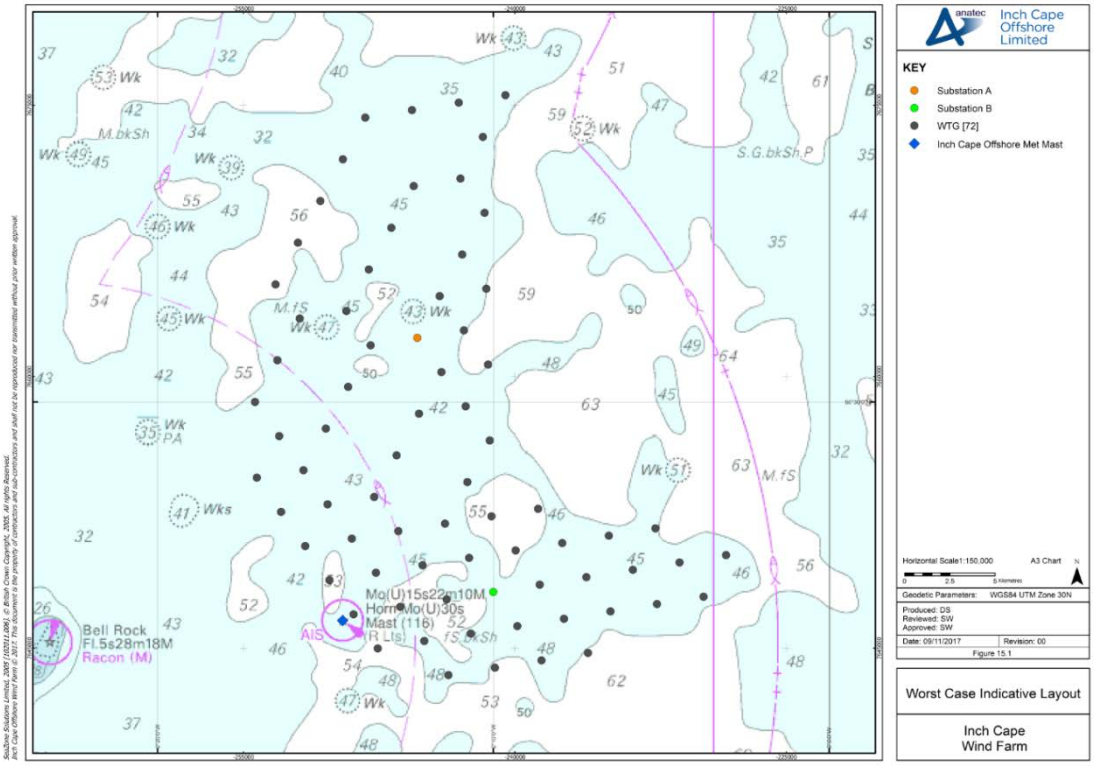
Potential Impact	Design Envelope Scenario Assessed
Operational Phase	
Increased vessel to vessel collision risk	• 72 WTGs compliant with *MGN 543*; • Two OSPs internal to the wind farm; • Micro siting ± 50 metres (m); • Closest average downwind spacing of 1,278 m; • Closest average crosswind spacing of 1,278 m; • Jacket foundations for WTGs: o 30 m × 30 m dimension at sea level for WTGs; and o 100 m × 100 m dimension at sea level for OSPs. • WTG minimum blade clearance of 22 m minimum above Mean High Water Springs (MHWS); • Minimum Under Keel Clearance (UKC) of four metres below MHWS; and • Offshore construction period of approximately 24 months over a three year period
Creation of vessel to structure allision risk	

14 Key parameters for the worst-case scenario, within the Offshore Export Cable Corridor, for each potential impact are detailed in Table 15.7. For this assessment, these include consideration of two cables each running parallel over an approximate distance of 83 kilometres (km) between the Development Area and the landfall near Cockenzie. The Offshore Export Cables will either be buried to a depth of up to three metres (target depth of one to three metres) or protected by a suitable and appropriate means where burial is not practicable. It has been assumed that as a worst case 80 -100 per cent of cables will be successfully buried to provide the required cover to the cables. Some sections of cable may be exposed over time and represent a snagging risk for vessels' anchors and fishing gear. There will be a series of cable route inspection surveys carried out over the life of the Development. These will monitor the status of the cables and identify any exposed areas to allow any required remedial works campaign to be planned.

Table 15.7: Worst case scenario definition - Offshore Export Cable Corridor

Potential Impact	Design Envelope Scenario Assessed
Operational Phase	
Impacts on anchoring operations	The main impact will be for those vessels anchoring in close proximity to the Offshore Export Cables, or those required to do so in an emergency situation, such as machinery failure. The following parameters represent the worst-case scenario: • 80-100% buried to 1-3 m target depth. Remaining burial of 0 m with cable protection; and • Two Offshore Export Cables with length 83.3 km.
Fishing Gear snagging risk	The main impact will be for those commercial fishing vessels actively engaged in fishing activities in close proximity to the Offshore Export Cables. The following parameters represent the worst-case scenario: • 80-100% buried to 1-3 m target depth. Remaining burial of 0 m with cable protection; and • Two Offshore Export Cables with length 83.3 km.

Figure 15.1: Worst case indicative layout



15.5.2 Embedded Mitigation

15 The assessment of effects on shipping and navigation has taken into account the following embedded mitigation measures:

- WTGs will be designed in accordance with *MGN 543* and procedures put in place for generator shut down and other operational requirements in emergency situations to reduce impacts on SAR provision;
- An application (including a safety case) will be made for 500 m 'rolling' Safety Zones to be established around working areas during construction, decommissioning and major maintenance activities to ensure vessels not associated with the works remain at a safe distance (further information can be found in *Appendix 15C.1*). Consultation will be undertaken with relevant stakeholders to ensure effective implementation and management of Safety Zones;
- Inch Cape Wind Farm structures including the Offshore Export Cable will be marked on relevant United Kingdom Hydrographic Office (UKHO) Admiralty charts. Inter-array cables may also be charted depending upon the scale of the individual chart;
- Inch Cape Wind Farm structures will be marked and lit in accordance with *Recommendation O-139 on the Marking of Man-Made Structures* (IALA, 2013) and the final lighting and marking scheme will be agreed with the relevant stakeholders prior to the commencement of construction though a lighting and marking plan (LMP);

- WTGs will be designed and constructed to ensure that the minimum blade clearance is at least 22 m minimum above MHWS;
- An ERCoP will be established for the Development and put in place for the construction, operations and maintenance (O&M) and decommissioning phases. The ERCoP will be based upon the MCA template and prepared in consultation with the MCA SAR safety branch;
- Offshore Export Cables and Inter-array cables will be suitably buried or protected by other means when burial is not practicable in order to reduce the risk of snagging and mitigate any effect on magnetic compasses due to Electromagnetic Interference (EMF). Consultation will be undertaken with the appropriate stakeholders to ensure that safe Under Keel Clearance (UKC) requirements will be maintained and periodically monitored throughout the installation life;
- Appropriate marine co-ordination (through a dedicated marine co-ordination function) of the Development's own vessels will be implemented in order to ensure that construction vessels do not create an additional risk to third parties;
- A risk assessment will be carried out to determine any requirements for guard vessels during the construction phase or major maintenance (if necessary), any requirements will thereby be implemented accordingly;
- Additional temporary buoyage, relating to partially constructed works, will be determined through risk assessment and agreed in consultation with the NLB; and
- A monitoring plan will be determined for the Offshore Export Cables, which considers higher risk areas such as anchorage locations. Appropriate remedial action will be taken where required.

Consent Conditions

16 As well as the embedded mitigation measures, ICOL proposes to commit to the purpose of the relevant consent conditions granted for the Inch Cape 2014 Consent, as they are still relevant to this application. This will provide reassurance to stakeholders that the relevant issues will be addressed and secured by way of appropriate conditions.

17 ICOL recognises that the wording and detail of the consent conditions will be at the discretion of the Scottish Ministers. For shipping and navigation interests, ICOL propose that the consent conditions address matters surrounding, but not limited to, the following;

- Development Specification and Layout Plan (DSLP);
- Production of a Vessel Management Plan (VMP);
- Production of a Navigational Safety Plan (NSP);
- Production of Cable Plan;
- Production of an Operations and Maintenance Plan (OMP); and
- Production of a Lighting and Marking Plan (LMP).

15.6 Baseline Environment

15.6.1 Introduction

18 The following section gives an overview of the baseline assessment which can be found in full in *Appendix 15A* and *Appendix 15C.*

15.6.2 Study Areas

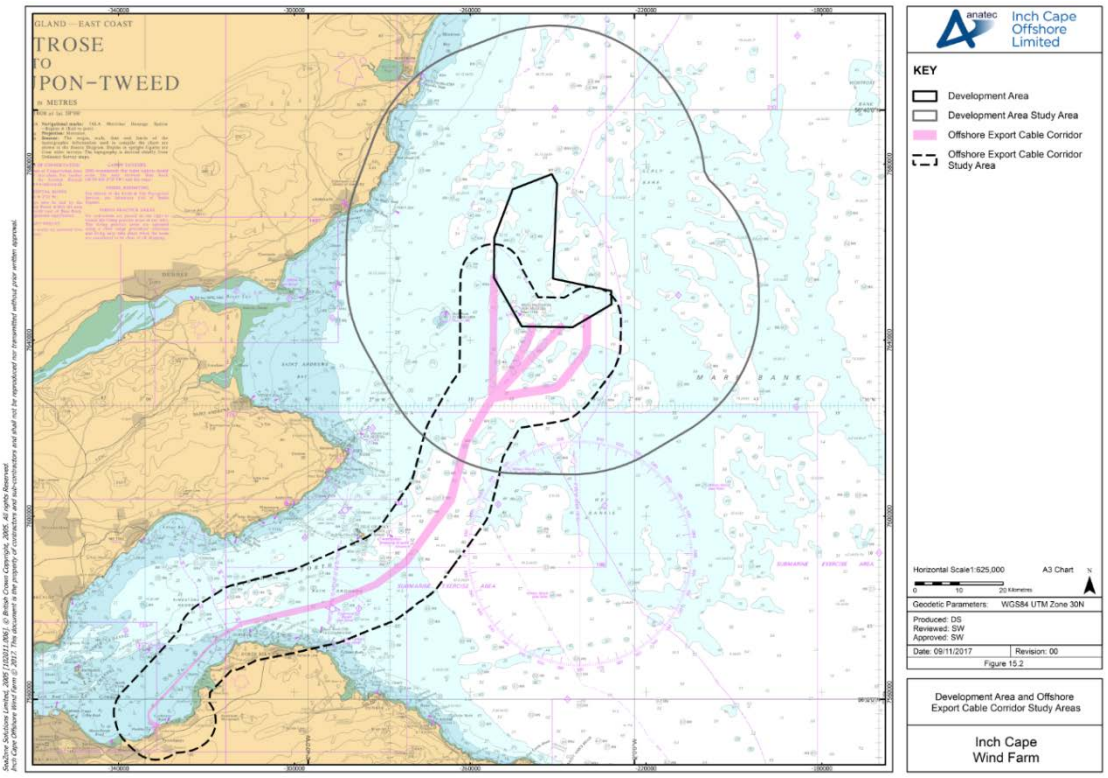
19 A 10-nautical mile (nm) buffer around the Development Area (the 'Development Area Study Area') has been defined in order to provide a sufficient distance within which to capture shipping movements and navigational features within and in the vicinity of the Development Area (as shown in Figure 15.2).

20 A minimum two nm buffer has also been applied around the Offshore Export Cable Corridor (the 'Offshore Export Cable Corridor Study Area') and again has been defined in order to provide a sufficient distance within which to capture shipping movements and navigational features within and in the vicinity of the Offshore Export Cable Corridor (as shown in Figure 15.2).

15.6.3 Data Sources

21 Two AIS marine traffic surveys were undertaken in waters in and around the Development Area to identify vessel activity. The data collection included both summer and winter periods to take account of seasonal patterns in marine traffic. Fourteen days of data were collected from shore based stations in June 2016 and 14 days of data were collected from shore based receivers in December 2016, giving a combined dataset of 28 days.

Figure 15.2: Development Area and Offshore Export Cable Corridor Study Areas



22 Two AIS marine traffic surveys were undertaken in waters in and around the Offshore Export Cable Corridor. The data collection included both summer and winter periods to take account of seasonal patterns in marine traffic. 28 days of Firth and Tay Offshore Wind Developers Group data were collected from coastal survey sites in January/ February 2011 and 28 days of data were collected from shore based stations in May 2012. This approach was agreed with the MCA, NLB and CoS.

23 Full details of the marine traffic surveys can be found in *Appendix 15A* and *Appendix 15C.*

24 AIS is required on board all vessels of more than 300 gross tonnage (GT) engaged on international voyages, cargo vessels of more than 500 GT not engaged on international voyages and passenger vessels irrespective of size built on or after 1 July 2002. At the time of the Offshore Export Cable Corridor marine traffic surveys, fishing vessels of 45 m length and over were required to carry AIS. This requirement has since changed, with fishing vessels of 15 m length and over required to carry AIS as of 31 May 2015 under *European Union (EU) Directive 2009/17/EC*.

25 In addition to the marine traffic data collected during the vessel surveys within the vicinity of the Development Area and Offshore Export Cable Corridor, the following data sources were also used to inform the description of the baseline environment:

- *RYA UK Coastal Atlas of Recreational Boating* dataset (RYA, 2016);
- Maritime incident data from the Marine Accident Investigation Branch (MAIB) and the Royal National Lifeboat Institution (RNLI) (2005 to 2014);

- UK Admiralty charts 1407-0 and 734-0 (UKHO); and
- *Admiralty Sailing Directions – North Sea (West) Pilot, NP 54* (UKHO, 2016).

15.6.4 Receptors

26 In terms of vessels potentially affected by the Development, commercial vessels, commercial fishing vessels and recreational vessels are considered relevant receptors. In addition, emergency responders may also be affected by the Development. The baseline for the Development Area and Offshore Export Cable Corridor outlined in *Section 15.6.55* and *Section 15.6.66* respectively is considered for each of these receptors.

15.6.5 Development Area Baseline

27 The main navigational feature in proximity to the Development Area is the Radar Beacon (Racon) transmitting Morse letter 'M' (- -) located on Bell Rock (as shown in Figure 15.1), approximately four (nm south-west of the Development Area. The light on Bell Rock is a flashing light every five seconds, at a height of 28 m above height datum with a luminous range of 18 nm.

28 The Inch Cape Offshore met mast is located within the Development Area, close to the south-western boundary. This met mast was installed in October 2014 and records accurate wind resource, direction and velocity data for the area. It carries a Morse code light of 15 seconds and has a minimum range of 10 nm.

29 There are a number of spoil grounds located in proximity to the Development Area. The closest of these are located approximately eight nm west of the Development Area, towards the coast. There is a foul area approximately 17 nm south-west of the Development Area. Vessels are cautioned from anchoring or fishing within this area due to the existence of obstructions on the seabed. There are two disused dumping grounds for ammunition and boom defence gear to the east of the Isle of May, approximately 16 nm south-west of the Development Area.

30 There is a submarine exercise area approximately seven nm south of the Development Area.

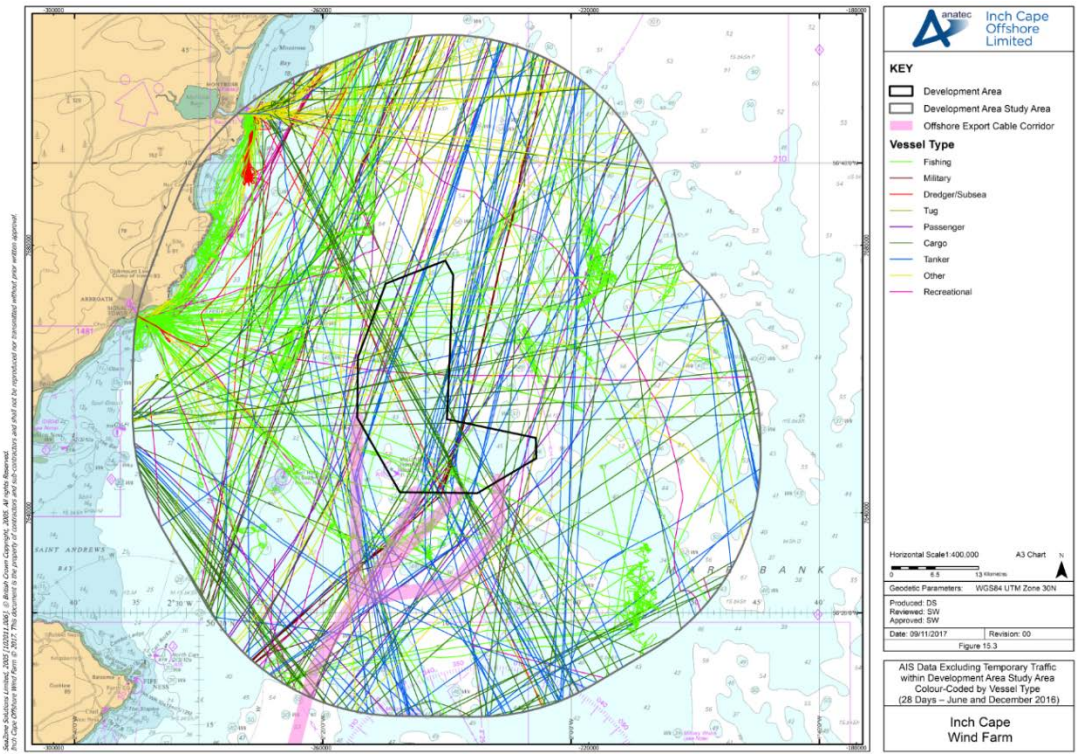
31 There are no oil and gas surface platforms or licensed aggregate dredging sites in proximity to the Development Area.

32 Other navigational features scoped out of the EIA assessment can be found in *Appendix 15C.*

Commercial Vessels

33 Figure 15.3 presents the vessel tracks recorded on AIS during the combined 28 day survey period, colour-coded by vessel type. Temporary traffic such as survey vessels operating in the area have been excluded from Figure 15.3 and the subsequent analysis since such traffic is classed as non-routine. Note that Figure 15.5 and Figure 15.6 isolate the vessel tracks for a particular vessel type; additional figures for individual vessel types can be found in *Appendix 15A*.

Figure 15.3: AIS data excluding temporary traffic within Development Area Study Area colour-coded by vessel type (28 Days – June and December 2016)



34 There was an average of 15 unique vessels per day recorded on AIS passing within the Development Area Study Area. Within the Development Area itself this reduced to approximately three to four unique vessels per day.

35 The majority of tracks recorded within the Development Area Study Area were fishing vessels (32 per cent). 'Other' vessels and cargo vessels made up 22 per cent and 20 per cent of the traffic recorded respectively. The 'other' vessels category included offshore support vessels, RNLI lifeboats and pilot vessels. The remainder of the traffic (26 per cent) comprised tankers, recreational vessels, passenger vessels, military vessels, dredgers and tugs.

36 The AIS data has been assessed and vessels identified as transiting at similar headings and broadcasting similar destinations have been identified as transiting a route. Twelve main commercial routes have been identified as transiting within the Development Area Study Area as shown in Figure 15.4. Details of the routes are provided in Table 15.8.

Figure 15.4: Main commercial vessel routes within Development Area Study Area

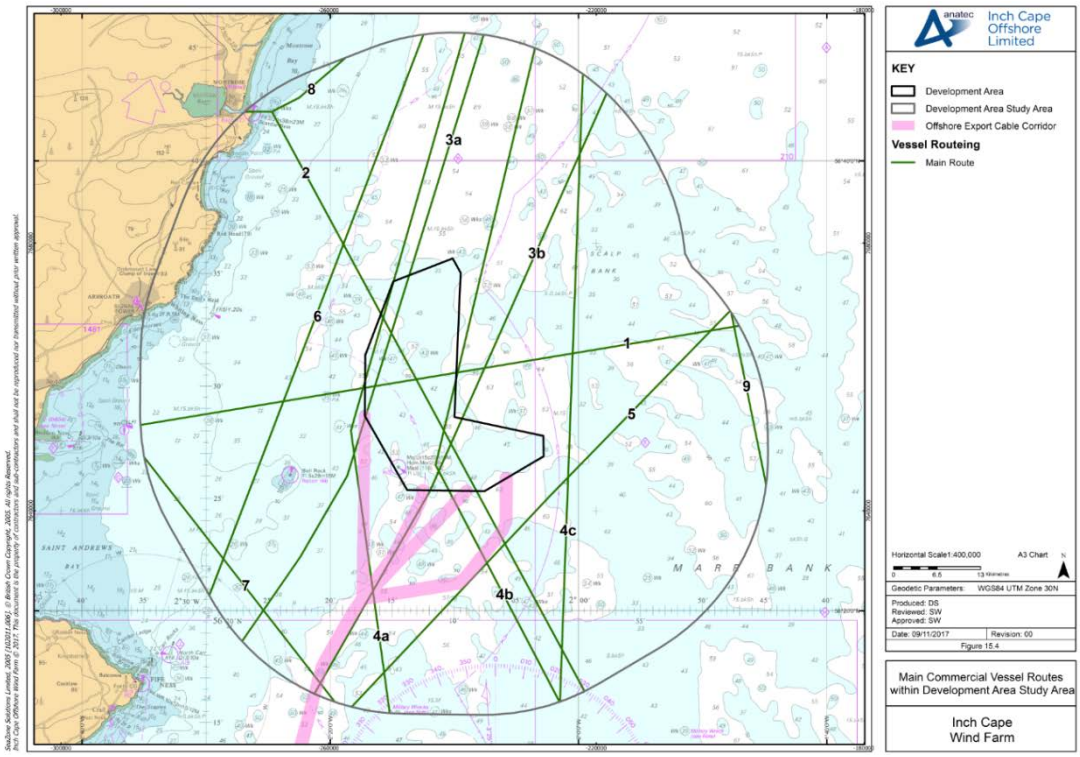


Table 15.8: Description of main commercial shipping routes

Route Number	Route Description	Vessel Numbers	Main Vessel Type(s)
1	River Tay ports – ports in northern Europe	1 vessel every 2 to 3 days	Cargo vessels
2	Montrose – European ports	1 vessel every 2 to 3 days	Cargo vessels
3a	Forth ports – northern Scotland	1 vessel every 4 days	Passenger vessels
3b		1 vessel every 1 to 2 days	Cargo vessels, tankers, passenger vessels
4a	Immingham within the Humber Estuary – northern Scotland	1 vessel every 1 to 2 days	Tankers
4b		1 vessel every 1 to 2 days	Tankers
4c		1 vessel every 3 days	Cargo vessels, tankers
5	Forth ports – northern Europe	1 vessel every 10 days	No specific usage

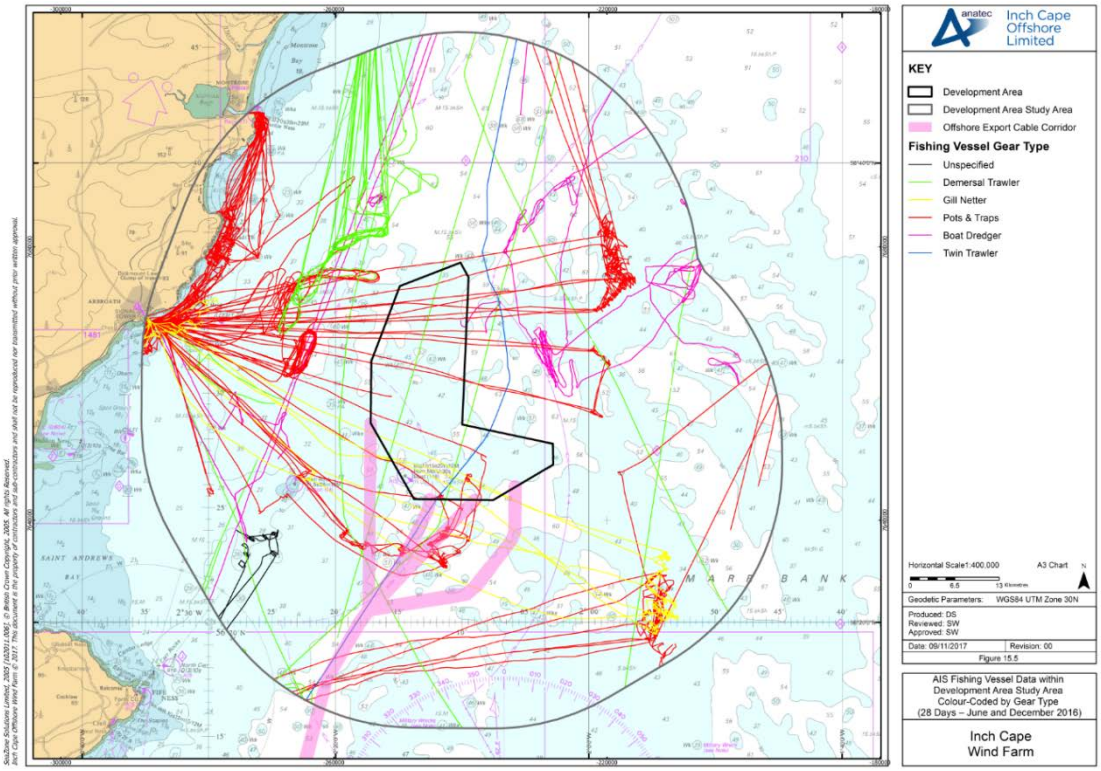
Route Number	Route Description	Vessel Numbers	Main Vessel Type(s)
6	Forth ports – northern UK coastal routes	1 vessel every 2 days	Fishing vessels, cargo vessels, tankers
7	River Tay ports – ports in northern Europe	1 vessel every 2 days	Cargo vessels
8	Montrose – northern UK coastal routes	1 vessel every 1 to 2 days	Cargo vessels, offshore support vessels
9	Aberdeen – Immingham	1 vessel every 3 days	Tankers

Fishing Vessels

37 Figure 15.5 presents the fishing vessels recorded on AIS within the Development Area Study Area for the combined 28-day survey period.

38 There was an average of four to five unique fishing vessels per day recorded within the Development Area Study Area. The number of fishing vessels was higher during the June 2016 survey data compared to the December 2016 survey data. Based upon track pattern and average speeds, the majority of fishing vessels were actively engaged in fishing activity rather than on transit, although there was limited fishing activity identified within the Development Area. Creelers were the most frequently recorded gear type (57 per cent), with creeling activity particularly prevalent to the north-west of the Development Area in the nearshore area between the ports of Montrose and Arbroath. See *Chapter 14* for further information on fishing activity.

Figure 15.5: AIS fishing vessel data within Development Area Study Area colour-coded by gear type (28 Days – June and December 2016)

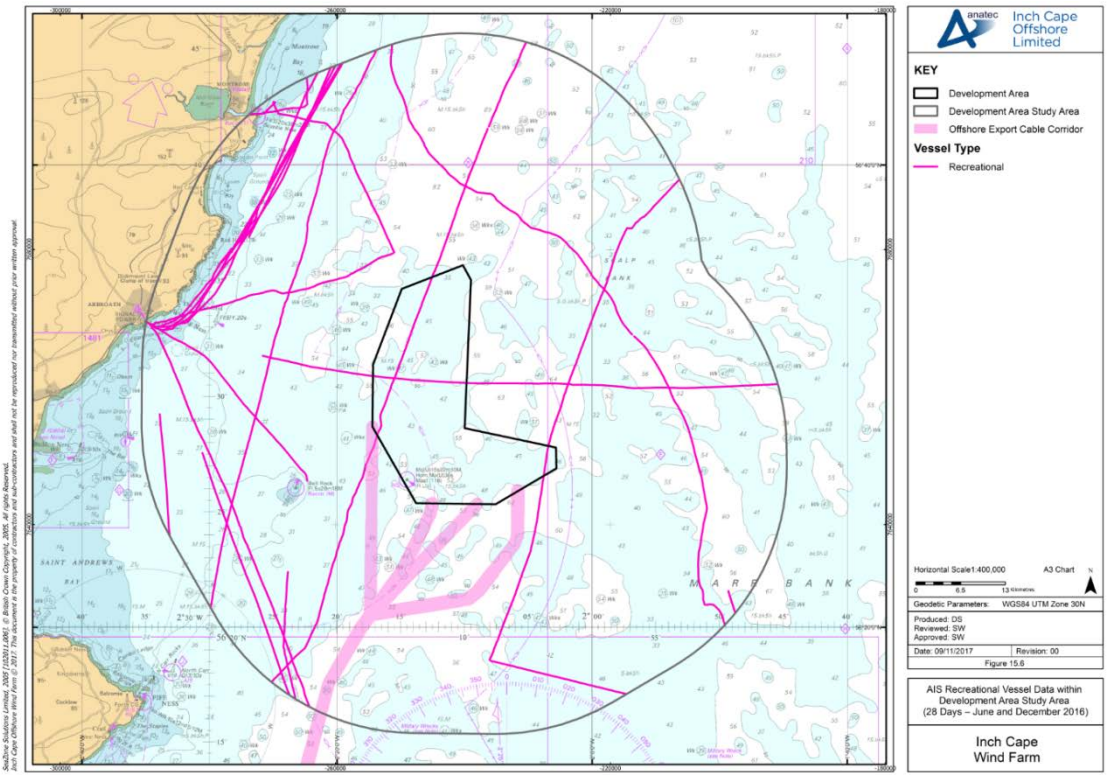


Recreational Vessels

39 Figure 15.6 presents the recreational vessels recorded on AIS within the Development Area Study Area for the combined 28-day survey period.

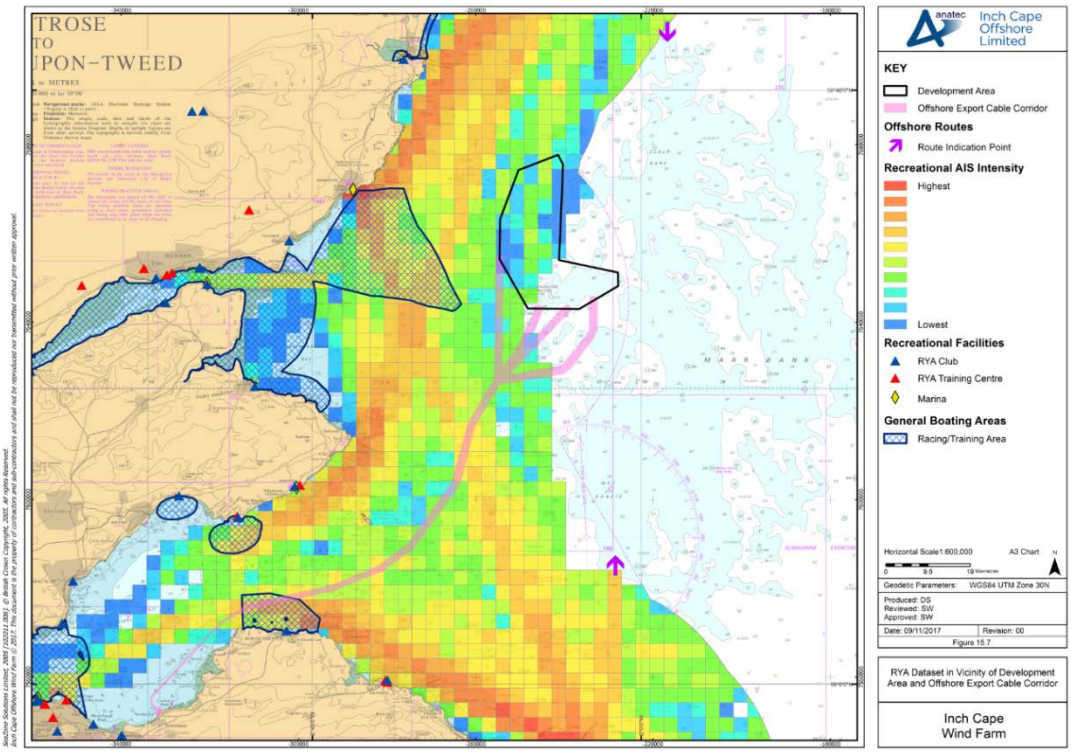
40 There was an average of two unique recreational vessels per day recorded within the Development Area Study Area, although no activity was recorded in December 2016. It can be seen that recreational vessels were recorded transiting past or within the Development Area, while a large proportion of the recreational traffic was transiting along the coastline to and from the port of Arbroath.

Figure 15.6: AIS recreational vessel data within Development Area Study Area (28 Days – June and December 2016)



41 Figure 15.7 presents the RYA's *UK Coastal Atlas of Recreational Boating* dataset in the vicinity of the Development Area. The recreational AIS intensity grid is based upon the total count of AIS intersections by recreational vessels over three summer periods between 2011 and 2013 and generally covers the coastal region up to 12 nm offshore. It is noted that from a survey undertaken by the RYA in 2014, 70 per cent of responders stated that they use AIS, with over half of AIS users having the function to both receive and transmit (RYA, 2014).

Figure 15.7: RYA dataset in vicinity of Development Area and Offshore Export Cable Corridor



42 Although the recreational AIS intensity grid only partially covers the Development Area, the intensity is seen to be relatively low compared to activity levels noted along the coast. As can be seen from Figure 15.6 a general boating area is located approximately 3.8 nm to the west of the Development Area. There are also two offshore routes in proximity to the Development Area, with one of these (with route indication point located south of the Development Area) potentially intersecting the Development.

Emergency Response – SAR Helicopters

43 Helicopter SAR operations are operated by the Bristow Group which were awarded the contract by the MCA (through their Department for Transport (DfT) remit) to provide helicopter SAR operations in the UK over a 10-year period from April 2015, taking over responsibility from the Royal Air Force (RAF) and Royal Navy.

44 The closest SAR helicopter bases to the Development Area are located at Prestwick and Inverness. The Prestwick base is situated approximately 83 nm south-west of the Development Area and the Inverness base is situated approximately 96 nm north-west of the Development Area. The new Leonardo AW189 helicopter entered service at Prestwick in July 2017 and is anticipated to be in use at Inverness by 2019 (the Sikorsky S-92 is in use at Inverness until this time). The AW189 has an endurance of over four hours and air speed of 166 miles per hour (mph) giving a radius of action of approximately 300 nm which is well within the range of the Development Area.

Emergency Response – RNLI Lifeboats

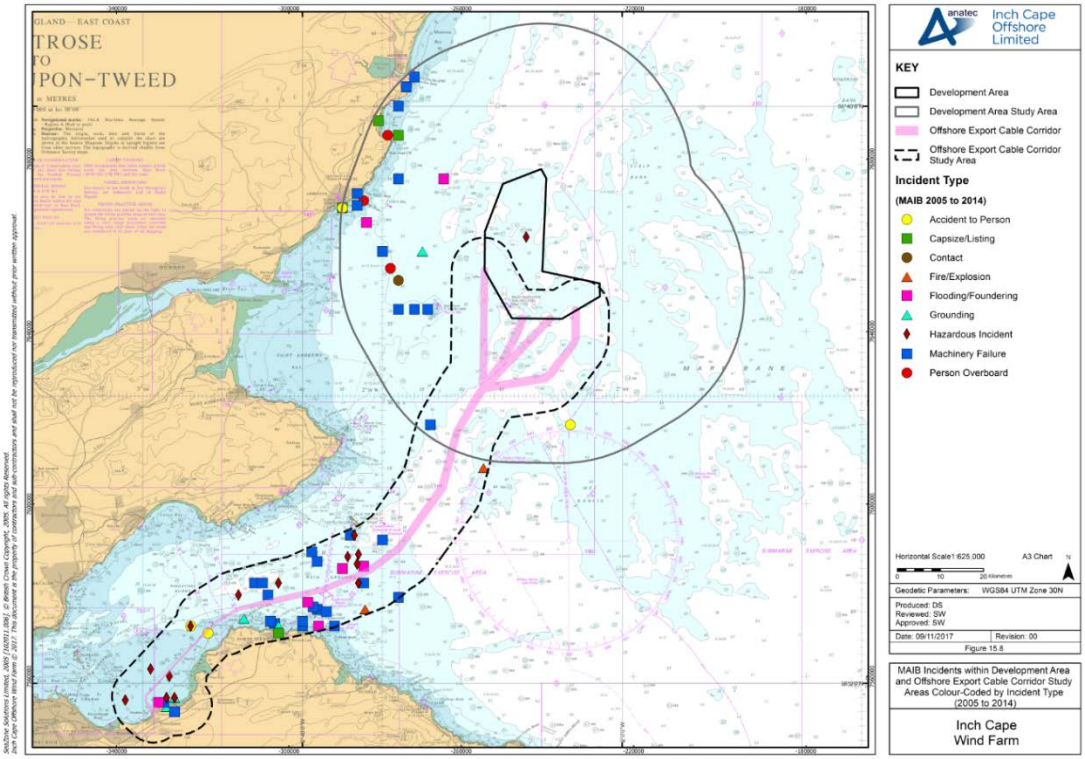
45 The RNLI maintains an active fleet of over 350 lifeboats (of various types ranging from five metres to 17 m in length) and a relief fleet of over 100 boats at more than 350 stations around the coast of the UK and the Republic of Ireland.

46 Based on the offshore position of the Development Area it is likely that the All-Weather Lifeboats (ALBs) from Montrose or Arbroath would respond to an incident. This is confirmed when reviewing historical incident data (see the *Maritime Incidents* section below).

Maritime Incidents

47 MAIB and RNLI data from within the Development Area study area were analysed for the period 2005 to 2014. Figure 15.8 includes the locations of incidents reported to the MAIB within the Development Area Study Area. A total of 24 unique incidents (excluding incidents in port/harbour areas) involving 26 vessels were reported to the MAIB, corresponding to between two and three incidents per year. Only one incident was recorded within the Development Area, involving a near miss between a sailing vessel and cruise liner in August 2007, defined as a hazardous incident.

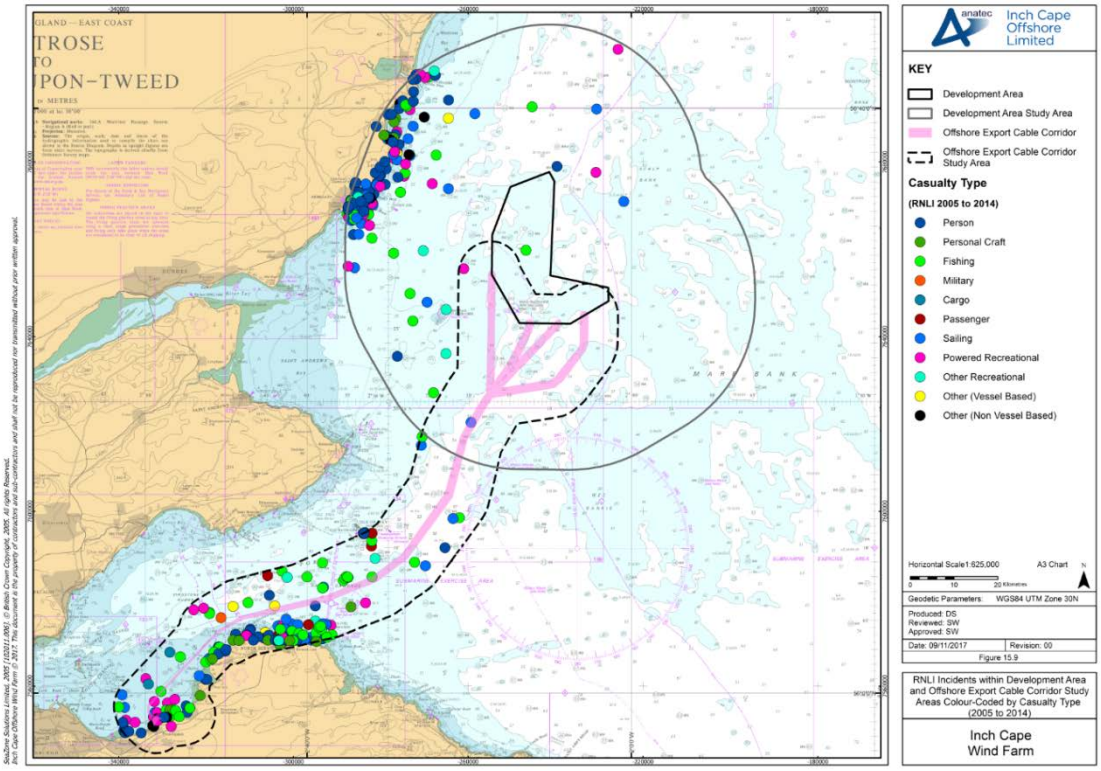
Figure 15.8: MAIB incidents within Development Area and Offshore Export Cable Corridor Study Areas colour-coded by incident type (2005 to 2014)



48 Figure 15.9 includes the locations of incidents recorded by the RNLI within the Development Area Study Area. A total of 196 unique incidents were recorded by the RNLI (excluding hoaxes and false alarms), corresponding to between 19 and 20 incidents per year. Only one incident was recorded within the Development Area, involving a fishing vessel experiencing machinery

failure in January 2013. The vast majority of incidents were responded to by lifeboats from either Arbroath (approximately 77 per cent) or Montrose (approximately 23 per cent). The incidents further offshore, including those within or in close proximity to the Development Area, tended to be responded to by ALBs as opposed to Inshore Lifeboats (ILBs).

Figure 15.9: RNLI incidents within Development Area and Offshore Export Cable Corridor Study Areas colour-coded by casualty type (2005 to 2014)



15.6.6 Offshore Export Cable Corridor Baseline

49 The main navigational features in the Offshore Export Cable Corridor Study Area are a number of designated anchorage areas and anchor berths in the Firth of Forth, none of which intersect the Offshore Export Cable Corridor.

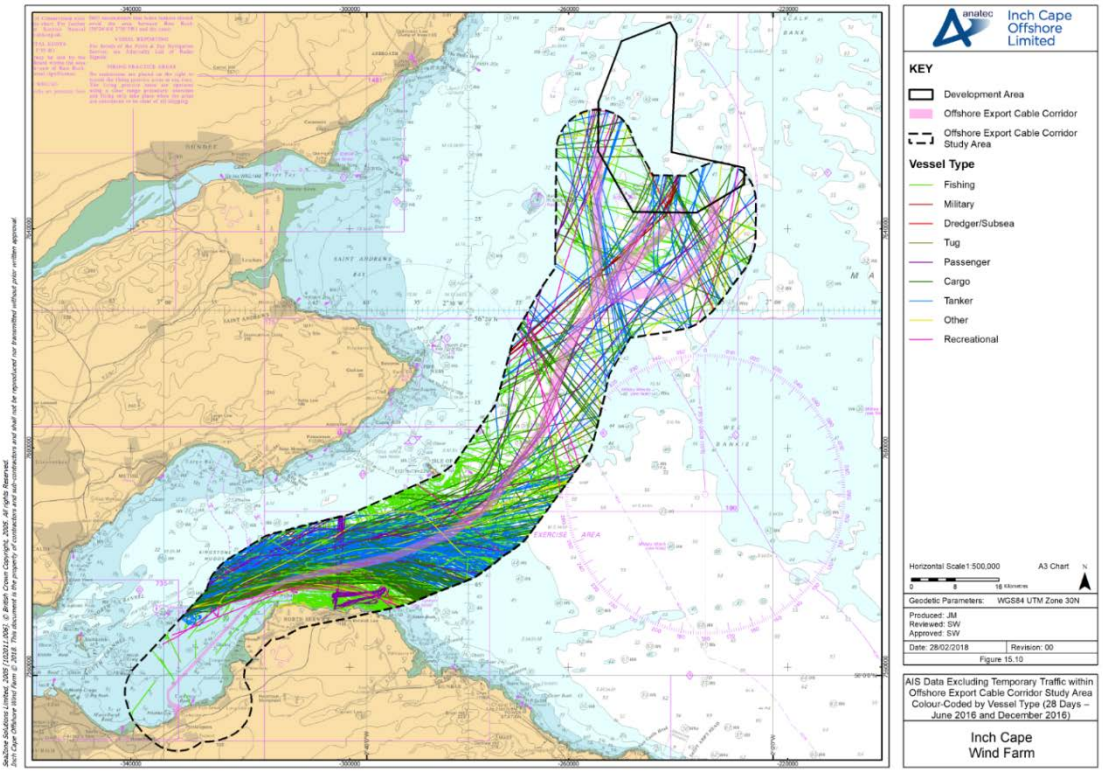
50 As with the Development Area, there are no oil and gas surface platforms or licensed aggregate dredging sites in proximity to the Offshore Export Cable Corridor.

51 There are three Marine Environmental High Risk Areas (MEHRAs) located in proximity to the Offshore Export Cable Corridor, as shown in Figure 15.11. These are located around Bass Rock and the adjacent coastline (approximately 1.4 nm south of the Offshore Export Cable Corridor), along the cliffs of the Isle of May (approximately 2.8 nm north-west of the Offshore Export Cable Corridor) and at Anstruther (approximately 6.8 nm north of the Offshore Export Cable Corridor). In each case the MEHRA has been designated on wildlife, landscape and geological grounds.

Commercial Vessels

52 Figure 15.10 presents the vessel tracks recorded on AIS during 14 days in June 2016 and 14 days in December 2016 (the same periods analysed within the Development Area Study Area), colour-coded by vessel type. Temporary traffic has been excluded from these figures and the subsequent analysis.

Figure 15.10: AIS data excluding temporary traffic within Offshore Export Cable Corridor Study Area colour-coded by vessel type (56 Days – January/February 2011 and May 2012)



53 Across the 28 day survey period there was an average of 27 unique vessels per day recorded on AIS passing within the Offshore Export Cable Corridor Study Area. In terms of vessels intersecting the Offshore Export Cable Corridor, there was an average of approximately 20 unique vessels per day.

54 The majority of tracks recorded within the Offshore Export Cable Corridor Study Area were fishing vessels (33 per cent), tankers (28 per cent) and cargo vessels (26 per cent). The remainder (13 per cent) of the traffic comprised passenger vessels, 'other' vessels, recreational vessels, military vessels, tugs and dredgers.

55 A number of commercial shipping routes have been identified as intersecting the Offshore Export Cable Corridor with defined traffic routes being identified as heading to and from ports in the Firth of Forth and the Firth of Tay.

56 Traffic headed in and out of the Firth of Forth crosses the Offshore Export Cable Corridor approximately one nm north of the North Berwick coastline and intersects the Offshore

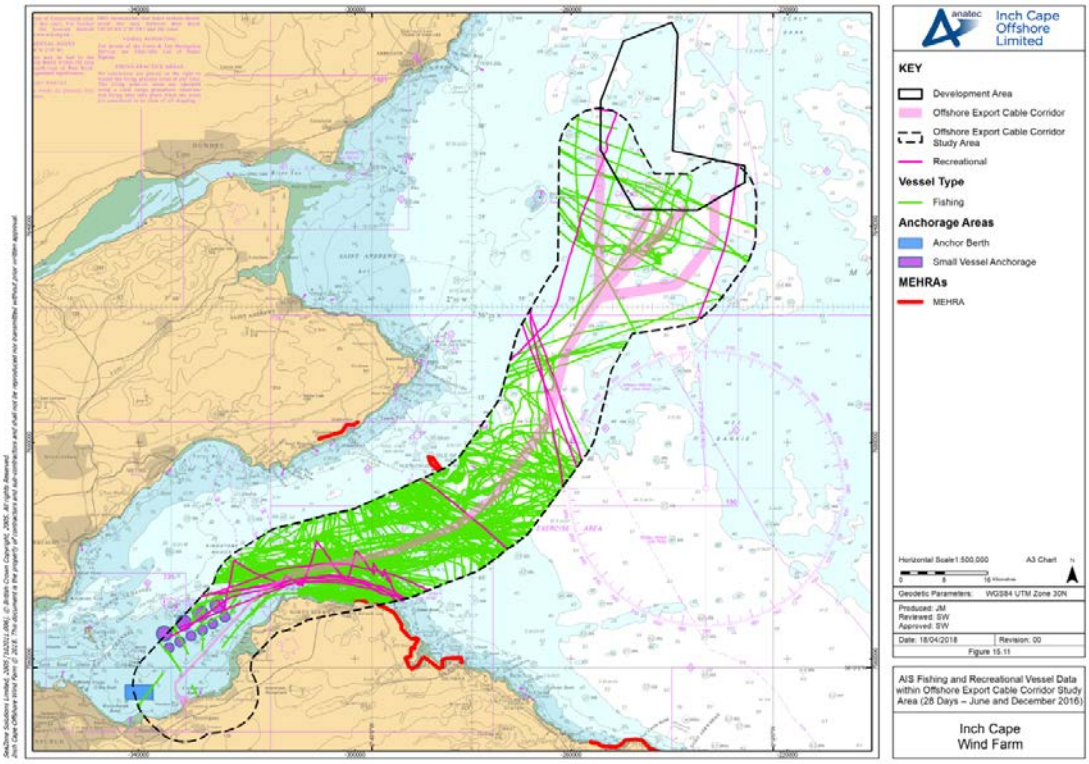
Export Cable Corridor for approximately 15 nm of its length. The majority of vessels on this route are cargo vessels and tankers with tugs, 'other' vessels and passenger vessels also recorded. Traffic is mainly headed between ports in the Firth of Forth (including Grangemouth, Leith and Braefoot Bay) to European Ports (including Rotterdam, Amsterdam and Antwerp).

57 Other lower use main routes also intersect the Offshore Export Cable Corridor. There is a tanker route between the port of Immingham in Lincolnshire and northern Scotland passing to the north of the Offshore Export Cable Corridor, heading towards the Development Area. This route is used by approximately one vessel every one to two days. The Offshore Export Cable Corridor is also intersected by cargo vessels transiting in and out of the Firth of Tay to ports in northern Europe and vessels headed north–south between the Firth of Forth and ports in northern Europe.

Fishing Vessels

58 Figure 15.11 includes the fishing vessels recorded on AIS within the Offshore Export Cable Corridor Study Area during 14 days in June 2016 and 14 days in December 2016. For context, the charted anchorage areas located within the Offshore Export Cable Corridor Study Area have also been included in Figure 15.11.

Figure 15.11: AIS fishing and recreational vessel data within Offshore Export Cable Corridor Study Area (28 Days – June and December 2016)



59 Approximately nine unique fishing vessels per day were recorded on AIS passing within the Offshore Export Cable Corridor Study Area. The most frequently visited area by fishing vessels within the Offshore Export Cable Corridor Study Area was the nearshore area on the North Berwick coastline.

60 Further information on commercial fishing in the vicinity of the Offshore Export Cable Corridor can be found in *Appendix 15C.1* and *Chapter 14*.

Recreational Vessels

61 Figure 15.11 includes the recreational vessels recorded on AIS within the Offshore Export Cable Corridor Study Area during the 14-day period in June 2016. No recreational vessels were recorded within the Offshore Export Cable Corridor Study Area during the 14-day period in December 2016.

62 Approximately one unique recreational vessel every two days was recorded on AIS passing within the offshore Export Cable Corridor Study Area, with the majority of transits occurring in the nearshore area on the North Berwick coastline.

63 Figure 15.7 presents the RYAs *UK Coastal Atlas of Recreational Boating* dataset in the vicinity of the Offshore Export Cable Corridor. The recreational AIS intensity is generally low to moderate within the Offshore Export Cable Corridor, with the highest intensity portion of the route located in the nearshore area at North Berwick where there is a general boating area.

Maritime Incidents

64 MAIB and RNLI data from within the Offshore Export Cable Corridor Study Area were analysed for the period 2005 to 2014. Figure 15.8 includes the locations of incidents reported to the MAIB within the Offshore Export Cable Corridor Study Area. A total of 50 unique incidents (excluding incidents in port/harbour areas) involving 56 vessels were reported to the MAIB, corresponding to five incidents per year. None of the incidents were recorded within the Offshore Export Cable Corridor.

65 Figure 15.9 includes the locations of incidents recorded by the RNLI within the Offshore Export Cable Corridor Study Area. A total of 189 unique incidents were recorded by the RNLI (excluding hoaxes and false alarms), corresponding to 19 incidents per year. Nine incidents were recorded within the Offshore Export Cable Corridor, with the majority of these located at the nearshore area close to the Offshore Export Cable landfall at Cockenzie. The majority of incidents were responded to by lifeboats from either North Berwick (41 per cent) or Kinghorn (25 per cent).

15.6.7 Baseline without Development

66 There is potential for an increase in commercial shipping movements as well as commercial fishing vessel and recreational vessel activity. This change in baseline conditions has also been considered in the collision risk modelling undertaken as part of the NRA (see *Appendix 15C.1*).

15.7 Assessment Methodology

67 The marine traffic surveys (including the baseline covered in *Appendix 15A*), desk-based research and consultation undertaken as part of the baseline assessment has allowed for the identification of impacts. As part of the NRA process an FSA was carried out in line with the IMO FSA Process (IMO, 2002) and MCA guidance (MCA, 2016). The FSA process is described in more detail and illustrated in the NRA (see *Appendix 15C.1*).

68 This impact assessment covers the potential effects that have been scoped in for commercial vessels, commercial fishing vessels and recreational vessels from the presence of structures associated with the Development. The assessment uses the NRA and FSA process to assess the significance of impacts. The NRA and FSA includes:

- Hazard log and risk ranking (as part of the NRA (see *Appendix 15C.1*) a Hazard Workshop was held in September 2012 with maritime stakeholders to gain local knowledge and expert opinion);
- Quantified NRA for selected hazards;
- Base case and future case risk levels assessed for selected hazards;
- Emergency response review; and
- Assessment of mitigation measures.

69 The assessment considers impacts on shipping and navigation, considering the nature, duration, magnitude and significance of effects arising from the wind farm and OfTW during the O&M phase. The definitions of sensitivity and magnitude are described in the sections below. The methodology has been made specific for shipping and navigation receptors where required.

15.7.1 Sensitivity of Receptor

70 A shipping and navigation receptor can only be sensitive if there is a pathway through which an impact can be transmitted between the source activity and the receptor. When a receptor is exposed to an impact, the overall sensitivity of the receptor is determined and the process incorporates a degree of subjectivity. Sensitivity assessments for shipping and navigation receptors used the following baseline data, in line with expert opinion, to assess:

- Outputs of the Hazard Workshop;
- Level of stakeholder concern;
- Extent of deviation;
- Number of transits of specific vessels and/or vessel types; and
- Lessons learnt from existing offshore wind developments.

71 Table 15.9 gives the definitions of sensitivity used in this chapter.

Table 15.9: Criteria for classifying sensitivity of receptor

Sensitivity	Definition
High	Present throughout the operational life or temporary impacts on tolerance, resulting in injury or loss of life to personnel and/ or damage to vessel or structure; High level of commercial impacts potentially resulting in permanent effects on business operations; and Limited or very limited ability to adapt to new impacts.
Moderate	Present throughout the operational life or temporary impacts on tolerance, resulting in minor damage to vessel or structure; Medium level of commercial impacts potentially resulting in permanent effects on business operations; and Ability to partially adapt to new impacts.
Low	Limited impacts through the operational life or minor temporary impacts on tolerance, but not resulting in damage to vessels or injury to personnel; Limited commercial impacts; and Ability to adapt to majority or all of new impacts.

15.7.2 Magnitude of Impact

72 Determining the overall magnitude of shipping and navigation impacts was based upon expert opinion and professional judgement in combination with baseline data and assessments already undertaken in the NRA including:

- Consultation feedback from stakeholders and regular operators;
- Outputs of the Hazard Workshop (see *Appendix 15C.3* for the *Hazard Log*);
- Lessons learnt or research from previous developments especially impacts associated with navigation and communication, where physical modelling is not available;
- Results of collision risk modelling in comparison with UK averages; and
- Analysis of baseline data where low confidence in data availability or clear evidence of impacts (i.e. deviations) have been identified.

73 When assessing the magnitude of an impact, the geographical extent, the duration and the frequency of occurrence were all considered.

74 Table 15.10 gives the definitions of magnitude used in this chapter.

Table 15.10: Classification of magnitude of impact

Magnitude	Definition
High	• Permanent deviation throughout O&M phase or large temporary deviation of shipping routes (including international); • Present for the O&M phase of the Development on receptors in the vicinity of Development Area and Offshore Export Cable Corridor (including wider Firth of Forth and Firth of Tay area); • Likely or extremely likely probability of occurrence; and • High or very high degree of change from baseline conditions.
Moderate	• Permanent deviation for the O&M phase of the Development or large temporary deviation of shipping routes; • Permanent impact, during the O&M phase of the Development, on receptors in Development Area and Offshore Export Cable Corridor; • Medium probability of occurrence; and • Medium degree of change from baseline conditions.
Low	• Small deviation for the O&M phase of the Development or large temporary deviation of shipping routes; • Temporary impact on receptors in Development Area and Offshore Export Cable Corridor; and • Unlikely or very unlikely probability of occurrence; and low degree of change from baseline conditions.
Negligible	• Small temporary deviation of shipping routes; • Temporary impact on area of construction or limited area; • Extremely unlikely probability of occurrence; and • Very low degree of change from baseline conditions.

15.7.3 Method for Assigning Significance of Effect

75 The assessment of significance of each potential impact has been based on the sensitivity of receptors and the magnitude of impacts, using the risk matrix in Table 15.11. For the purposes of this assessment, those residual positive and negative effects indicated as major and moderate/major are considered significant.

Table 15.11: Classification of significance of effect

Magnitude	Sensitivity		
	Low	**Moderate**	**High**
High	Moderate	Moderate/Major	Major
Moderate	Minor/ Moderate	Moderate	Moderate/Major
Low	Minor	Minor/Moderate	Moderate
Negligible	Negligible/ Minor	Minor	Minor/Moderate

15.8 Impact Assessment- Development Area

15.8.1 Effects on Construction

76 No potential impacts have been scoped into this assessment during the construction phase. Justification is provided in Table 15.5 and agreed through consultations. Refer to the Scoping Report and subsequent Scoping Opinion for more details[2].

15.8.2 Effects of O&M

Effects on Commercial Vessels

77 Following consideration of the baseline, the following impacts have been identified for commercial vessels:

- Increased vessel to vessel collision risk; and
- Creation of vessel to structure allision risk.

78 The baseline assessment identified nine main commercial vessel routes (including variations of route three and four) passing through the Development Area Study Area, four of which intersected the Development Area itself (two variations of route four, two variations of route three, route two and route one). Based on activity observed at other constructed wind farms, commercial vessels will choose, as part of their passage plan, to avoid the WTGs altogether, resulting in route displacement. This may lead to increases in vessel density surrounding the wind farm, as multiple routes are displaced into similar transit patterns. This may in turn lead to an increase in collision rates, particularly if routes are displaced into areas of pre-existing vessel activity (for example fishing or recreation).

79 It was estimated within the NRA undertaken in 2012 that collision rates will rise by 15 per cent as a result of route displacement, from one every 797 years (without the Inch Cape Wind Farm) to one every 695 years (with the Inch Cape Wind Farm). These values are considered low compared to other North Sea wind farm developments.

80 The structures within the Development Area will also create a vessel to structure allision risk to passing commercial traffic. As previously discussed, commercial vessels are very unlikely to deliberately transit through the WTGs, and so an allision scenario is most likely to occur from a commercial vessel entering the Development Area accidently, either through human error, or a mechanical fault.

81 It was estimated within the NRA that a vessel would allide with a wind farm structure once every 1,510 years whilst under power. A “not under command” (drifting) vessel was estimated to allide with a wind farm structure once every 12,349 years.

[2] At the time of writing these documents can be found at this link: http://www.gov.scot/Topics/marine/Licensing/marine/scoping/ICOLRevised-2017 [Accessed 17/04/2018].

82 Given that past experience shows commercial vessels will adapt to wind farm projects through deviation, and the amount of sea space vessels in the area will have to do so, the sensitivity of commercial vessels is considered to be moderate.

83 Based on the modelling undertaken in the NRA, collision and allision events are expected to be of a moderate frequency, and the magnitude has subsequently been assessed as moderate.

84 Allision and collision impacts to commercial vessels are therefore both assessed to be of **moderate** significance and therefore not significant for the purposes of this assessment.

Effects on Fishing Vessels

85 Following consideration of the baseline, the following impacts have been identified for fishing vessels:

- Increased vessel to vessel collision risk; and
- Creation of vessel to structure allision risk.

86 From analysis of the marine traffic survey data, it was identified that there were approximately four to five fishing vessels per day within the Development Area Study Area. The majority of fishing vessels were actively engaged in fishing activity rather than on transit, with activity particularly prevalent in the nearshore area between the ports of Montrose and Arbroath.

87 During the O&M phase of the Inch Cape Wind Farm, fishing vessels will be required to either deviate around the Development Area or pass between Inch Cape Wind Farm structures (this will be a decision made by the Master and based upon the vessel type and size, weather conditions and visibility). There is a low risk to fishing vessels transiting through the Development Area of alliding with a wind farm structure further information on allision is contained within the NRA (*Appendix 15C.1*) noting that behaviour has speed and low energy, with the likelihood increasing during adverse weather and poor visibility.

88 Vessel density inshore of the wind farm may increase as a result of commercial vessel displacement, with commercial traffic deviating into areas of pre-existing fishing activity. Based on this, there is the potential for a small increase in collision risk to fishing vessels. Based on vessel size, a collision between a fishing vessel and a large commercial vessel may lead to foundering and the potential for loss of life.

89 Given that commercial fishing vessels which will be affected by the presence of the Inch Cape Wind Farm structures and the commercial implications, but also the sufficient sea room around the Development Area for fishing vessels to alter their routes if required, the sensitivity is considered to be moderate.

90 These effects will be present throughout the operational life of the Development and will affect receptors within the Development Area. The results of the allision risk modelling undertaken in the 2012 NRA (*Appendix 15C.1*) suggest that these effects are likely to occur, and therefore the magnitude is considered to be moderate.

91 Consequently, the significance of effect has been assessed to be **moderate** from a navigational safety perspective and therefore not significant for the purposes of this assessment.

Effects on Recreational Vessels

92 Following consideration of the baseline, the following impacts have been identified for recreational vessels:

- Increased vessel to vessel collision risk; and
- Creation of vessel to structure allision risk.

93 From analysis of the marine traffic survey data, it was identified that there were approximately two recreational vessels per day within the Development Area Study Area, although activity was restricted to the summer period. The RYA density data showed the Development Area to be in an area of low recreational user data, with only one offshore route identified as potentially intersecting the Development Area Study Area.

94 During the O&M phase of the wind farm, recreational vessels will be required pass around or between Inch Cape Wind Farm structures (when conditions allow - there is a low risk to recreational vessels transiting through the Development Area of alliding with an Inch Cape Wind Farm structure, especially in adverse weather and poor visibility).

95 The displacement of commercial traffic into areas of pre-existing recreational activity may also lead to an increase in vessel to vessel risk for recreational vessels. As with fishing vessels, a recreational vessel may be more vulnerable in the event of a collision with a larger vessel however this risk is considered low.

96 Given the low number of recreational vessels in the vicinity of the Development Area which will be affected by the Inch Cape Wind Farm structures and the sufficient sea room around the Development Area for recreational vessels to alter their routes if required, the sensitivity is considered to be low.

97 These effects will be present throughout the operational life of the Development and will affect receptors within the Development Area. Therefore, the magnitude is considered to be moderate.

98 Consequently, the significance of effect has been assessed to be **minor/moderate** and therefore not significant for the purposes of this assessment.

Summary of Effects of O&M, Development Area

99 Table 15.12 summarises the impacts identified for the Development Area during the O&M phase.

Table 15.12: O&M impacts upon shipping and navigation receptors for the Development Area

Effect	Receptor	Sensitivity of the Receptor	Magnitude of Impact	Significance of Effect
Increased vessel to vessel collision risk/ Creation of vessel to structure allision risk	Commercial vessels	Moderate	Moderate	Moderate
	Commercial fishing vessels	Moderate	Moderate	Moderate
	Recreational vessels	Low	Moderate	Minor/Moderate

15.8.3 Effects of Decommissioning

100 No potential impacts have been scoped into this assessment during the decommissioning phase. Justification is provided in Tables 15.3 and 15.5, and agreed through consultations.

15.9 Impact Assessment- Offshore Export Cable Corridor

15.9.1 Effects on Construction

101 No potential impacts have been scoped into this assessment during the construction phase. Justification is provided in Table 15.5 and agreed through consultations.

15.9.2 Effects of O&M

Effects on Commercial Vessels

102 Following consideration of the baseline, the following impact has been identified for commercial vessels:

- Effects on anchoring operations.

103 A number of commercial shipping routes have been identified as intersecting the Offshore Export Cable Corridor with defined traffic routes being identified as heading to and from ports in the Firth of Forth and the Firth of Tay. There are a number of designated anchorage areas to the north of the Offshore Export Cable landfall near Cockenzie (as shown in Figure 15.11), with vessels being recorded at anchor in these designated areas during the marine traffic surveys.

104 The main effect to commercial vessels following the installation of the Offshore Export Cable will be for those vessels anchoring in close proximity to the Offshore Export Cable, or required to do so in an emergency situation such as machinery failure. It is noted that mariners should take the charted positions of the cables into consideration when anchoring, and it is therefore considered unlikely that a commercial vessel would deliberately anchor over, or in close proximity to subsea cables, except in an emergency.

105 The design depth of cover has been selected to provide protection against anchors; therefore a commercial vessel's anchor is unlikely to penetrate far enough to encounter the cable. In the extremely unlikely event that a commercial vessel's anchor interacts with the cable, the most likely scenario is damage to the cable, as the large anchors used by commercial vessels are unlikely to snag.

106 Given that there are numerous designated anchorages in the area that can be used rather than anchoring near the Offshore Export Cable and the low levels of anchoring observed within the vicinity of the corridor in the AIS data (see NRA - *Appendix 15C.1*); the adaptability to this effect is high and therefore the sensitivity is considered to be low.

107 This effect will be present throughout the operational life of the Development but will be localised to the area of the Offshore Export Cable. Given that a monitoring plan will be in place for the Offshore Export Cable and it will be marked on relevant UKHO Admiralty charts, the magnitude is considered to be minor.

108 Consequently, the significance of effect has been assessed to be **negligible/minor** which is therefore not significant for the purposes of this assessment.

Effects on Fishing Vessels

109 Following consideration of the baseline, the following impact has been identified for fishing vessels:

- Fishing Gear snagging risk (navigational safety risk).

110 From analysis of the marine traffic data, a low number of fishing vessels were identified in proximity to the Offshore Export Cable Corridor with only nine unique fishing vessels identified within the Offshore Export Cable Corridor Study Area throughout the survey periods.

111 The main risk to commercial fishing vessels will be snagging their gear on the Offshore Export Cable which could lead to damage to the cable, the gear and/ or the fishing vessel. In the event of a snagging on subsea infrastructure, attempts to free the gear may lead to loss of stability of the vessel, which as a worst case may result in capsize. However, as an embedded mitigation (see *Section 15.5.2*) the Offshore Export Cable will be buried or protected where burial is not practicable, which should reduce the snagging frequency, particularly as fishing gear will not typically penetrate as deep as vessel anchors.

112 Given the low number of fishing vessels which will be affected and the low penetration depth of fishing gear, sensitivity is considered to be low.

113 These effects on navigational safety will be present through the operational life of the Development and will be localised to the area of the Offshore Export Cable. Given that a monitoring plan will be in place for the Offshore Export Cable, the magnitude is considered to be low.

114 Consequently, the significance of effect has been assessed to be **negligible/ minor** from a navigational safety perspective which is therefore not significant for the purposes of this assessment.

115 Effects on commercial fishing vessels have been further discussed in *Chapter 14*.

Effects on Recreational Vessels

116 Following consideration of the baseline, the following impact has been identified for recreational vessels:

- Effects on anchoring on operations.

117 From analysis of the marine traffic data, a very low number of recreational vessels were identified in proximity to the Offshore Export Cable Corridor with only three unique recreational vessels identified within the Offshore Export Cable Corridor Study Area throughout the survey periods. The RYA density data showed the density of recreational vessels to be higher in coastal areas.

118 Recreational vessels are likely to anchor coastally in sheltered areas, and therefore are only likely to be at risk of snagging on the cable in the area of the landfall approach. However, it should be taken into consideration that recreational users may lack experience, and may be less likely to be aware of the presence of cable than a commercial vessel.

119 The design depth of cover has been selected to provide protection against anchors. The relatively small size of a typical recreational vessel anchor is extremely unlikely to penetrate far into the seabed; however this also means that should a cable interaction occur, a snagging is more likely than in the case of an interaction from a large commercial vessel anchor. A snagging may lead to a loss of stability of a small recreational vessel, which may result in capsize.

120 Given the very low number of recreational vessels which will be affected by the Offshore Export Cable, the sensitivity is considered to be low.

121 This effect will be present throughout the operational life of the Development but will be localised to the area of the Offshore Export Cable. Given that a monitoring plan will be in place for the Offshore Export Cable and recreational vessels generally do not anchor in water depths greater than 10 m, the magnitude is considered to be low.

122 Consequently, the significance of effect has been assessed to be **negligible/minor** which therefore is not significant for the purposes of this assessment.

Summary of Effects of O&M, Offshore Export Cable Corridor

123 Table 15.13 summarises the impacts identified for the Offshore Export Cable Corridor during the O&M phase.

Table 15.13: O&M impacts upon shipping and navigation receptors for the Offshore Export Cable Corridor

Effect	Receptor	Sensitivity of the Receptor	Magnitude of Impact	Significance of Effect
Effects on anchoring operations	Commercial vessels	Low	Low	Negligible/ minor
	Recreational vessels	Low	Low	Negligible/ minor
Fishing Gear snagging risk (navigational; safety risk)	Commercial fishing vessels	Low	Low	Negligible/ minor

15.9.3 Effects of Decommissioning

124 No potential impacts have been scoped into this assessment during the decommissioning phase. Justification is provided in Table 15.3 and agreed through consultation.

15.9.4 Impact Assessment- Development (Wind Farm and Offshore Export Transmission Works)

Effects on Commercial, Fishing and Recreational Vessels

125 Scoped-in effects assessed for the wind farm (collision and allision) and the OfTW (anchoring and snagging) are markedly different. The effects therefore are no worse when considered as a Development as a whole and the assessment carried out above remains relevant for the Development impact assessment.

15.10 Cumulative Impact Assessment (CIA)

15.10.1 Introduction

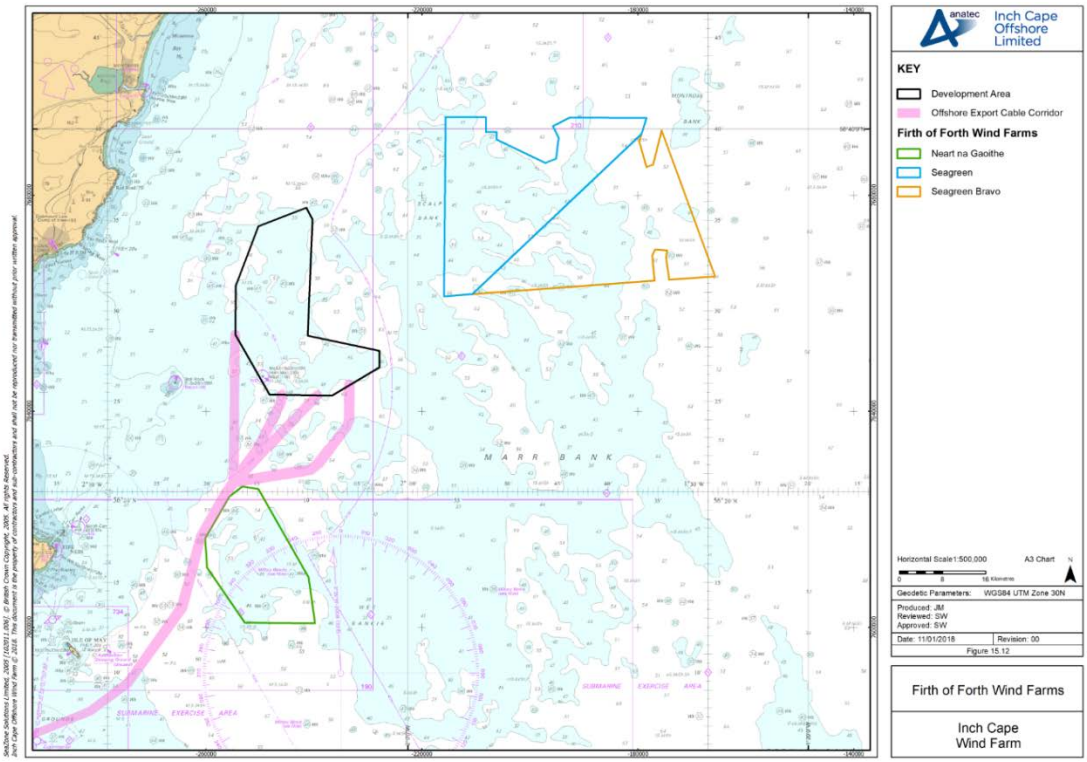
126 As the baseline and status for cumulative projects are ever evolving a cut-off date of November 2017 was used to allow the EIA and CIA to progress. ICOL appreciates and acknowledges that the status of some of these projects may have changed since this date and note however that the individual status of projects has not been updated in the EIA Report due to the time restrictions associated with the assessment.

127 Two other offshore wind farm projects in the Firth of Tay and Firth of Forth region are consented and considered relevant to this CIA; consideration of these two projects were agreed through the scoping process. These are the Scottish Territorial Waters (STW) site Neart na Gaoithe (NnG), and the Round 3 Seagreen Alpha and Bravo projects within the Firth of Forth Phase 1, (with the Inch Cape Wind Farm are referred to as the 'Firth of Forth Wind Farms') as shown in Figure 15.12.

128 Due to the low level of other marine activities or users of the sea in the vicinity of the Development Area and Offshore Export Cable Corridor (i.e. limited defence areas and no oil and gas platforms or dredging areas), there are not expected to be any other significant cumulative effects on the navigational elements of these activities. Also, due to the distance of the Development Area from non UK ports, there are no major transboundary issues to be considered for shipping and navigation.

129 There are also not anticipated to be any cumulative impacts associated with the Export Cable Corridor given the limited duration and extent of any effects associated with the installation process. During the operational phase the export cable will be effectively buried and/or protected to prevent interaction with shipping and navigation receptors including cumulatively with other developments.

Figure 15.12: Firth of Forth Wind Farms



15.10.2 Effects on Construction

130 As agreed through consultations, there are no cumulative impacts scoped in to the assessment during the construction phase.

15.10.3 Effects of O&M

Cumulative Effects on Commercial Vessels

131 Following consideration of the baseline the following impacts have been identified for commercial vessels:

- Increased transit times and distances;
- Increase of vessel to vessel collision risk;
- Vessel to structure allision risk; and
- Increase of visual confusion when navigating.

132 Post construction of the Firth of Forth Wind Farms, commercial vessels transiting the area will either need to pass west (inshore) of the wind farms, east (offshore), or transit in between project boundaries (either between Inch Cape and NnG, or between Inch Cape and Seagreen. This represents a more significant deviation and will affect a greater number of commercial vessels than when only the wind farm is considered. Based on the limited sea room, and the pre-existing vessel activity, it is considered unlikely that commercial vessels would pass inshore of the wind farms unless they required access to ports in either the Firth of Tay, of the Firth of Forth.

133 Of the nine main routes identified in the Development Area Study Area, eight will be cumulatively affected by the presence of the Firth of Forth Wind Farms. The largest deviation required is an increase in distance of approximately 5.3 nm for vessels transiting between the Forth and northern Scotland, corresponding to an increased time of approximately 30 minutes (based on the average speed of vessels on that route).

134 Vessels displaced inshore of the Firth of Forth Wind Farms, or between wind farms will focus vessel density into corridors (either between the coast and a wind farm, or between wind farms), and vessel to vessel collision rates may therefore increase in these areas. Vessels displaced east of the wind farms have ample sea space for manoeuvre, and so collision rates offshore are considered unlikely to rise significantly. The risk of an allision will also increase, particularly in corridors between wind farms, where allision targets are present on both sides of a vessel.

135 Multiple wind farms can cause visual confusion for mariners because WTG alignment (including non-linear boundaries, irregular WTG layouts and peripheral WTGs) may potentially hinder a vessel's ability to navigate safely, therefore increasing the collision and allision risk.

136 Given the number of commercial vessels in the region which will be cumulatively affected and the commercial implications of route deviations, the sensitivity is considered to be moderate.

137 These effects are likely to occur given that vessels will be required to deviate when multiple wind farms are present and will be present throughout the operational life of the wind farms and across the entire region. Therefore the magnitude is considered to be high.

138 Consequently, the significance of effect has been assessed to be **moderate/major** which is therefore significant for the purposes of this assessment

Cumulative Effects on Fishing Vessels

139 Following consideration of the baseline the following impacts have been identified for commercial fishing vessels:

- Deviations to avoid the wind farm areas; and
- Creation of vessel to structure allision risk.

140 Analysis of the 28 days of survey data collected in 2016 identified that a number of fishing vessels are active in the area to the south east of the Development Area and will be cumulatively affected when transiting to and from this area by the presence of the Inch Cape Wind Farm and NnG. This means that such fishing vessels will be required to deviate around the sites or pass between the wind farm structures (this will be a decision made by the skipper and based upon the vessel type and size, weather conditions and visibility). There is assessed to be sufficient sea room for fishing vessels to deviate around the wind farms, should they choose to do so.

141 Given the number of commercial fishing vessels which will be affected by the presence of multiple wind farms and the commercial implications, the sensitivity is considered to be moderate.

142 These effects will be present throughout the operational life of the wind farms and will affect commercial fishing vessels within the wind farms and the wider area. However, it is noted that the traffic levels for fishing vessels are considered low within the wider area, and therefore the magnitude has been considered as moderate.

143 Overall, the significance of effect has been assessed to be **moderate** from a navigational safety perspective which is therefore not significant for the purposes of this assessment.

Cumulative Effects on Recreational Vessels

144 Following consideration of the baseline the following impact has been identified for recreational vessels:

- Creation of vessel to structure allision risk.

145 Generally the level of recreational vessel activity was considered to be low (based on both the marine traffic survey data and the RYA density data) and there are no RYA offshore routes which will be cumulatively affected by the presence of the Firth of Forth Wind Farms.

146 However, for vessels choosing to transit through any of the wind farms there is a risk of alliding with a structure and this risk will increase with the number of structures in the area. Once the Offshore Export Cables are installed, there are not expected to be any cumulative impacts associated with other elements of the projects, apart from limited periods where cable maintenance occurs.

147 Given the low number of recreational vessels which will be affected by the presence of multiple wind farms and the lack of commercial implications, the sensitivity is considered to be low.

148 This effect will be present throughout the operational life of the wind farms and may affect recreational vessels within the wider area. However, it is noted that the traffic levels for recreational vessels are considered low within the wider area, and therefore the magnitude has been considered as moderate.

149 Consequently, the significance of effect has been assessed to be **minor/moderate** which is therefore not significant for the purposes of this assessment

Summary of Effects of O&M, CIA

150 Table 15.14 summarises the cumulative impacts identified for the O&M phase.

Table 15.14: Impacts upon shipping and navigation receptors

Effect	Receptor	Sensitivity of the Receptor	Magnitude of Impact	Significance of Effect
Increased transit times and distances	Commercial vessels	Moderate	High	Moderate /Major
Increase of vessel to vessel collision risk		Moderate	High	Moderate /Major
Vessel to structure allision risk		Moderate	High	Moderate /Major
Increase of visual confusion when navigating.		Moderate	High	Moderate /Major
Deviations to avoid the wind farm areas	Commercial fishing vessels	Moderate	Moderate	Moderate
Creation of vessel to structure allision risk		Moderate	Moderate	Moderate
Creation of vessel to structure allision risk.	Recreational vessels	Low	Moderate	Minor/ Moderate

15.10.4 Effects of Decommissioning

151 No cumulative impacts were scoped in for the decommissioning phase.

15.11 Impact Interactions

15.11.1 Development Alone

152 The potential for individual impacts identified through the impact assessment above to interact and create new, or more significant impacts on shipping and navigation receptors has been assessed. No such interactions have been identified.

153 This chapter has identified linkages between different areas or disciplines covered in this EIA Report. Potential impacts on commercial fisheries both within the Development Area and the Offshore Export Cable Corridor have been fully assessed in *Chapter 14* and are also referenced where appropriate.

15.12 Additional Mitigation

154 In order to ensure that navigational risks are appropriately managed, all vessels will be fit for purpose for construction, and O&M and decommissioning activities as per MCA, international and project safety management system requirements. Audits will be undertaken to ensure each such vessel is compliant with these requirements.

155 An advanced level of promulgation of information will be carried out for the O&M phase which is specifically targeted to receptors identified through consultation (including regular commercial operators, and fishing and recreational users). This will inform mariners of the location of the wind farm structures so that they can passage plan effectively. It will also ensure recreational and fishing users are aware of the potential for increased commercial vessel density inshore of the wind farm. This advanced level of promulgation will include issuing project information via Notice to Mariners to organisations such as those that publish recreational sailing directions. However it is noted that it is for the author of any publication to define what information is included within it.

156 Consideration will be given to any additional Aids to Navigation that result as a requirement of the finalised Development layout. This discussion will occur as part of the LMP and DSLP.

157 For cumulative impacts additional aids to navigation (including temporary buoyage) may be required between separate projects to manage navigational safety risk during overlapping phases. This additional mitigation will be determined through risk assessment and agreed in consultation with the NLB post consent but could include additional lighting and marking on peripheral turbines facing a separate project i.e. the eastern boundary of the development area. It is not considered necessary at this stage to include permanent buoyage throughout the operational phases, but if required this would again be defined by NLB post consent[1]. Aids to navigation will also assist fishing vessels in mitigating against any navigational safety impacts by ensuring all structures are marked and visible, and that it is clear where current construction or major maintenance activity is occurring.

158 An advanced level (stakeholder targeted) of promulgation of information will also be carried out to allow stakeholders to effectively passage plan their journeys and mitigate any impacts associated with cumulative displacement.

[1] Under the Article 25 of the Marine Licensing (Exempted Activities) Order 2011 the NLB have authority to deploy navigation aids where required to mitigate effects on navigational safety within the need for a marine license.

15.13 Conclusion and Residual Effects

15.13.1 Development Area

159 As summarised in Table 15.15, impacts associated with the Development Area were assessed as being of moderate significance to commercial vessels, moderate significance to commercial fishing vessels, and minor/moderate significance to recreational vessels. Following the application of further mitigation beyond the embedded mitigations listed in *Section 15.5.2*, the impacts were assessed as being of minor significance to commercial vessels, minor significance to commercial fishing vessels and negligible/minor significance to recreational vessels.

Table 15.15: Development Area - Summary of effects

Impact	Receptor	Effect
Construction		
All construction phase impacts were scoped out.		
Operations and Maintenance (O&M)		
Increased vessel to vessel collision risk	Commercial vessels	Minor
	Commercial fishing vessels	Minor
	Recreational vessels	Negligible/ Minor
Creation of vessel to structure allision risk	Commercial vessels	Minor
	Commercial fishing vessels	Minor
	Recreational vessels	Negligible/ Minor
Decommissioning		
All decommissioning phase impacts were scoped out.		

15.13.2 Offshore Export Cable Study Area

160 As summarised in Table 15.16, impacts associated with the Offshore Export Cable were assessed as being of negligible/minor significance to commercial vessels, commercial fishing vessels and recreational vessels. Consequently, no further mitigation was considered necessary.

Table 15.16: Offshore Export Cable Study Area - Summary of effects

Impacts	Receptor	Effect
Construction		
All construction phase impacts were scoped out.		
Operation and Maintenance (O&M)		
Effects on anchoring operations	Commercial vessels	Negligible/Minor
	Recreational vessels	Negligible/Minor
Fishing Gear snagging risk (navigational safety risk)	Commercial fishing vessels	Negligible/Minor
Decommissioning		
All decommissioning phase impacts were scoped out.		

15.13.3 Cumulative Impacts

161 As summarised in Table 15.17, impacts associated with cumulative interactions are noted below. Impacts on commercial vessels were considered moderate/major and require further mitigation post consent to ensure they are not significant. Impacts on commercial fishing vessels and recreational vessels were both not significant for the purposes of this assessment and no further mitigation is required.

Table 15.17: Summary of effects and mitigation (cumulative)

Impacts	Receptor	Pre-mitigation Effect	Mitigation	Post-Mitigation Effect
Construction				
All construction phase impacts were scoped out.				
Operation and Maintenance (O&M)				
Increased transit times and distances	Commercial vessels	Moderate/ Major	Additional Aid to Navigation (AtoN) (including temporary buoyage) maybe required between cumulative projects to manage navigational risk during overlapping phases.	Moderate
Increase of vessel to vessel collision risk				

Impacts	Receptor	Pre-mitigation Effect	Mitigation	Post-Mitigation Effect
Vessel to structure allision risk Increase of visual confusion when navigating			This will be determined through risk assessment, agreed in consultation with the NLB. An advanced level of promulgation of information will be carried out which is specifically targeted to receptors identified through consultation.	
Deviations to avoid the wind farm areas Creation of vessel to structure allision risk	Commercial fishing vessels	Moderate	Additional AtoN (including temporary buoyage) maybe required between cumulative projects to manage navigational risk during overlapping phases. This will be determined through risk assessment, agreed in consultation with the NLB. An advanced level of promulgation of information will be carried out which is specifically targeted to receptors identified through consultation.	Minor/ Moderate
Creation of vessel to structure allision risk	Recreational Vessels	Minor/ Moderate	Additional AtoN (including temporary buoyage) maybe required between cumulative projects to manage navigational risk during overlapping phases. This will be determined through risk assessment, agreed in consultation with the NLB.	Negligible/ Moderate
Decommissioning				
All decommissioning phase impacts were scoped out.				

References

IALA (2013). *International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) – O-139 The Marking of Man-Made Offshore Structures*. Edition 2. Saint Germain en Laye, France: IALA.

IMO (2002). *Guidelines for Formal Safety Assessment (FSA) – MSC/Circ. 1023*. London: IMO.

MCA (2008) *Marine Guidance Note 372 Offshore Renewable Energy Installations (OREIs) Guidance Operating in the Vicinity of UK OREIs*. Southampton: MCA.

MCA (2016). *Methodology for Assessing the Marine Navigational Safety Risks of Offshore Wind Farms*. Southampton: MCA.

MCA (2016). *Marine Guidance Note 543 Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response*. Southampton: MCA.

RYA (2014). *Royal Yachting Association AIS Survey Results.*

RYA (2015). *The RYA's Position on Offshore Renewable Energy Developments Paper 1 – Wind Energy*. Southampton: RYA.

RYA (2016). *UK Coastal Atlas of Recreational Boating*. Southampton: RYA.

UKHO (2016). *Admiralty Sailing Directions – North Sea (West) Pilot*. Taunton: UKHO.

Contents

List of Tables

List of Figures

Glossary

Cumulative Impact Assessment (CIA)	Defines the consequences, positive or negative, of a combination of operations or developments on the environment.
Deadweight	Refers to outcomes which would have occurred without intervention.
Dependency Ratio	The dependency ratio or proportion of working age people measures the relationship between the productive element of a population and the economically dependent. The number of under 16s and those of pensionable age to every 100 people of working age.
Development	Refers to WTGs, inter-array cables, OSPs and the Offshore Export Cable and any other associated works (all elements associated with this application).
Development Area	The area which includes WTGs, inter-array cables, OSPs and initial part of the Offshore Export Cable and any other associated works (see Figure 1.2).
Displacement Effects	Measures the extent to which the benefits of a project are offset by reductions of output or employment elsewhere.
Economic Activity Rate	Measures the percentage of the population, both in employment and unemployed that represent the labour supply, and hence is a useful measure of the labour market opportunities available to the population.
Economic Study Area	Based on labour market catchment areas around locations considered as representative of the type of locations that may, with appropriate development and investment, be able to support the Development.
Gross Value Added (GVA)	The measure of the value of goods and services produced in an area, industry or sector of an economy
Job Density	Ratio of total jobs to population aged 16-64
Leakage Effects	Those jobs taken up by people from outside a specific area, e.g. Economic Study Area, rest of Scotland and rest of UK.
Mullier Effect	Further economic activity (jobs, expenditure or income) associated with additional local income and local supplier purchases.
Onshore Application Site	The area within the red line Planning Boundary comprising the Onshore Transmission Works (OnTW), as defined.
Onshore Transmission Works (OnTW)	All works within the Application Site, typically including underground electricity transmission cables connecting to an onshore substation and further underground cables required to facilitate connection to the national grid. This includes all permanent and temporary works required.
Substitution Effects	Like Displacement Effects, they measure the extent to which the benefits of a project are offset by reductions of output or employment elsewhere.

Abbreviations and Acronyms

AREG	Aberdeen Renewable Energy Group
BiFab	Burntisland Fabrications Limited
BOWL	Beatrice Offshore Windfarm Limited
CAPEX	Capital Expenditure
CEBR	Centre for Economics and Business Research
CIA	Cumulative Impact Assessment
EIA	Environmental Impact Assessment
EOWDC	European Offshore Wind Deployment Centre
ES	Environmental Statement
FTE	Full-Time Equivalent
GW	Gigawatt
GVA	Gross Value Added
HIE	Highlands and Islands Enterprise
HND	Higher National Diplomas
ICOL	Inch Cape Offshore Limited
LDP	Local Development Plan
MS-LOT	Marine Scotland Licensing Operations Team
MW	Megawatt
NNG	Neart na Gaoithe
NPF3	National Planning Framework 3
N-RIF	National Renewables Infrastructure Fund
N-RIP	National Renewables Infrastructure Plan
NRS	National Records of Scotland
NSRI	National Subsea Research Initiative
O&M	Operations and Maintenance
ONS	Office for National Statistics

OPEX	Operational Expenditure
ORE	Offshore Renewable Energy
OSP	Offshore Substation Platform
OfTW	Offshore Transmission Works
OnTW	Onshore Transmission Works
ORI	Offshore Renewables Institute
RSA	Regional Selective Assistance
RYA	Royal Yachting Association
SDP	Strategic Development Plan
SESplan	The SDP for Edinburgh South East Scotland
STW	Scottish Territorial Waters
UK	United Kingdom
WTG	Wind Turbine Generator

16 Socio-Economics

16.1 Introduction

1 This chapter presents the assessment of potential socio-economic impacts predicted to arise from the Inch Cape Wind Farm and associated Offshore Transmission Works (OfTW) (the Development).

2 This chapter includes an assessment of the direct and indirect impacts upon the economy of an Economic Study Area as defined in *Section 16.6.1* below, which is intended to provide a representative analysis for relevant areas within Scotland and the rest of the United Kingdom (UK).

3 The following appendices and chapters, as well as the introductory chapters (*Chapters 1-8*), should be read in conjunction with this chapter:

- *Appendix 16A: Inch Cape Supply Chain Assessment*; and
- *Chapter 15: Shipping and Navigation.*

16.2 Consultation

4 Scoping responses relating to socio-economics were received from Marine Scotland Licensing Operations Team (MS-LOT) on 28 July 2017 which included a response from The Royal Yachting Association (RYA) Scotland. Table 16.1 summarises the responses received from the RYA and MS LOT's formal Scoping Opinion.

Table 16.1: Scoping responses and Inch Cape Offshore Ltd (ICOL) responses

Consultees	Scoping Response	ICOL Response
RYA Scotland / MS-LOT	RYA Scotland notes that the Scottish Marine Recreation and Tourism Survey was published in 2015 (Scottish Government, 2015b) and contains mapped information about a wide range of recreational activities. A strategic framework for Scotland's Marine Tourism Sector has also been published. RYA request that the framework should be consulted to confirm the results do not result in material change in socio-economic activity. **The Scottish Ministers agree with the RYA and subject to this confirmation, The Scottish Ministers agree that the review of new data as outlined in the Scoping Report is sufficient to conclude there has been no material change in the socio-economic activity in the area.** RYA Scotland note that it is unclear whether there will be significant	The 2015 Survey and the framework have been consulted as part of the assessment, finding there to be no material change in the socio-economic activity in the area since 2013. As such, in line with the Scoping Opinion this survey and framework does not need to be considered within the chapter.

Consultees	Scoping Response	ICOL Response
	cumulative impact of a series of hazards from UK and foreign recreational sailors passing up the east coast of Scotland on passage for the Northern Isles or Caledonian Canal. Certain areas may require increased watchkeeping effort, such as the Kincardine Floating Wind Scheme and the Aberdeen Offshore Wind Farm. **Ministers note that no evidence is provided to indicate that this is likely to be a significant effect. The Scottish Ministers agree with the receptors and potential impacts to be included within the impact assessment and are satisfied that this covers the potentially significant impacts from the Development.**	The scope of this assessment focusses on that as identified in the Scoping Report (see Table 16.2 below) which is consistent with the Ministers' position and their Scoping Opinion.

16.3 Scope of Assessment

5 As part of this application ICOL has drawn on the detail presented in the Scoping Report and subsequent Scoping Opinion (Marine Scotland, 2017) from MS-LOT to agree on those impacts that may lead to a significant effect as a result of the construction, operation and decommissioning of the Development.

6 For clarity, those impacts that have been agreed to be scoped in to the Environmental Impact Assessment (EIA) are included below in Table 16.2 and those agreed to be scoped out are included in Table 16.3. For further information, reference should be made to the Scoping Report and the Scoping Opinion which can be found on Marine Scotland's website. At the time of writing these documents can be found at this link:

http://www.gov.scot/Topics/marine/Licensing/marine/scoping/ICOLRevised-2017

Table 16.2: Scope of assessment covered in this chapter

Potential Impact	Scope of Assessment	Reason
Construction (& Decommissioning) Phase		
Construction Employment	Impact on employment within the Economic Study Area. These impacts are defined in terms of Full-Time Equivalent (FTE) jobs and economic output measured by the Gross Value Added (GVA) generated by those jobs.	Taking into account the likely residual positive impacts from the Development, it is considered that the impacts on construction employment should be scoped in to the EIA.

Potential Impact	Scope of Assessment	Reason
Wider Economic Impacts	Employment and income generated in the economy related to the wider role of the Development in influencing economic activities including wider socio-economic impacts.	Taking into account the likely residual positive impacts from the Development, it is considered that the impacts on the wider economy should be scoped in to the EIA.
Cumulative Construction Employment and Economic Impacts	The in-combination impact of the Inch Cape Wind Farm, OfTW and Onshore Transmission Works (OnTW), together with relevant projects off the east coast of Scotland.	Taking into account the scale of the projects to be considered in the Cumulative Impact Assessment (CIA), it is considered that there will be potentially significant positive cumulative impacts associated with the construction phase of the Development and OnTW alongside other relevant projects. Therefore, the assessment will be scoped in for the CIA.
Operations & Maintenance Phase		
Operation and Maintenance (O&M) Employment	Impact on employment within the Economic Study Area. These impacts are defined in terms of FTE jobs and economic output measured by the GVA generated by those jobs.	Taking into account the likely residual positive impacts from the Development, it is considered that the impacts on employment during the O&M phase of the Inch Cape Wind Farm should be scoped in to the EIA.
Wider Economic Impacts	Employment and income generated in the economy related to the wider role of the Development in influencing economic activities including wider socio-economic impacts.	Taking into account the likely residual positive impacts from the Development, it is considered that the impacts on the wider economy during the O&M phase of the wind farm should be scoped in to the EIA.
Cumulative O&M Employment and Economic Impacts	The in-combination impact of the Development and OnTW, together with relevant projects off the east coast of Scotland.	Taking into account the scale of the projects to be considered in the CIA, it is considered that there will be potentially significant positive cumulative impacts associated with the O&M phase of the Development and OnTW, alongside other relevant projects. Therefore, the assessment will be scoped in for the CIA.

Table 16.3: Impacts scoped out of this chapter

Potential Impact	Justification for Scoping out of the EIA
Tourism and recreation visual impacts	Consideration of the potential for tourism and recreation visual effects during the construction (and decommissioning) phase and the O&M phase has been scoped out of the assessment after agreement by MS-LOT in their Scoping Opinion that it is not required subject to confirmation that the Scottish Marine Recreation and Tourism Survey published in 2015 and strategic framework for Scotland's Marine Tourism Sector is consulted to confirm the results do not result in a material change in the socio-economic activity. This has been consulted and it can be confirmed that they do not result in a material change. Assessment of this potential impact has therefore been scoped out of the EIA after agreement with consultees through scoping that it is unlikely to lead to significant effects.
Tourism accommodation impacts	Consideration of the potential for tourism accommodation impacts during the construction (and decommissioning) phase and the O&M phase has been scoped out of the assessment after agreement by MS-LOT in their Scoping Opinion that it is not required subject to confirmation that the Scottish Marine Recreation and Tourism Survey published in 2015 and strategic framework for Scotland's Marine Tourism Sector is consulted to confirm the results do not result in a material change in the socio-economic activity. This has been consulted and it can be confirmed that they do not result in a material change. Assessment of this potential impact therefore has been scoped out of the EIA after agreement with consultees through scoping that it is unlikely to lead to significant effects.

16.4 Regulation and Guidance

7 A detailed review of legislation, charters, conventions and planning documents have been provided in *Chapter 2: Policy and Legislative Context* and *Chapter 3: Regulatory Requirements*. For the purposes of this chapter a wide range of regulations and guidance relevant to the Economic Study Area have been considered including the following:

- National Plans, Policies and Guidance:
  - *Scottish Energy Strategy (2017);*
  - *2020 Routemap for Renewable Energy in Scotland - Update (2015);*

- *Scotland's Offshore Wind Route Map (2013);*
- *Scotland's Economic Strategy (2015);*
- *National Planning Framework 3 (2014);*
- *National Renewables Infrastructure Plan (2010);* and
- *National Renewables Infrastructure Fund (2012).*

- Regional Plans, Policies and Guidance:
  - *The Strategic Development Plan (SDP) for Edinburgh South East Scotland (SESplan) (2013);*
  - *Edinburgh Local Development Plan 2016;*
  - *Edinburgh's Economic Strategy 2012-2017;*
  - *Fife's Economic Development Strategy 2005-2015;*
  - *Fife's Economic Development Strategy 2017-2027;*
  - *Dundee's Economic Strategy and Action Plan 2013-2017;*
  - *TAYplan Strategic Development Plan 2016-2036;*
  - *Angus Local Development Plan 2016;*
  - *Angus Economic Development Strategy 2013-2020;*
  - *Highlands and Islands Enterprise (HIE) Operating Plan 2017-2018;*
  - *Aberdeen City and Shire Economic Action Plan 2013-2018;*
  - *Aberdeen Local Development Plan 2017;* and
  - *Aberdeenshire Local Development Plan 2017.*

8 The following sections will give a brief overview of the above regulations and guidance focusing on those parts of the regulations and guidance that are relevant to the Socio-Economic Assessment.

16.4.1 National Plans, Policies and Guidance

Scottish Energy Strategy: The future of energy in Scotland

9 Published in December 2017, Scotland's first *Energy Strategy* sets out the Scottish Government's vision for the future energy system in Scotland. It articulates six energy priorities, including championing Scotland's renewable energy potential, for a whole-system approach that considers both the use and the supply of energy for heat, power and transport (Scottish Government, 2017c).

2020 Routemap for Renewable Energy in Scotland – Update (2015)

10 The Scottish Government's target for renewable electricity generation is for renewables to generate the equivalent of 100 per cent of gross annual consumption by 2020.

11 The updated *2020 Routemap for Renewable Energy in Scotland* highlights the increasing promise of offshore wind as a source of renewable energy which can be used to meet the Scottish Government's target and also highlights that offshore wind can be a source of huge economic value to Scotland (Scottish Government 2015a).

Scotland's Offshore Wind Route Map (2013)

12 It is estimated that the seas surrounding Scotland have around 25 per cent of Europe's offshore wind potential (Scottish Government, 2013). This provides a significant opportunity for economic growth in Scotland that has the *"potential to attract billions of pounds of investment and create tens of thousands of highly skilled, sustainable jobs"* (Scottish Enterprise, 2013).

13 *Scotland's Offshore Wind Route Map* which was updated in 2013 provides an update of where the industry is at in terms of opportunities, challenges and priority recommendations for action to ensure that Scotland fulfils its full potential and exploits the above opportunity.

14 Key areas of action discussed within the updated Route Map include:

- Investment in infrastructure;
- Appropriate supply chain;
- Ongoing innovation of technology and practices;
- Regulation of and access to the electricity grid;
- Managing the marine environment;
- Skills;
- Finance; and
- Securing support of local communities and existing users of the sea.

15 The updated Route Map provides a progress update with regards to the key areas for action. This update shows that significant progress has been made, however it is clear that there are still several difficult challenges that remain such as the ability to unlock private investment for the development of port and manufacturing facilities, supply chain uncertainty that exists while port and manufacturing facility projects await consents, lack of intelligence about specific skills demands and job opportunities and funding opportunities to name a few.

Scotland's Economic Strategy (2015)

16 The ambition of *Scotland's Economic Strategy* (updated in 2015) is to *"create a more cohesive and resilient economy that improves the opportunities, life chances, and wellbeing of every citizen in our country".* Whilst, its purpose it to create *"a more successful country, with opportunities for all of Scotland to flourish, through increasing sustainable economic growth".* The approach of the Strategy is *"based on two key pillars: increasing competitiveness and tackling inequality"* (Scottish Government, 2015c). Within the Strategy

there are also four key priority areas where their actions will be targeted to deliver sustainable economic growth. These keys areas are:

- An economy where growth is underpinned by long-term sustainable investment in people, infrastructure and assets;
- An economy where growth is based on innovation, change and openness to new ways of doing things;
- A society that promotes inclusive growth and creates opportunity through a fair and inclusive jobs market and regional cohesion to provide economic opportunities across all of Scotland; and
- A country with an international outlook and focus, open to trade, migration and new ideas.

National Planning Framework 3 (2014)

17 NPF3 is a long-term strategy for Scotland. It is the spatial expression of the Government Economic Strategy, and of the plans for development and investment in infrastructure. NPF3 identifies national developments and other strategically important development opportunities in Scotland.

18 NPF3 Enterprise Areas are a priority action area within NPF3, one such area is the Low Carbon/Renewables East Enterprise Area which includes Dundee Port and the Port of Leith.

19 The NPF3 strategy for a successful, sustainable place highlights the particular scope for the cities network to progress their economic agenda. Focusing on the creation of opportunities for all of Scotland to flourish, including areas which have, in the past, experienced decline. To support this, two national developments are taken forward including Dundee Waterfront. Plans for the waterfront support several of the NPF3 objectives, including: regeneration, high quality placemaking, improvements to the public realm, better connections, and support for the low carbon economy.

20 Spatial priorities for change including the economic opportunities arising from the transition to a low carbon economy emerging in our coastal areas such as ports and harbours that have been identified in NPF3 as having potential for renewables-based investment, including Montrose, Methil and Burntisland.

21 NPF3 also highlights Aberdeen Harbour as one of Scotland's key gateways. As such, expansion of Aberdeen Harbour, including improved intermodal connections by road, is identified as a national development.

National Renewables Infrastructure Plan (2010)

22 *National Renewables Infrastructure Plan* (N-RIP) stages 1-3 were undertaken to set out a group of best fit port locations based on industry requirements and a short process to develop investment cases for ports that can support the development of the offshore wind, wave and tidal industry.

23 N-RIP also set out investment required for the best fit locations identified in stage 1, with the public sector pump-priming investment approach for these sites and the key planning and consenting steps that have to be taken to deliver these sites in a timeframe that makes the attraction of private investment achievable. The report clusters together the ports identified in stage 1 into three clusters: Forth/Tay, West Coast and Moray Firth. The three clusters were indicated to be the key manufacturing, installation and operation and maintenance locations. Market interest was indicated to be strongest in the Forth/Tay and Moray Firth clusters, therefore these clusters should be the focus for initial investment. In addition, a fourth, existing, subsea cluster exists focussed on Aberdeen and Peterhead and these locations amongst others are used by companies which will bring expertise to offshore wind installation and operations and maintenance (O&M) processes. Some offshore wind manufacturing is also thought possible in this area.

24 In addition to this N-RIP was undertaken to develop and deliver investment packages driven by the asset owner with appropriate public investment where required. Key planning and consenting issues were to be progressed to ensure that users' timescales could be met and sites developed sustainably. This investment was to be based on an assessment of market interest. The regional port cluster approach detailed in the stage 2 report was to be further developed and used to draw more supply chain interest to Scotland.

25 With regards to the Economic Study Area discussed within this chapter, the stage 2 report identifies Leith Docks area as a strong location for large scale manufacturing, installation activities and O&M for the renewables industry. Other ports identified include the Port of Dundee, Aberdeen Port and the Energy Park, Fife at Methil.

National Renewables Infrastructure Fund (2012)

26 The Scottish Government through Scottish Enterprise and HIE created the £70 million National Renewables Infrastructure Fund (N-RIF) in 2012 to lever in private sector investment to the key port demonstration and manufacturing infrastructure prioritised in the N-RIP (Scottish Enterprise 2012). This fund is in addition to Regional Selective Assistance (RSA) and other funding that is available for companies in some areas, with the aim of creating and supporting new employment in the industry.

Scotland's National Marine Plan

27 *Scotland's National Marine Plan* was published in March 2015 (Scottish Government, 2015d). The Plan provides a comprehensive overarching framework for all marine activity in Scottish Territorial Waters (STW) including the potential for economic activity in the marine environment and the careful consideration that this requires, to ensure that developments are taken into account, appropriately and proportionately, in marine decision making.

16.4.2 Regional Plans, Policies and Guidance

28 The defined Economic Study Area, discussed in *Section 16.6.1* below, is made up of 23 local authority areas, as such this section will firstly discuss regulations and guidance from local authority areas that have locations within that are considered as representative of the type

of locations that may, with appropriate development and investment, be able to support the offshore wind sector (See Table 16.4 below). In addition, relevant regulations and guidance from the other local authorities whose boundaries lie within the Economic Study Area will be discussed or listed below.

Table 16.4: Regional and local regulation and guidance

Local Authority	Strategies, Plans, and Guidance	Key Aims and Objectives
Edinburgh, City of (includes the representative location of Leith)	The SDP for South East Scotland (SESplan) (2013)	The SDP is intended to set out a vision statement on the future development of the SESplan area (City of Edinburgh, East Lothian, Fife, Midlothian, Scottish Borders and West Lothian), along with a Spatial Strategy on the future development and land use within the area, taking into account cross-border relationships. The SDP Capital City vision is that *"by 2032, the Edinburgh City Region is a healthier, more prosperous and sustainable place which continues to be internationally recognised as an outstanding area in which to live, work and do business"* The SDP has 8 aims to deliver this vision, 2 of which are especially relevant to socio-economics: • Enable growth in the economy by developing key economic sectors, acting as the national hub for development and supporting local and rural development; and • Promote the provision of improved infrastructure to enhance connectivity within the area, between the area and other parts of the UK and elsewhere to support economic growth and meet the needs of communities. The Spatial Strategy Regional Core area includes the Edinburgh Waterfront area, focusing on the potential of Leith as a location for the manufacturing of offshore wind infrastructure.
	Edinburgh Local Development Plan (LDP) 2016	The LDP is consistent with the SDP and has a key role in helping to meet its aims and deliver its strategy. The LDP identifies seven 'special economic areas', all of which are of national or strategic economic importance, providing or with the potential to provide a significant number of jobs. Leith Docks are identified as a 'special economic area', the main purpose of this area is identified for business and industry. The plan sets out the main proposals, anticipated changes and key investment opportunities for the Edinburgh Waterfront area, including Leith Docks as an area with potential to accommodate major operations, supported by other east coast ports.

Local Authority	Strategies, Plans, and Guidance	Key Aims and Objectives
	Edinburgh's Economic Strategy 2012-2017	Edinburgh's economic strategy 2012-17, aims to achieve sustainable economic growth through investment in jobs. The Council and its partners are working towards this goal in four ways: • Investing in the city's development and regeneration; • Supporting inward investment; • Supporting businesses; and • Helping unemployed people into work or learning. In terms of the goal of supporting inward investment, one of the Strategies priority outcomes is to establish Edinburgh and Fife among the Scottish centres of excellence in renewable energy. In addition to this, one of the priority outcomes of the supporting businesses goal is that *"the city's universities will demonstrate innovation in knowledge sectors such as renewable energy".*
Fife (Includes the representative locations of Rosyth, Methil and Burntisland)	SESplan 2013	As part of the SDP, the Energy Park Fife at Methil is identified as a key location for the research and development of renewable energy technologies and is promoted as a 'centre of excellence' in Scotland for these activities.
	FIFEplan 2017	The plan states that Fife will continue to be a leading centre in the field of low carbon developments with the University of St Andrews' proposal for low carbon and sustainable energy related research, development, and industry expected to be an important addition to Fife's assets in energy and renewables. This will complement the Energy Park at Methil which is a key component of the NRIP.
	Fife's Economic Development Strategy 2005-2015	The Strategy focuses on the need to *"create the conditions necessary for sustainable economic growth within Fife, to maximise the skills of Fife's people and to attract and retain skilled talent to the area"*. The Strategy determined that key economic challenges and opportunities for Fife were: • Improving skills, productivity and business growth and continuing to improve the business start-up rate;

Local Authority	Strategies, Plans, and Guidance	Key Aims and Objectives
		• Creating a more diverse, high value economy; • Maximising investment in St Andrews World Class, Rosyth Waterfront, John Smith Business Park and the Renewable Energy Park at Methil; • Sustaining the manufacturing industry and ensuring that Fife is ready to meet the challenges of the growing service sector; and • Creating a knowledge economy in Fife.
	Fife's Economic Development Strategy 2017-2027	The updated Strategy is a joint Fife Economy Partnership, Opportunities Fife Partnership and Fife Council strategy. It sets out how they will work together, as well as with the Scottish Government, its national agencies and with their city region partners over the next 10 years to achieve sustainable and fair economic growth for Fife. This Strategy identifies four priority areas where actions will be targeted in order to make a difference: • Achieving fairer, more inclusive growth; • Increasing investment in Fife's business infrastructure; • Improving business growth through increased internationalisation, sales and exports; and • Fostering a culture of innovation and enterprise. One of the key sectors Fife will focus its economic development and employability efforts on is energy and renewables as *"Fife is one of the country's leading centres for energy, low carbon and renewables with a strong and growing profile of low carbon businesses, a range of site development locations and world-class training and research facilities"*. The support from the Strategy will be targeted through the *"promotion of Fife's competitive advantage in energy and renewables to encourage further inward and mobile investment"*.
City of Dundee	Dundee LDP 2014	The Development Plan for Dundee consists of two documents; the SDP (TAYplan) and the LDP. The TAYplan is discussed below. The LDP supports existing employment activity and encourages further growth through the

Local Authority	Strategies, Plans, and Guidance	Key Aims and Objectives
		designation of appropriate and effective Economic Development Areas. The LDP expects there to be a strong cause for optimism within Dundee with expected increased employment to be generated in the Renewable Energy Sector. The LDP also identifies Dundee as a key location for offshore renewable energy (ORE) related developments, stating that the City is well equipped with sites and facilities and a number of specific measures are in place to accommodate this category of development.
	Dundee's Economic Strategy and Action Plan 2013-2017	The focus of the Strategy and Action Plan is on *"delivering economic recovery & growth and the creation of employment opportunities that people have the qualifications and skills to access".* One of the intended objectives of the Strategy and Action Plan is to make *"Dundee a leading centre for the offshore renewables industry in the UK".* Key Action Areas that the Dundee Partnership have undertaken or plan to undertake to achieve the objective include: • Promote Dundee through the activities of the Dundee Renewables partnership (website, publicity material, attendance at major events); • Work in partnership with 10 local authorities through East Coast Renewables to promote the east coast as a viable location; • Encourage companies to register in Dundee Renewables Green Directory and Scottish Enterprise's Offshore Renewables Supply Chain Directory; • Encourage participation in Scottish Enterprise's Offshore Wind Expert Support Programme; • Develop a comprehensive range of training and support opportunities through Energy Training East, an alliance of Tayside's 5 Universities and Colleges; and • Create a leading academic centre – the Offshore Renewables Institute (ORI) – based at the University of Dundee.

Local Authority	Strategies, Plans, and Guidance	Key Aims and Objectives
	TAYplan SDP 2016-2036	The approved Plan sets the overall planning vision for the next 20 years for the whole Dundee and Perth area, including North Fife and parts of Angus and Perth and Kinross. The TAYplan vision is that by 2036, the TAYplan area will be sustainable, more attractive, competitive and vibrant without creating an unacceptable burden on our planet. The quality of life will make it a place of first choice where more people choose to live, work, study and visit and where businesses choose to invest and create jobs. This Plan sets out a spatial strategy to deliver a sustainable pattern of development which says where development should and should not go in order to deliver the vision and the outcomes which underpin it. Policy 10 of the Plan has specific significance in terms of socio-economics in that it states that the LDP should enhance connectivity of people, places and markets by: A. safeguarding land at Dundee and Montrose Ports, and other harbours as appropriate, for port related uses to support sea freight, economic growth in the port, ORE and offshore oil and gas sectors, and, maritime trade, recreation and tourism.
Angus (Includes the representative location of Montrose)	Angus LDP 2016	TAYplan SDP provides the strategic context for the preparation of the Angus LDP (ALDP). The ALDP guides development for 10 years following adoption, up to 2026. The plan sets out where land is being allocated to meet development needs and where new development should and should not happen. Policy M6 of the Plan has specific significance in terms of socio-economics in that it safeguards Montrose Port for port related uses. Development proposals which enhance the commercial and economic role of the Port will be supported where these are compatible with adjacent land uses.
	Angus Economic Development Strategy 2013-2020	The Strategy maps out how the Angus Community Planning Partnership intends to continue to develop the area for the coming years, setting out the key priorities, challenges and opportunities.
Highlands (Includes the representative location of the Cromarty Firth)	HIEOperating Plan 2017-2018	The HIE Operating Plan 2017-18 sets out *"four strategic priorities, and shows how these align with the key themes of investment, innovation, internationalisation and inclusive growth at the heart of Scotland's Economic Strategy"*. The priorities of the Plan are:

Local Authority	Strategies, Plans, and Guidance	Key Aims and Objectives
		• Supporting businesses and social enterprises to shape and realise their growth aspirations; • Strengthening communities and fragile areas; • Developing growth sectors, particularly distinctive regional opportunities; and • Creating the conditions for a competitive and low-carbon region. In terms of developing growth sectors, particularly distinctive regional opportunities, one of their priorities in the present year is investment in Energy focusing on: • Supporting excellence in test and demonstration activity associated with offshore developments in marine, floating wind, subsea and decommissioning sectors; • Supporting oil and gas internationalisation, diversification into renewables and exploring decommissioning opportunities; • Building on the success of Wave Energy Scotland to accelerate the establishment of a sustainable wave energy sector in Scotland; • Securing significant economic growth through supply chain engagement in large-scale energy projects, whilst actively promoting international opportunities through matching company capabilities with markets in priority geographies; • Ensuring the delivery of flagship demonstration projects in low carbon local energy systems; and • Continued partnership working with the Scottish Government, industry and stakeholders to support a transition to a low carbon energy economy.
Aberdeen City/Aberdeenshire	Aberdeen City and Shire Economic Action Plan 2013-2018	The Plan sets out the vision for the area, which is: *"By 2035 Aberdeen City and Shire will be an even more attractive, prosperous and sustainable European city region and an excellent place to live, visit and do business. We will be recognised for:* • our enterprise and inventiveness, particularly in the knowledge economy and in high-

Local Authority	Strategies, Plans, and Guidance	Key Aims and Objectives
		value markets; • the unique qualities of our environment; and • our high quality of life. *We will have acted confidently and taken the courageous decisions necessary to further develop a robust and resilient economy, and to lead the way towards development being sustainable, including dealing with climate change and creating a more inclusive society".* A key target of the Plan is to achieve an annual economic growth rate of 2.5 per cent. To achieve this level of economic growth, key sectors will include the energy sector and the action plan will utilise and focus on the energy position of Aberdeen City and Shire as a global energy hub, building on the world class expertise of the oil and gas industry and growing the offshore energy supply chain for renewables.
	Aberdeen LDP 2017 / Aberdeenshire LDP 2017	The Aberdeen LDP and Aberdeenshire LDP provide a land use framework within which the Aberdeen City and Shire Strategic Development Plan can be worked towards. The Aberdeen LDP recognises Aberdeen Harbour as playing a critical role in the economy of Aberdeen and Scotland as a whole. It is a gateway for trade linking with over 40 countries, and an important point of access for the offshore energy industry. Policy B5 – Aberdeen Harbour of the Aberdeen LDP states that there will be a presumption in favour of harbour infrastructure and ancillary uses, which are required for the effective and efficient operation of the harbour and which have a functional requirement to be located there. This may include administrative offices, warehousing and storage (including fuel storage), distribution facilities and car/HGV parking. Other harbour-related uses will be treated on their merits. The Aberdeenshire LDP amongst other things helps to support the area to grow as an international centre for the oil and gas industry, to spread into the renewables sectors, and improve the knowledge and service sectors.

29 In addition to those regulations and policies included in Table 16.4 above, relevant regulations and guidance from the other local authorities whose boundaries lie within the Economic Study Area include the *East Lothian Economic Development Strategy 2012-2022* (East Lothian Council, 2012) which acknowledges that East Lothian has historically been an affluent area with strong links to the economic development and opportunities provided by the City of Edinburgh which has resulted in a lack of focus on the economic development of the area. The impact of the 2008 recession has changed that, as such the economic strategy aims to enhance the role that economic development has.

30 One of the issues identified in the strategy is the anticipated future employment losses from the closure of Cockenzie and Torness power stations. The strategy acknowledges that for East Lothian to become the most sustainable local economy it must develop new low carbon sectors to cope with this change to the labour market. Renewable energy is also identified as one of the key sectors that needs to be developed.

31 Other relevant plans from local authorities whose boundaries lie within the Economic Study Area include:

- *East Lothian Local Plan 2008*;
- *East Lothian Proposed Development Plan*;
- *West Lothian Local Plan 2009*;
- *West Lothian Economic Strategy 2010-2020*;
- *Midlothian Local Development Plan 2017;*
- *North Lanarkshire Local Plan 2012*;
- *Falkirk Local Development Plan 2015;*
- *Falkirk Economic Strategy 2015-2025*;
- *Perth and Kinross Local Development Plan 2014*;
- *Moray Local Development Plan 2015*;
- *Stirling Local Development Plan 2014;*
- *Clackmannanshire Local Development Plan 2015*;
- *East Dunbartonshire Local Development Plan 2017;*
- *West Dunbartonshire Local Plan 2010;*
- *East Renfrewshire Local Development Plan 2015*;
- *Renfrewshire Local Development Plan 2014*;
- *Glasgow and Clyde Valley Strategic Development Plan (Clydeplan) 2017*;
- *Glasgow City Development Plan 2017*;
- *South Lanarkshire Local Development Plan 2015*;

- *Scottish Borders Local Development Plan 2016*; and
- *Scottish Borders Economic Strategy 2023*.

32 The plans and strategies identified above set out amongst other things the economic objectives for the local authority areas. Objectives include:

- Grow innovative, competitive and sustainable businesses;
- Promote and manage sustainable economic growth;
- Ensure availability of infrastructure to support growth;
- Set out plans to broaden and diversify the industrial base;
- Identify new sectors and opportunities for growth;
- Promote innovation and the application of new technologies;
- Highlight the area's potential and means to attract investment;
- Stimulate further development in the skills and experience of the authority's people;
- Developing the workforce for the future.

16.5 Design Envelope and Commitments

16.5.1 Design Envelope

33 It is anticipated that the Development will consist of up to 72 Wind Turbine Generators (WTGs), on steel or concrete cylindrical towers or steel lattice (jacket) substructures, supported on gravity base or piled foundations (including monopiles), up to 190 km of inter-array cables, up to two Offshore Substation Platforms (OSPs) and up to two export cables with a construction programme of 24 months within a 3 year period.

34 In order to follow EIA Regulations, this socio-economic assessment is based on the minimum generating capacity considered for the Development which is 560 Megawatt (MW[1]) (e.g. in terms of economic impacts this would be considered the lowest or the worst case scenario associated with the Development). It should be noted that the expected Development capacity will be greater than this. Based on the current existing grid connection agreement the capacity will be around 700 MW, although it should be noted that this grid connection agreement may be altered during the final design process.

16.5.2 ICOL's commitment to supporting the Scottish Economy

35 ICOL's commitment for the Development will seek to benefit local and national opportunities associated with the Development, and are as follows:

- ICOL will support a protocol to give local contractors the opportunity to tender for appropriate work arising from the Development Construction (& Decommissioning)

[1] ICOL are not including a minimum MW within their design envelope application and this number is provided as a realistic minimum for the purposes of the EIA only.

Phase, and Operation & Maintenance Phase. The protocol will ensure that local contractors with the relevant skills and experience will be able to access the procurement process through "meet the buyer" events and other initiatives; and

- ICOL has worked closely with Scottish economic development agencies to promote opportunities since the inception of the project and this approach will continue throughout the life of the Development.

16.6 Baseline Environment

36 In order to assess the economic impacts of the Development for the EIA, the baseline environment first needs to be identified. The following sections identify the Economic Study Area and the baseline receptors within this area.

16.6.1 Economic Study Area

37 At the time of writing the final selection of facilities required for the Development has not yet been determined. Instead, ICOL are exploring Scottish ports, facilities, supporting infrastructure and labour markets to understand the potential capability, capacity and availability of each. Subject to these factors, the most likely scenario is that a port or a range of ports and facilities along the east coast of Scotland will be used to support elements of the construction, O&M, and decommissioning phases of the Development as part of a global supply chain. It is likely that ports and facilities nearer the Development Area will be used to support O&M for the Development.

38 Since it is not possible, at this stage, to provide an assessment based on firm locations for the facilities, an Economic Study Area has been defined based on the labour market catchment areas (60 minute drive-time catchments) around eight locations considered as representative of the type of locations that may, with appropriate development and investment, be able to support the offshore wind sector. These locations are Leith (Edinburgh), Rosyth (Fife), Dundee, Montrose, Methil, Burntisland, the Cromarty Firth (Highland) and Aberdeen (shown in Figures 16.1- 16.3 below).

39 Selection of actual facilities will be subject to ongoing engineering and procurement considerations and the use of representative facilities for the purposes of this assessment does not indicate any preference or imply any decision.

40 In terms of the OnTW, the Economic Study Area is predominantly the Preston/Seton/Gosford Ward 2007 (shown in Figure 12.1 of Chapter 12 of the OnTW EIA Report), but wider supply chain activity and specialist employment may also be generated in the East Coast of Scotland and further afield. This is fully considered within Chapter 12 of the OnTW EIA Report; however, the CIA within *Section 16.9* below considers GVA and job numbers for the Development and the OnTW.

Figure 16.1: Illustration of Economic Study Area

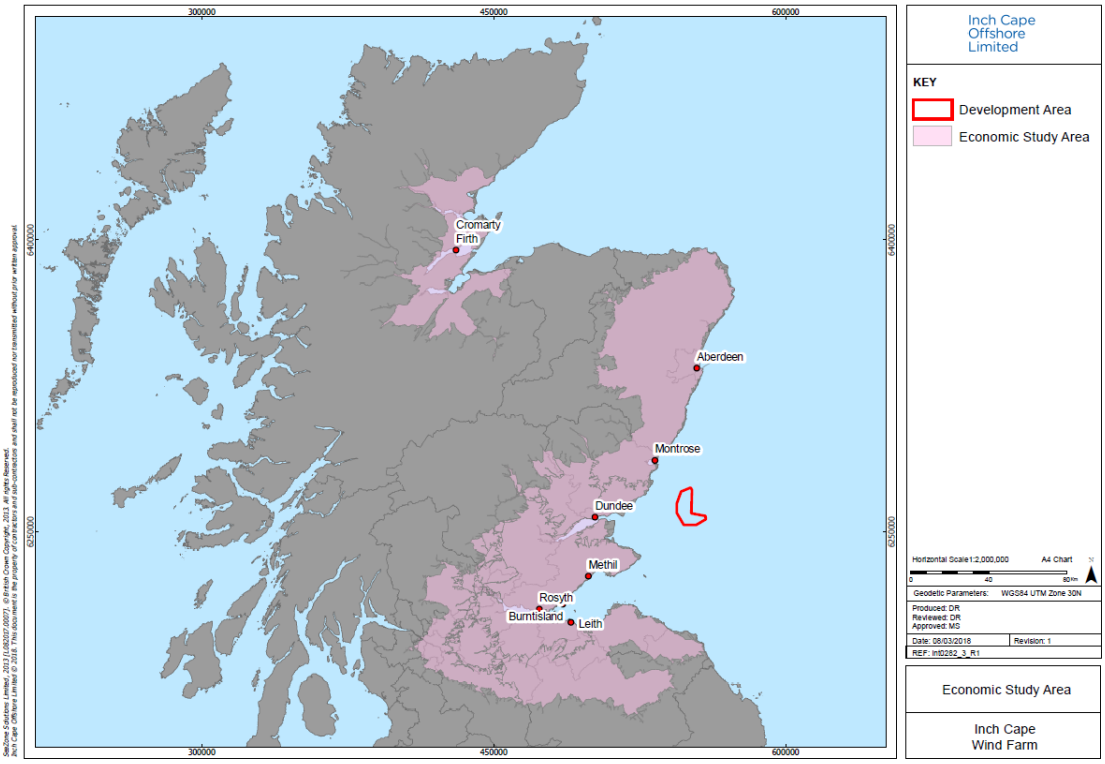


Figure 16.2: Labour market catchment areas

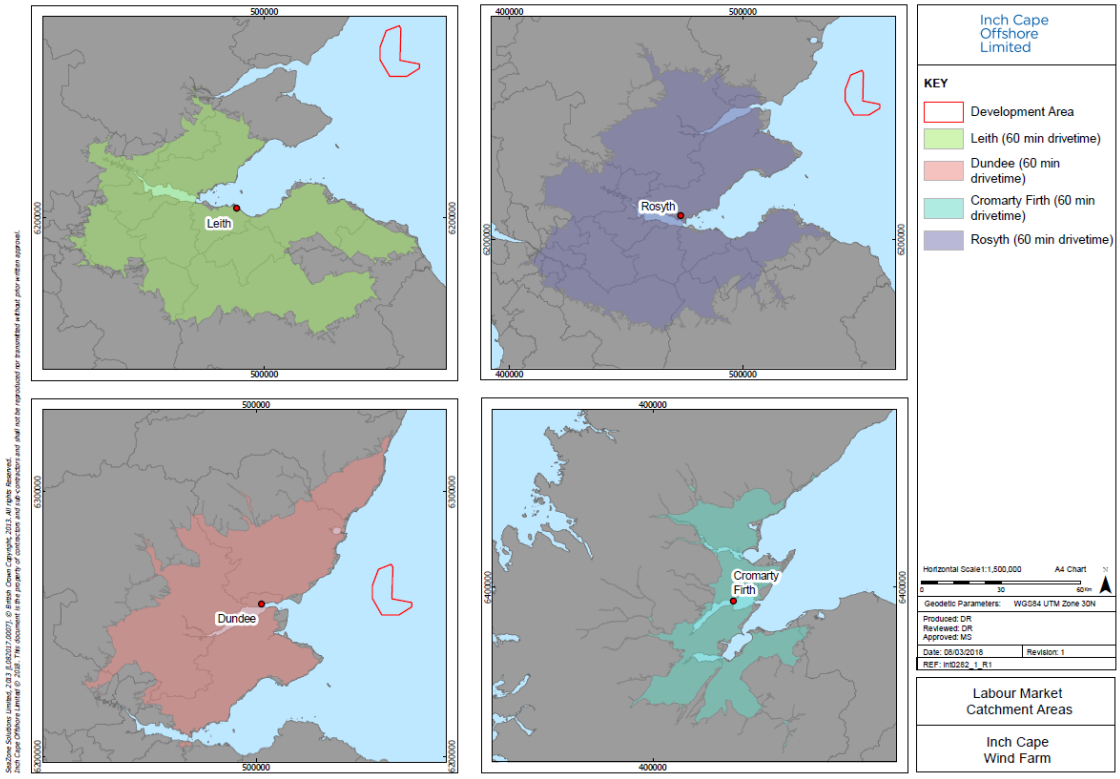
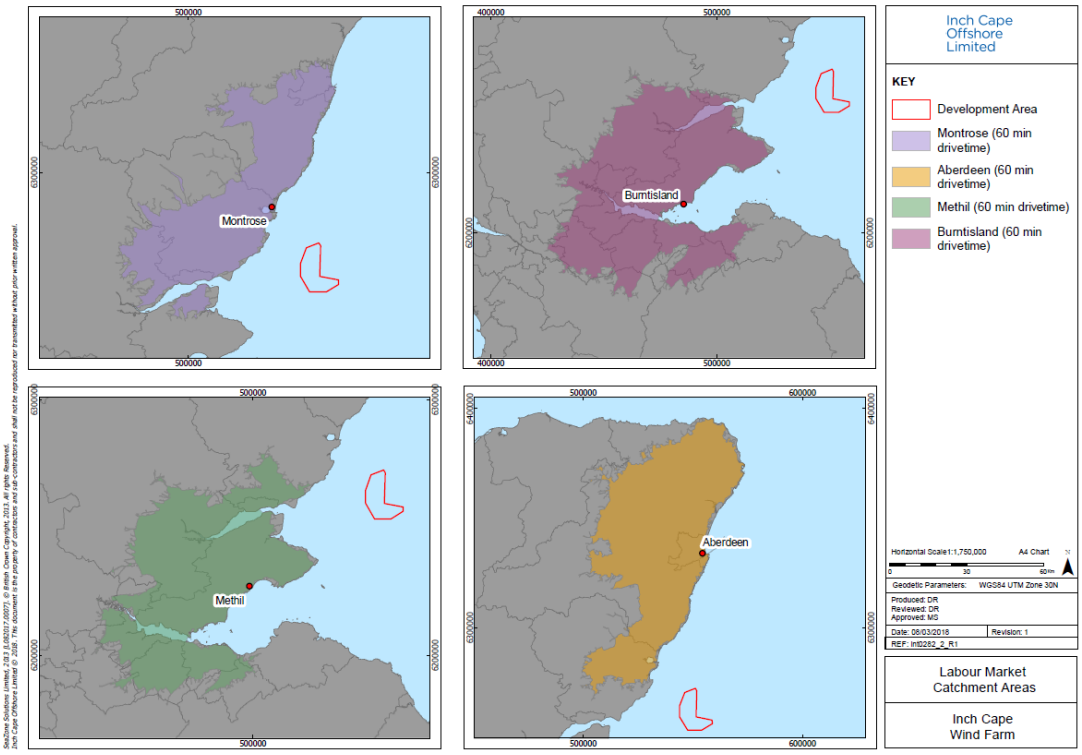


Figure 16.3: Labour market catchment areas



41 The eight labour market catchment areas that collectively form the Economic Study Area cross local authority boundaries within Scotland. Relevant local authority areas are Edinburgh, the Lothians, North Lanarkshire, Falkirk, Fife, City of Dundee, Angus, Aberdeen City, Aberdeenshire, Moray, Highland, Perth & Kinross, Stirling, Clackmannanshire, East Dunbartonshire, West Dunbartonshire, East Renfrewshire, Renfrewshire, Glasgow City, South Lanarkshire and the Scottish Borders. Statistics are used where relevant for these local authority areas to provide baseline information.

42 The impacts and effects identified through the assessment are set within the wider context of the Scottish economy as a whole. Assessments at a Scottish level are used for cumulative assessment since impacts can be meaningfully combined at this level and cannot be combined at Economic Study Area level since these are unique for each project.

16.6.2 Data Sources

43 Data sources used to identify baseline conditions include the following publicly available data:

- Development policies and strategic Plans at national and regional levels that are relevant to the assessment;
- Office for National Statistics (ONS) data covering the period 2016 to 2017 (ONS, 2017a and 2017b);
- National Records of Scotland (NRS); and

- Scotland's Census 2011 Area Profiles.

16.6.3 Overview of baseline

44 The remainder of this section presents the baseline conditions for the socio-economic activities across the Economic Study Area described above.

16.6.4 Receptors

45 The following baseline conditions will be considered within the socio-economic baseline environment:

- Population and age structure;
- Economic activity;
- Employment structure;
- Job density;
- Industry structure;
- Unemployment (Job Seekers Allowance);
- Qualifications;
- Earnings; and
- Infrastructure, initiatives and skills.

16.6.5 Economic Study Area Baseline

46 The baseline will be of the Economic Study Area as defined above in *Section 16.6.1*.

Population and Age Structure

47 The population across the Economic Study Area has grown between 2015 and 2016, most notably in the City of Edinburgh, Midlothian and Glasgow City. However, the population of Angus and Aberdeen City has decreased over this period (NRS, 2017a). The population has increased across all local authorities within the Economic Study Area other than Clackmannanshire compared to that shown in the 2011 census data (NRS, 2017b).

48 The City of Edinburgh, Aberdeen City, City of Dundee and Glasgow City local authorities have a higher than average (compared to Scotland overall) proportion of working age people (NRS, 2017a). The working age population has however decreased over all local authorities within the Economic Study Area compared to that shown in the 2011 census data (NRS, 2017a and 2017b).

49 Angus, East Dunbartonshire, Perth and Kinross and Scottish Borders have a noticeably higher Dependency Ratio compared to the Scottish and UK averages during 2016. Whereas, Aberdeen City, City of Edinburgh, Glasgow City all have noticeably lower Dependency Ratios with North Lanarkshire, Stirling and West Lothian having a Dependency Ratio in line with that of Scotland. All of the local authorities within the Economic Study Area have a higher

Dependency Ratio during 2016 compared to that shown within the 2011 census data (NRS, 2017a and 2017b).

50 Within the Economic Study Area, the Aberdeen, Burntisland, Leith, Methil, Montrose and Rosyth Labour Catchment Areas all have higher than average (compared to Scotland overall) proportion of working age people (ONS, 2017b).

Economic Activity

51 The Economic Activity Rate measures the percentage of the population, both in employment and unemployed that represent the labour supply, and hence is a useful measure of the labour market opportunities available to the population. During the period October 2016 to September 2017 East Lothian, West Lothian, Midlothian, Falkirk, Angus, Aberdeen City, Aberdeenshire, Highlands, Perth and Kinross, East Dunbartonshire, South Lanarkshire and Scottish Borders have an Economic Activity Rate higher than the Scottish and UK averages and North Lanarkshire, City of Dundee, Stirling and Glasgow City having economic activity lower than average. Edinburgh City and Fife have an Economic Activity Rate in line with that of Scotland (ONS, 2017a and 2017b).

52 Within the Economic Study Area, the Aberdeen, Cromarty Firth, Leith and Montrose Labour Catchment Areas all have an Economic Activity Rate higher than the Scottish average and Methil has an Economic Activity Rate in line with that of Scotland.

53 Within the Economic Study Area, the Dundee, Montrose and Rosyth Labour Catchment Areas all have a higher potential available labour pool than the Scottish average and the other Labour Catchment Areas (ONS, 2017b).

Employment Structure

54 The City of Edinburgh, East Lothian, Aberdeen City, Aberdeenshire, Stirling and East Dunbartonshire all have higher than average proportion of highly skilled and skilled workers compared with the Scottish and UK average. The City of Dundee has the highest proportion of unskilled workers. The City of Edinburgh and East Dunbartonshire have the lowest proportions of unskilled workers in the Economic Study Area (ONS, 2017b).

55 Within the Economic Study Area, the Aberdeen, Leith, Methil and Rosyth Catchment Areas all have a higher than average proportion of highly skilled and skilled workers compared with the Scottish average (ONS, 2017b).

Job Density

56 Job Density measures the number of jobs for every resident (each aged 16 – 64 years). City of Edinburgh, Aberdeen City, Highlands and Glasgow City have Job Densities higher than the Scottish and UK average. Dundee City, Perth and Kinross and Stirling have a Job Density in line with or close to the Scottish/UK average, while all other local authorities have Job Densities lower than the Scottish average (ONS, 2017a and 2017b).

Industry Structure

57 West Lothian, North Lothian, Falkirk, Fife, Angus, Aberdeenshire, Clackmannanshire, Scottish Borders, South Lanarkshire have an above average proportion of manufacturing jobs, while the other local authorities in the Economic Study Area are below the Scottish average with East Lothian in line with the Scottish average. Nineteen of the local authorities in the Economic Study Area have above Scottish average proportions of construction jobs, however Dundee City, City of Edinburgh, Aberdeen City and Glasgow City all have below the Scottish average (ONS, 2017a and 2017b).

58 Within the Economic Study Area, the Dundee, Leith and Rosyth Catchment Areas all have a higher than average proportion of manufacturing and construction jobs compared with the Scottish average (ONS, 2017b).

Unemployment (Job Seekers Allowance)

59 Claimant count rates in the Economic Study Area were highest in North Lanarkshire, Dundee City, Clackmannanshire and Glasgow City with Fife, Highlands and South Lanarkshire just above the Scottish average (ONS, 2017a and 2017b). All other local authorities were below the Scottish average with the lowest proportion of claimants within the City of Edinburgh, Aberdeenshire and Perth and Kinross (ONS, 2017a and 2017b).

Qualifications

60 City of Edinburgh, Aberdeen City, Stirling and Perth and Kinross have higher than the Scottish average for educational and attainment level for Degree, Higher National Diplomas (HND) and Highers (ONS, 2017b). Whereas West Lothian, Midlothian, North Lanarkshire, Falkirk, Dundee City, Clackmannanshire and Scottish Borders has below the average for educational and attainment level for Degree, HND and Highers (ONS, 2017b).

Earnings

61 Residents of City of Edinburgh, East Lothian, Aberdeenshire, Perth and Kinross, Stirling, East Dunbartonshire and South Lanarkshire all received salaries above the Scottish average for the 2017 period (ONS, 2017b). Whereas all other local authorities all received below the Scottish average (ONS, 2017b).

Infrastructure, Initiatives and Skills

62 In addition to the above baseline characteristics, it is important to set out the capacity and capability of the Economic Study Area supply chain to accommodate offshore wind development and provide the necessary support in terms of infrastructure, initiatives and skills from which Scotland can benefit.

63 There is a wide range of business and infrastructure initiatives, being implemented across Scotland, designed to enhance the capacity and capability of facilities and the supply chain. These range from business and industry networks (Aberdeen Renewable Energy Group (AREG), European Offshore Wind Deployment Centre (EOWDC) and National Subsea

Research Initiative (NSRI) in Aberdeen, Energy Dundee, Fife Renewables Innovation Centre and other business and industry networks outside the Economic Study Area such as ORE Catapult in Glasgow, through infrastructural strengthening (the upgrading of ports at Dundee, Montrose and Methil), to developing focal points of investment (Energetica Summer Festival held in May to August each year with activities taking place over a 30-mile stretch between the north of Aberdeen and Peterhead).

64 Added to these initiatives a number of multi-national energy sector companies have located within the Economic Study Area and in other parts of Scotland. Interest has also been expressed by wind turbine manufacturers in establishing facilities within the Economic Study Area or in other parts of Scotland that may in time also attract tier 2 or 3 component suppliers (machine parts, fixings, bearings, castings, rolled steel, etc.). In addition to this, in 2016, Dong Energy made a multi-million-pound investment in the CS Wind offshore tower manufacturing facility in Campbelltown. The new facility will be the first in the UK that can manufacture for offshore wind turbines. Also in 2016, Rosyth Dockyard operators Babcock won the deal to build two Offshore Transformer Modules for the Beatrice Offshore Windfarm Limited (BOWL) project in the Outer Moray Firth and secured a prestigious multi-million-pound contract to construct the world's first reactive compensation station for DONG Energy's Hornsea Project One offshore wind farm. The Port of Cromarty Firth has also won two contracts from Seaway Heavy Lifting as part of the BOWL project for berth and laydown space and office space. In addition, Burntisland Fabrications Limited (BiFab), located at the Energy Park, Fife at Methil has been a major player in the manufacturing of jackets for offshore wind turbines, however there has been some uncertainty over its future after being unsuccessful at securing a level of contracts required to sustain the core workforce, resulting in a number of redundancies.

65 An assessment of the ability for the supply chain within the study area, the rest of Scotland and the rest of the UK is included at *Appendix 16A* of this chapter.

66 Part of the business infrastructure necessary to exploit the opportunities from the offshore industry is the network of education, training and skills facilities within the Economic Study Area that would provide the requisite skilled labour force, upon which extensive development of the offshore wind industry will be reliant. These range from the higher education university, centres of excellence, and research institutions focal points in Edinburgh, Dundee, St Andrews and Aberdeen, together with the network of colleges across the Economic Study Area.

67 The training infrastructure within the Economic Study Area also includes several partnerships and organisations including Skills Development Scotland and Tresta amongst others. In addition, the Scottish Government have committed to 30,000 apprenticeship starts per year by 2020, this includes apprenticeships in the energy and climate change industry (Scottish Government, 2017a). To assist in this the Scottish Government have set up the £12 m Transition Training Fund which is managed by Skills Development Scotland. It offers support with training grants to help individuals to retrain, upskill or get accreditation or certification that would help them to get a new job in oil and gas, the wider energy sector, or engineering and manufacturing.

68 All of the above capability and capacity strengthening measures are supported by the Scottish Government strategies and policy frameworks detailed in *Section 16.4* above and are supported by the regional regulations and guidance from the City of Edinburgh Council, Fife Council, Dundee Partnership, Angus Council, the HIE, Aberdeen City Council and Aberdeenshire Council (see *Section 16.4*) which all target the offshore wind industry as a key economic sector. The above shows that the offshore wind industry across Scotland is improving, however with increased investment in infrastructure, initiatives and skills the offshore wind industry across Scotland is capable of increased productivity, which will increase productivity along the eastern coast.

69 Recent research completed by ORE Catapult and detailed in their report *The Economic Value of Offshore Wind: Benefits to the UK of Supporting the Industry 2017* (ORE Catapult, 2017). This report looks at the benefits of an active UK supply chain, showing that there is a clear net benefit to the UK from investing in the offshore wind industry, both to serve UK projects as well as bolstering the potential to export skills, products and services to the global market.

70 The ORE Catapult report also states that UK offshore wind projects currently being installed and operated are estimated to supply 32 per cent of their expenditure within the UK supply chain (referred to as UK content). The report states that *"by continuing to increase UK content in areas of strength such as blade and tower manufacture, cable supply and operations and maintenance (O&M), and developing strengths in other areas, including installation and foundation manufacture, it is projected that up to 65 per cent UK content could be possible by 2030, given the deployment of 19 Gigawatt (GW) plus installed capacity. Successfully developing capability in these areas will open up further export opportunities for the UK in a European market worth an estimated £9.2 billion per year by 2030"* (ORE Catapult, 2017).

71 The capabilities and capacity of the Economic Study Area supply chain to accommodate offshore wind development and provide the necessary support in terms of infrastructure, initiatives and skills alongside the rest of the baseline section above will be considered further within the impact assessment sections (*Sections 16.8-12*) below to estimate the percentage of expenditure likely to be supplied by the Development within the Economic Study Area, rest of Scotland and the rest of the UK.

16.6.6 Baseline without the Development

72 The above information describes the baseline conditions of the Economic Study Area at the time of undertaking the assessment. There is the likelihood that these baseline conditions will change in the future regardless of whether or not the Inch Cape Wind Farm and OfTW is developed. However, prediction of many of these aspects is very uncertain and is considered unlikely to impact upon the conclusions of the assessment.

73 Employment and economic activity can be very difficult to predict. However, in terms of energy developments it seems likely that the Scottish Government energy targets (as outlined above in *Sections 16.4* and in *Chapter 2* and *Chapter 3*) and commitment to

investment in renewable energy that there will be continued growth associated with renewable energy developments. Consequently, the proportion of the local economy benefitting from renewables related developments is likely to increase in the future.

16.7 Impact Assessment

16.7.1 Guidance

74 A number of relevant guidance documents have informed the identification of impacts, mitigation and assessment of residual economic effects of the Development. These guidance documents include:

- *The Green Book Appraisal and Evaluation in Central Government* (HM Treasury, 2003);
- *Economic Appraisal Guidance Note. A Summary Guide to Developing the Economic Case for a Project or Programme* (Scottish Enterprise, 2008);
- *Additionality & Economic Impact Assessment Guidance Note* (Scottish Enterprise, 2008);
- *Scottish Government Input-Output Tables* (Scottish Government, 2017b);
- UK Input-Output Analytical Tables (ONS 2017a and 2017b);
- *Analysis of the Employment Effects of the Operation and Maintenance of Offshore Wind Parks in the UK* (Oxford Economics, 2010);
- *The Macroeconomic Benefits of Investment in Offshore Wind* (CEBR, 2012);
- *The Economic Value of Offshore Wind: Benefits to the UK of Supporting the Industry* (ORE Catapult, 2017);
- *A New Economic Impact Methodology for Offshore Wind* (BVG Associates, 2017);
- *Draft Advice on Net Economic Benefit and Planning* (Scottish Government, 2016); and
- Existing Scottish policy and guidance documents in relation to the specific format of socio-economic assessments has also been considered.

16.7.2 Methodology

75 Potential impacts from the construction, operation and decommissioning of the Development are identified and their significance assessed with regard to the sensitivity of receptors and the magnitude of the effect.

76 The socio-economic impact assessment covers the following impacts:

- Creation of jobs and training opportunities;
- Provision of additional local services and improvements to local infrastructure;
- Impact of a changing influx of workers during the different construction, operation and decommissioning phases; and
- Consideration of cumulative effects with other projects.

77 In considering these impacts, this socio-economic impact assessment establishes the potential nature and scale of economic impacts generated by the Development, by reference to a number of best practice and research documents as set out in this chapter. Use is also made of industry experience of existing and emerging offshore wind schemes. In addition, the outputs generated by the Development are set within the context of the baseline capacity and capability of the Economic Study Area to absorb and benefit from these impacts. Considering the extent to which Scottish based businesses can benefit from the Development expenditure in terms of their capability, experience, skills and capacity.

78 The nature and scale of impacts are assessed by reference to a series of socio-economic significance criteria and by temporal phase of development, namely those impacts arising from the construction, O&M and decommissioning phases of the Development. Information from the baseline relating to infrastructural strengthening has also been used to prepare this assessment.

79 The principal socio-economic assessment criteria relate to the impact on employment within the Economic Study Area. These impacts are defined in terms of FTE jobs and economic output measured by the GVA generated by those jobs. The assessment outputs are therefore focussed on the following categories:

- Direct economic impacts: jobs and GVA that are wholly or largely related to construction, O&M, and decommissioning of the Development, which are generated in the Economic Study Area;
- Indirect economic impacts: jobs and GVA generated in the economy of the Economic Study Area in the chain of suppliers of goods and services to the direct activities;
- Induced economic impacts: jobs and GVA created by direct and indirect employees' spending in the Economic Study Area or in the wider economy; and
- Wider economic (catalytic) impacts: employment and income generated in the economy related to the wider role of the Development in influencing economic activities including wider socio-economic impacts.

80 The potential for cumulative impacts has been examined where relevant, and where data were available for the in-combination impact of the Development and OnTW, together with the relevant projects off the east coast of Scotland.

16.7.3 Significance Criteria

Sensitivity of Receptor

81 For the purposes of this socio-economic impact assessment the main factors considered relevant when defining the sensitivity of receptors are outlined in Table 16.5 below.

82 For economic impacts and effects, including employment, the availability of labour and skills is critical in being able to accommodate the demands, needs and requirements of the Development. Adequate capacity results in a low sensitivity, while conversely limited capacity results in a high sensitivity.

Table 16.5: Criteria for classifying sensitivity of receptor

Sensitivity	Definition
High	Where there is a low availability of labour and skills
Moderate	Where there is a constrained supply of labour and skills
Low	Where there is a readily available labour force and skills

Magnitude of Impact

83 A level of impact significance has been ascribed based on the information on both the Development socio-economic outputs and also the baseline structure of the Economic Study Area.

84 The magnitude of the effect of potential impacts on socio-economic receptors will be assessed as defined in Table 16.6 below.

Table 16.6: Classification of magnitude of impact

Magnitude	Definition
High	Impacts of the project of greater than local scale
Moderate	Noticeable impacts of the project that may be judged to be important at a local scale
Low	Slight impacts of the project that may be judged to be of minor importance
Negligible	Where impact is not discernible

Method for Assigning Significance of Effect

85 In line with standard EIA practice, the sensitivity of receptors, as defined in Table 16.5 Receptor Sensitivity (Socio-Economics) above are considered against the magnitude of impact (Tables 16.6) above to determine the significance of effect (Table 16.7).

Table 16.7: Significance of effects

Magnitude of Impact	Sensitivity of resource/receptor		
	Low	**Moderate**	**High**
Negligible	Negligible/Minor	Minor	Minor/Moderate
Low	Minor	Minor/Moderate	Moderate

Moderate	Minor/Moderate	Moderate	Moderate/Major
High	Moderate	Moderate/Major	Major

86 For the purposes of this assessment those residual positive and negative effects indicated as Major and Moderate/Major are considered significant.

16.8 Impact Assessment – Development

87 This section considers the source and nature of the impacts of the Development on the Economic Study Area. The impact assessment is considered in relation to the construction, operational and decommissioning phases. Values are presented for the Economic Study Area, the 'rest of Scotland', the 'rest of the UK' and the balance as the 'rest of the World'.

16.8.1 Effects on Construction

Construction Scenarios

88 ICOL have used industry figures[2] to estimate the offshore capital expenditure (CAPEX); operating expenditure (OPEX) and decommissioning expenditure by region, as set out in Table 16.8 below, based on the following 'Base' and 'High' scenarios, defined as:

- Base socio-economic scenario – moderate supply chain capacity capable of supplying around 15 per cent of whole life expenditures from within the Economic Study Area, a further 13 per cent from the rest of Scotland and a further 18 per cent from within the rest of the UK; and
- High socio-economic scenario – a more developed supply chain capable of supplying around 36 per cent of whole life expenditures from the Economic Study Area, a further 14 per cent from the rest of Scotland and a further 27 per cent from the rest of the UK.

89 Both scenarios assume that the Development will be fully developed in terms of the worst case 560 MW generating capacity (and full expenditure), but differ in the proportions of expenditure made within the Economic Study Area, the rest of Scotland and the rest of the UK.

[2] Taken from Shafiee, M., Brennan, F., and Espinosa, I.A. (2016) *A Parametric Whole Life Cost Model for Offshore Wind Farms in The International Journal of Life Cycle Assessment*. Available at: https://link.springer.com/article/10.1007/s11367-016-1075-z [Accessed 16/04/2018].

Table 16.8: Offshore expenditure estimates by scenario (£ million) – Development Area

	Base Socio-economic Scenario				High Socio-economic Scenario			
	Economic Study Area	Rest of Scotland	Rest of UK	Rest of the World	Economic Study Area	Rest of Scotland	Rest of UK	Rest of the World
CAPEX	194.7	64.9	259.7	1,103.6	503.1	129.8	486.9	503.1
Operational Expenditure (OPEX)	843.2	932.0	1,153.9	1,508.9	1,819.6	1,331.4	1,109.5	177.5
Decommi-ssioning	34.0	29.5	29.5	133.7	79.3	11.3	56.7	79.3
TOTAL	1,072.0	1,026.4	1,443.0	2,746.2	2,402.0	1,472.6	1,653.0	759.9
As a % of Each Region (figures rounded)								
CAPEX	18 %	6 %	18 %	40 %	21 %	9 %	29 %	66 %
OPEX	79 %	91 %	80 %	55 %	76 %	90 %	67 %	23 %
Decommi-ssioning	3 %	3 %	2 %	5 %	3 %	1 %	3 %	10 %
TOTAL	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
As a % of Total Expenditure								
CAPEX	12 %	4 %	16 %	68 %	31 %	8 %	30 %	31 %
OPEX	19 %	21 %	26 %	34 %	41 %	30 %	25 %	4 %
Decommi-ssioning	15 %	13 %	13 %	59 %	35 %	5 %	25 %	35 %
TOTAL	15 %	13 %	18 %	54 %	36 %	14 %	27 %	23 %

90 These 'Base' and 'High' scenarios have been considered in relation to the assessment of the socio-economic effects arising from the Development through its life (expected to be up to 50 years). These scenarios reflect two key considerations; firstly, that the design of the Development remains within a design envelope and therefore the nature of goods and services procured will vary; and secondly that the capacity, capability and availability of the supply chain to support the Development is subject to change. Other offshore wind farm projects may also be developed and procured in a similar time period and this will also affect the supply chain locally and on a wider basis (see *Appendix 16A*).

91 Businesses have the potential to diversify and grow by moving into new markets including the offshore wind industry. Businesses in the UK, Scotland, and in particular in the Economic Study Area are well positioned to attract a proportion of expenditure from offshore wind farm projects due to the existing skills base that could assist in the delivery of the STW and Round 3 offshore wind farm projects, however this requires businesses to offer both technically and commercially competitive propositions. There is potential for successful businesses to export goods and services to other offshore wind farm projects on a global basis.

92 The baseline assessment shows that there is currently an economically active, skilled and semi-skilled workforce in the Economic Study Area, with the capacity for retraining and up-skilling at all levels. This pool of potential labour and skills will have the capacity to act as a labour market resource, upon which the Development can draw its labour market requirements in the construction, O&M and decommissioning phases.

Estimation of Gross Direct and Net Additional Construction Employment

93 The net additional impact of the Development was estimated, taking account of deadweight, leakage, displacement and economic multipliers.

94 The 'no project' scenario (deadweight) effects are assumed to be zero; as without the Development no impacts would result.

95 Leakage is defined as those jobs taken up by people from outside a specific area, e.g. Economic Study Area, rest of Scotland and rest of UK, and is set out in Table 16.9 below. Leakage rates out of the Economic Study Area to the rest of the UK in the 'Base' impact scenario are expected to be low (4 per cent) and greater in the high impact scenario (8 per cent). However, there is less leakage out of the UK as a whole to overseas in the 'High' impact scenario (31 per cent) compared to the 'Base' impact scenario (68 per cent).

96 Displacement Effects within the Economic Study Area's business infrastructure are expected to be low to zero due to the limited numbers of manufacturing businesses currently operating within and providing components for the offshore wind industry. If business involvement expands through additional investment, the capacity of industry to supply the needs of the Development would also develop through up-skilling and importation of labour to address the requirements.

97 A multiplier value from the recent Centre for Economics and Business Research (CEBR) scenario based assessment of the economic impact on the UK of alternative options for the realisation of offshore wind capability (Report for Mainstream Renewable Power *The Macroeconomic Benefits of Investment in Offshore Wind* (CEBR, 2012)) has been used to establish the level of downstream indirect and induced employment that would be generated as a result of the direct construction arising from the Development. This multiplier value estimates that 1.41 indirect and induced jobs would be created elsewhere in the economy for every one FTE direct construction job.

Employment and GVA Impacts

98 A range of scenarios has been considered that may affect Development design and construction methods and therefore the number of construction jobs have been set out separately as 'High' and 'Base' supply chain scenarios. The number of construction FTE jobs created in total is estimated at 1,120 for the offshore elements of the Development. This is based on an assumed lowest case Development size of approximately 560 MW[3] although it should be noted that economic impacts are related to the scale and nature of procurement, construction and operations associated with the required infrastructure rather than the specific electrical output of the Wind Farm. A potential geographic distribution of these jobs has been estimated for the 'Base' and 'High' scenarios based on analysis of the existing supply chain and where there is potential for growth respectively, as described above.

99 Depending on the impact scenario the proportion of the Development expenditure spent in the Economic Study Area, rest of Scotland, and rest of UK could potentially create between 134 FTE direct jobs and 347 direct FTE jobs at an Economic Study Area level, between a further 45 and 90 FTE direct jobs in the rest of Scotland, and between a further 179 and 336 FTE direct jobs in the rest of UK, as shown in Table 16.9 below.

Table 16.9: Construction phase gross direct employment and leakage effects

	Low Impact		High Impact	
Leakage effects	**No. of FTE Jobs**	**% of Total**	**No. of FTE Jobs**	**% of Total**
Economic Study Area[4]	134	12	347	31
Rest of Scotland	45	4	90	8
Rest of UK	179	16	336	30
Overseas	762	68	347	31
Total	**1,120**	**100 %**	**1,120**	**100 %**

100 As shown below in Table 16.10, net additional employment from the Development is estimated to be between 321 FTE and 832 FTE direct, indirect and induced construction jobs at an Economic Study Area level for the 'Base' and 'High' scenarios respectively. For the rest of Scotland, net additional employment from the Development is estimated to be between 108 FTE and 216 FTE direct, indirect and induced construction jobs for the 'Base' and 'High' scenarios respectively. Net additional employment in the Rest of UK is estimated to be between 429 FTE and 806 FTE direct, indirect and induced jobs. This gives an overall total of

[3] Based on a study conducted by Cambridge Econometrics, 2017.
[4] This row shows the retention of jobs within the Economic Study Area and is included for reference

between 858 and 1854 net additional direct, indirect and induced FTE construction jobs in the UK.

101 Using an average GVA per employee value of £130,000[5] for the construction sector in Scotland, the net additional jobs represent between £41.8 million and £108.2 million GVA per annum at an Economic Study Area level, and between £55.8 million and £136.2 million at a Scottish level as set out in Table 16.10.

Table 16.10: Construction phase direct and net additional employment and GVA

	Base Impact		High Impact	
Employment	**No. of FTE Jobs**	**Displacement and Multiplier**	**No. of FTE Jobs**	**Displacement and Multiplier**
Economic Study Area				
Direct FTE Jobs	134		347	
Displacement Effect	-1	0.5 %	-2	0.5 %
Net Additional Local Jobs	133		345	
Multiplier Effect	188	1.41	487	1.41
Net Additional Economic Study Area Jobs	***321***		***832***	
Rest of Scotland				
Direct FTE Jobs	**45**		**90**	
Displacement Effect	0	0.5 %	-0.45	0.5 %
Net Additional Local Jobs	45		89.55	
Multiplier Effect	63	1.41	126	1.41
Total Net Additional Rest of Scotland Jobs	***108***		***216***	
Total Scotland Jobs	***429***		***1048***	
Rest of UK				
Direct FTE Jobs	179		336	
Displacement Effect	-1	0.5 %	-2	0.5 %
Net Additional Local Jobs	178		334	
Multiplier Effect	251	1.41	471	1.41
Total Net Additional Rest UK Jobs	***429***		***806***	
Total UK Jobs	***858***		***1854***	
GVA Per Annum	**£m p.a.**		**£m p.a.**	
Economic Study Area	41.8		108.2	
Scotland Total	55.8		136.2	
Rest of UK	55.8		104.7	

[5] Based on Marine Scotland Topic Sheet No. 99

	Base Impact		High Impact	
UK Total	111.6		241.0	
GVA Total CAPEX	**£m**		**£m**	
Economic Study Area	208.9		540.9	
Scotland Total	279.0		681.1	
Rest of UK	279.0		523.7	
UK Total	558.0		1204.8	

Construction Phase Economic Impacts

102 The potential employment impacts of the Development are considered within the context of the Economic Study Area labour market. The analysis is designed to provide an understanding of the potential scale of impacts generated by the Development and the degree to which the available labour market is able to accommodate such impacts.

103 The estimated construction phase impacts highlighted above have been assessed against the current labour market, including working age population, economically active, and potentially available labour pool, for the Economic Study Area consisting of the 60 minute drive-time catchments centred on Leith, Rosyth, Dundee, Montrose, Methil, Burntisland, the Cromarty Firth and Aberdeen as representative potential locations for construction and deployment activities. Table 16.11 below provides an illustration of the number of new jobs that could potentially be created by the Development relative to the workforce available within the 60 minute drive-time catchment of each labour market location.

104 See *Appendix 16A* for a high-level review of the potential of supply for each potential stage and sector of the construction phase.

Table 16.11: Construction employment scenarios versus labour market scale

	Leith	Rosyth	Dundee	Montrose	Methil	Burntisland	Cromarty	Aberdeen
	60min	**60min**	**60min**	**60min**	**60min**	**60min**	**60min**	**60min**
Working age population (Source - NOMIS)	1,144,030	1,854,496	402,385	324,703	860,676	1,220,849	13,127	272,718
Economically active (16-74 years) (Source – NOMIS)	891,626	1,407,628	307,113	254,131	666,117	941,318	11,139	224,244
Potentially available labour pool (Source – NOMIS)	37,361	63,792	13,416	11,477	27,333	40,684	409	9,038
Manufacture and construction related workforce (Source – NOMIS)	95,742	142,006	37,358	32,660	71,070	104,998	1,195	30,825
Low scenario: Net Additional Jobs Total = 321								
As % of working age population	0.03 %	0.02 %	0.08 %	0.10 %	0.04 %	0.03 %	2.45 %	0.12 %
As % of economically active	0.04 %	0.02 %	0.10 %	0.13 %	0.05 %	0.03 %	2.88 %	0.14 %
As % of potentially available labour pool	0.86 %	0.50 %	2.39 %	2.80 %	1.17 %	0.79 %	78.48 %	3.55 %
Manufacture and construction related workforce	0.34 %	0.23 %	0.86 %	0.98 %	0.45 %	0.31 %	26.86 %	1.04 %
High scenario: Net Additional Jobs Total = 832								
As % of working age population	0.07 %	0.04 %	0.21 %	0.26 %	0.10 %	0.07 %	6.34 %	0.31 %
As % of economically active	0.09 %	0.06 %	0.27 %	0.33 %	0.12 %	0.09 %	7.47 %	0.37 %
As % of potentially available labour pool	2.23 %	1.30 %	6.20 %	7.25 %	3.04 %	2.05 %	203.42 %	9.21 %
Manufacture and construction related workforce	0.87 %	0.59 %	2.23 %	2.55 %	1.17 %	0.79 %	69.62 %	2.70 %

105 Under the 'Base' scenario the sensitivity of the Cromarty Firth labour market area would be moderate given that the potentially available labour pool would experience a considerable demand (78.48 per cent) and the magnitude of change would be high, resulting in a **Moderate/Major** positive significant effect. In the 'High' scenario the sensitivity would be high given that the demand would be higher than the potentially available labour pool (203.42 per cent) and the magnitude would be high, resulting in a **Major** positive significant effect. Despite the demand being more than the potentially available labour pool the impact on those 'economically active' in the catchment area would not result in a negative effect.

106 Due to the nature of the wider catchment, the magnitude of change experienced in the other labour market catchments would only be negligible on low sensitivity catchments, resulting in a negligible/minor positive non-significant effect.

107 Given that the construction period would be temporary and that the nature of the skills required would include both specialist and general construction labour capabilities, this would likely require both the up-skilling of available labour and also the importation and attraction of additional labour into the area. This is not unusual for large construction projects during the construction works period, with a mobile and specialist workforce being attracted to such projects. In addition, there is a number of offshore wind farms on the east coast of Scotland at differing stages of construction which would provide an existing available labour pool which could be utilised. In such circumstances this form of mobile workforce would generally be absorbed into the available accommodation facilities, in bed & breakfasts and similar cost-effective accommodation, benefitting this sector of the economy in addition to expenditure on goods and services in an area.

108 A proportion of this mobile labour force would also likely be attracted to remain on a more permanent basis, particularly where there is a prospect of on-going major project construction work along the east coast of Scotland related to other offshore wind farms.

16.8.2 Effects of Operation and Maintenance

109 The O&M approach for the Development has not yet been determined, however there are different offshore O&M scenarios that can be used such as a shore-based O&M approach whereby small service craft for access with limited helicopter access are used. The shore-based operation would require a nearby port to support vessel operations and include base facilities for maintenance crew carrying out planned and unplanned maintenance and repair. Support facilities would be required such as a helipad, warehousing for consumables and equipment, mechanical/electrical workshop, personnel welfare, catering and associated parking. Other scenarios include the increased use of helicopters or the use of a mothership. Each scenario will generate different economic benefits within the Economic Study Area and the rest of the UK which makes it difficult to categorise the O&M phase in terms of industry employment ratios.

110 As such, the following assessment is based on estimates of direct and indirect O&M employment per MW which can be found within *Analysis of the Employment of the*

Operation and Maintenance of Offshore Wind Parks in the UK (Oxford Economics, 2010). Table 16.12 below shows the O&M employment per MW alongside the Inch Cape Wind Farm maximum generating output and the estimated O&M employment.

111 See *Appendix 16A* for a high-level review of the potential of supply for each potential stage and sector of the operations phase.

Table 16.12: O&M employment

	O&M employment per MW	Inch Cape Wind Farm MW	Estimated O&M Employment
Direct	0.2	560	112
Indirect	0.16	560	89.6
Total	-	-	201.6

112 ICOL estimates of direct O&M activities indicate that there would be approximately 112 FTE jobs over the period of up to 50 years and estimates of indirect employment as a result of O&M activities indicate that there would be approximately 90 FTE jobs.

113 Net employment which would result from this level of direct employment would be approximately 202 FTE jobs, as set out in Table 16.12 above.

114 The number of O&M jobs have been set out separately as 'High' and 'Base' supply chain scenarios in Table 16.13 below. The number of O&M FTE jobs created in total is estimated at 202 for the offshore elements of the Development. This is based on an assumed lowest case Development size of approximately 560 MW although it should be noted that economic impacts are related to the scale and nature of procurement, construction and operations associated with the required infrastructure rather than the specific electrical output of the Wind Farm. A potential geographic distribution of these jobs has been estimated for the 'Base' and 'High' scenarios based on analysis of the existing supply chain and where there is potential for growth respectively, as described above.

115 Depending on the impact scenario the proportion of the Development expenditure spent in the Economic Study Area, rest of Scotland, and rest of UK could potentially create between 38 FTE direct and indirect jobs and 83 indirect and direct FTE jobs at an Economic Study Area level, between a further 42 and 61 FTE direct and indirect jobs in the rest of Scotland, and between a further 53 and 51 FTE direct and indirect jobs in the rest of UK, as shown in Table 16.13 below.

Table 16.13: O&M phase gross direct employment and leakage effects

	Base Impact		High Impact	
Leakage effects	**No. of FTE Jobs**	**% of Total**	**No. of FTE Jobs**	**% of Total**
Economic Study Area[6]	38	19 %	83	41 %
Rest of Scotland	42	21 %	61	30 %
Rest of UK	53	26 %	51	25 %
Overseas	69	34 %	8	4 %
Total	**202**	**100 %**	**202**	**100 %**

116 The net employment from O&M (direct and indirect) is shown in Table 16.12 and 16.13 above. Table 16.14 below takes into account deadweight and displacement to calculate the net additional employment within the Economic Study Area.

117 Table 16.14 assumes that there would be zero dead-weight effect due to the unique nature of the Development in the area and that displacement would be higher but still relatively limited at around 0.5 per cent. This would result from potential constraints on the level of appropriately qualified and skilled people within the Economic Study Area and wider Scottish labour force, upon which the Inch Cape Wind Farm and OfTW would draw. As a consequence, the Development may draw in skilled labour from outside the Economic Study Area, and also attract labour from existing economic activities within the Economic Study Area. This net additional employment would represent new GVA at an Economic Study Area level of £4.9 million to £10.7 million per annum and £10.3 million and £18.6 million per annum for the 'Base' and 'High' case for Scotland as a whole.

Table 16.14: Operation & maintenance phase direct and net additional employment

	Base Impact		High Impact	
Employment	**No. of FTE Jobs**	**Displacement and Multiplier**	**No. of FTE Jobs**	**Displacement and Multiplier**
Economic Study Area				
Direct and Indirect FTE jobs	38		83	
Displacement effect	0	0.5 %	0	0.5 %
Net Additional Economic Study Area jobs	**38**		**83**	
Rest of Scotland				

[6] This row shows the retention of jobs within the Economic Study Area and is included for reference

	Base Impact		High Impact	
Employment	**No. of FTE Jobs**	**Displacement and Multiplier**	**No. of FTE Jobs**	**Displacement and Multiplier**
Direct and Indirect FTE jobs	42		61	
Displacement effect	0	0.5 %	-0.3	0.5 %
Net Additional Rest of Scotland jobs	**42**		**60.7**	
Total Scotland Jobs	**80**		**143**	
Rest of UK				
Direct and Indirect FTE jobs	53		51	
Displacement effect	0	0.5 %	0	0.5 %
Net Additional Rest UK Jobs	**53**		**51**	
Total UK Jobs	***132***		***194***	
GVA Per Annum[7]	**£m p.a.**		**£m p.a.**	
Economic Study Area	4.9		10.7	
Scotland Total	10.3		18.6	
Rest of UK	6.9		6.6	
UK Total	17.2		25.2	
GVA Total OPEX	**£m**		**£m**	
Economic Study Area	24.6		53.7	
Scotland Total	51.7		93.1	
Rest of UK	34.3		33.0	
UK Total	86.0		126.1	

Operation and Maintenance Phase Economic Impacts

118 Estimated O&M phase impacts have been assessed against the current labour market, as set out in the baseline assessment, for Leith (Edinburgh), Rosyth (Fife), Dundee, Montrose, Methil, Burntisland, the Cromarty Firth (Highland) and Aberdeen.

119 Table 16.15 provides an illustration of the number of new jobs potentially created by the Development relative to the workforce available within the 60 minute drive-time catchment of each labour market location.

[7] Based on Marine Scotland Topic Sheet No. 99

Table 16.15: Operation & maintenance employment scenarios versus labour market scale

	Leith	Rosyth	Dundee	Montrose	Methil	Burntisland	Cromarty	Aberdeen
	60min	**60min**	**60min**	**60min**	**60min**	**60min**	**60min**	**60min**
Working age population (Source – NOMIS)	1,144,030	1,854,496	402,385	324,703	860,676	1,220,849	13,127	272,718
Economically active (16-74 years) (Source – NOMIS)	891,626	1,407,628	307,113	254,131	666,117	941,318	11,139	224,244
Potentially available labour pool (Source – NOMIS)	37,361	63,792	13,416	11,477	27,333	40,684	409	9,038
Manufacture and construction related workforce (Source – NOMIS)	95,742	142,006	37,358	32,660	71,070	104,998	1,195	30,825
Low scenario: Net Additional Jobs Total = 38								
As % of working age population	0.00 %	0.00 %	0.01 %	0.01 %	0.00 %	0.00 %	0.29 %	0.01 %
As % of economically active	0.00 %	0.00 %	0.01 %	0.01 %	0.01 %	0.00 %	0.34 %	0.02 %
As % of potentially available labour pool	0.10 %	0.06 %	0.28 %	0.33 %	0.14 %	0.09 %	9.29 %	0.42 %
Manufacture and construction related workforce	0.04 %	0.03 %	0.10 %	0.12 %	0.05 %	0.04 %	3.18 %	0.12 %
High scenario: Net Additional Jobs Total = 83								
As % of working age population	0.01 %	0.00 %	0.02 %	0.03 %	0.01 %	0.01 %	0.63 %	0.03 %
As % of economically active	0.01 %	0.01 %	0.03 %	0.03 %	0.01 %	0.01 %	0.75 %	0.04 %
As % of potentially available labour pool	0.22 %	0.13 %	0.62 %	0.72 %	0.30 %	0.20 %	20.29 %	0.92 %
Manufacture and construction related workforce	0.09 %	0.06 %	0.22 %	0.25 %	0.12 %	0.08 %	6.95 %	0.27 %

120 Due to the nature of the Economic Study Area, the magnitude of change experienced in the labour market catchments would only be **negligible** on **low** sensitivity catchments, resulting in a **negligible/minor** positive impact during the O&M phase.

16.8.3 Effects of Decommissioning

121 A decommissioning plan will be prepared as part of the on-going development work and will be subject to approval from Scottish Ministers following the requirements of Section 105 of the *Energy Act 2004* outlined in *Chapter 3, Section 3.2.4*. The following generic activities may be required during the decommissioning phase:

- Project management;
- WTG removal;
- Substructure/foundation removal;
- Associated port activities;
- Beneficial use or disposal of materials; and
- Sub-sea survey on completion.

122 The estimated number of decommissioning jobs is likely to be lower than construction. Decommissioning work offshore will generally reverse the installation work and recover structures to shore. It is estimated there would be approximately 30 full time personnel involved in managing the activities and a further 530 temporary personnel. The decommissioning phase is estimated to take approximately 18 to 24 months for removal activities and therefore provide approximately 110 FTE jobs.

Decommissioning Phase Economic Impacts

123 Facilities at Leith, Rosyth, Dundee, Montrose, Methil, Burntisland, the Cromarty Firth and Aberdeen are also considered representative of the type of facilities that could be utilised in the decommissioning phase. They could all accommodate and process structures removed from offshore although other facilities may also be required depending on capacity and availability within these facilities at the time of decommissioning. The nature of onshore activities will be different to the construction phase and will depend on how equipment and structures will be re-used or recycled for other purposes.

124 The estimated 530 temporary decommissioning jobs (110 FTE) would have a low magnitude of change on a low sensitivity receptor, resulting in a minor non-significant effect in terms of Leith, Rosyth, Dundee, Montrose, Methil, Burntisland or Aberdeen. For the Cromarty Firth, however, the magnitude of change would potentially be low on a moderate sensitivity receptor, resulting in a minor/moderate non-significant effect for the 'Base' scenario and minor/moderate non-significant effect in the 'High' scenario. This number of jobs would be readily absorbed locally through a mixture of locally based and temporarily accommodated imported labour over the limited timescale for the decommissioning phase. Thus, the creation of new, and safeguarding of existing jobs, would have a positive effect in economic terms and each job would be valuable to the Economic Study Area economy.

16.9 Cumulative Impact Assessment (CIA)

125 GVA and job numbers have been used from the assessment for the Development and the OnTW and presented on an equivalent basis at a Scottish level with numbers for other proposed, consented, under construction or operational large scale offshore wind farm projects off the east coast of Scotland:

- Kincardine Floating Offshore Wind Farm (Kincardine Offshore Wind Ltd, proposed 2016);
- Firth of Forth Phase 1 (Seagreen Wind Energy Ltd, consented 2014);
- Neart na Gaoithe (NNG) (Mainstream Renewable Power, consented 2014);
- Levenmouth Offshore Demonstration Turbine (ORE Catapult, operational);
- Hywind Scotland Pilot Park Offshore Wind Farm (Statoil ASA, operational);
- Aberdeen Offshore Wind Farm/Aberdeen Bay, EOWDC (Vattenfall and AREG, under construction);
- Moray Firth Eastern Development (Moray Offshore Renewables and EDP Renewables (EDPR), consented 2014, pre-construction);
- Beatrice Offshore Windfarm (Beatrice Offshore Windfarm Ltd and Scottish and Southern Energy (SSE) Renewables, consented 2014 under construction); and
- Beatrice Demonstration (SSE Renewables and Talisman Energy, operational).

126 As the baseline and status for cumulative projects are ever evolving a cut-off date of November 2017 was used to allow the EIA and CIA to progress. ICOL appreciates and acknowledges that the status of some of these projects may have changed since this date and note however that the individual status of projects has not been updated in the EIA Report due to the time restrictions associated with the assessment.

127 As the CIA is based on the Development and the OnTW, the OnTW elements have been considered, however, they are not expected to significantly alter impacts from the Development alone. As such, Table 16.16 below sets out the potential impacts of the Development as assessed in this chapter cumulatively with the above projects.

128 Source references are provided and where job numbers have been derived, the basis is noted in Table 16.16. It is assumed that each project will be developed over a broadly similar timescale and will jointly draw upon the labour market catchments as shown in this assessment.

Table 16.16: Cumulative summary - Whole of Scotland

All Values - Total Scotland	Inch Cape Wind Farm	Kincardine Offshore Wind Farm	Firth of Forth Phase 1	NNG	Levenmouth Offshore Demonstration Turbine	Hywind Scotland Pilot Park Offshore Wind Farm	Aberdeen Offshore Wind Farm (also known as European Offshore Wind Deployment Centre)	Moray Firth Eastern Development (MORL)	Beatrice Offshore Windfarm	Beatrice Demo	Total
Construction (CAPEX)											
GVA – Low/Base £m	55.8	Not Stated	80	75	Construction complete so the GVA from this phase will have already benefited the Scottish economy so will not be included in this assessment	Based on scenario where only the O&M and decommissioning takes place in Aberdeenshire and the rest of Scotland	39.6	312	320	Construction complete so the GVA from this phase will have already benefited the Scottish economy so will not be included in this assessment	882.4

All Values - Total Scotland	Inch Cape Wind Farm	Kincardine Offshore Wind Farm	Firth of Forth Phase 1	NNG	Levenmouth Offshore Demonstration Turbine	Hywind Scotland Pilot Park Offshore Wind Farm	Aberdeen Offshore Wind Farm (also known as European Offshore Wind Deployment Centre)	Moray Firth Eastern Development (MORL)	Beatrice Offshore Windfarm	Beatrice Demo	Total
GVA - High £m	136.2	Not Stated	321	518	Construction complete so the GVA from this phase will have already benefited the Scottish economy so will not be included in this assessment	40	39.6	802	576	Construction complete so the GVA from this phase will have already benefited the Scottish economy so will not be included in this assessment	2,432.8
Low/Base Case - average net jobs per annum	429	110	1,728	322	Construction complete so the average jobs from this phase will have already benefited the Scottish economy so will not be included in this assessment	Based on scenario where only the O&M and decommissioning takes place in Aberdeenshire and the rest of Scotland	738	960	1,246	Construction complete so the average jobs from this phase will have already benefited the Scottish economy so will not be included in this assessment	5,533

All Values - Total Scotland	Inch Cape Wind Farm	Kincardine Offshore Wind Farm	Firth of Forth Phase 1	NNG	Levenmouth Offshore Demonstration Turbine	Hywind Scotland Pilot Park Offshore Wind Farm	Aberdeen Offshore Wind Farm (also known as European Offshore Wind Deployment Centre)	Moray Firth Eastern Development (MORL)	Beatrice Offshore Windfarm	Beatrice Demo	Total
High Case - average net jobs per annum	1,048	110	7,196	2,704	Construction complete so the average jobs from this phase will have already benefited the Scottish economy so will not be included in this assessment	260	738	2,500	2,169	Construction complete so the average jobs from this phase will have already benefited the Scottish economy so will not be included in this assessment	16,725
Operations (OPEX) per annum											
GVA – Low/Base £m p.a.	10.3	Not Stated	17.4	12	1.2	44	1.06	17.1	17.1		120.16
GVA - High £m p.a.	18.6	Not Stated	23.5	18	1.2	40	1.06	43	26.4		171.76
Low/Base Case - average net jobs per annum	80	8	200	100	15	33	35	244	188		903
High Case - average	143	8	200	145	15	33	35	376	343		1,298

All Values - Total Scotland	Inch Cape Wind Farm	Kincardine Offshore Wind Farm	Firth of Forth Phase 1	NNG	Levenmouth Offshore Demonstration Turbine	Hywind Scotland Pilot Park Offshore Wind Farm	Aberdeen Offshore Wind Farm (also known as European Offshore Wind Deployment Centre)	Moray Firth Eastern Development (MORL)	Beatrice Offshore Windfarm	Beatrice Demo	Total
net jobs per annum											
Decommissioning											
Low/Base Case - average net jobs per annum	110	Not Stated	Not Stated	275	Not Stated	21	248	75	363		1,092
High Case - average net jobs per annum	110	Not Stated	Not Stated	352	Not Stated	21	248	350	478		1,559

All Values - Total Scotland	Inch Cape Wind Farm	Kincardine Offshore Wind Farm	Firth of Forth Phase 1	NNG	Levenmouth Offshore Demonstration Turbine	Hywind Scotland Pilot Park Offshore Wind Farm	Aberdeen Offshore Wind Farm (also known as European Offshore Wind Deployment Centre)	Moray Firth Eastern Development (MORL)	Beatrice Offshore Windfarm	Beatrice Demo	Total
Reference notes		KOWL ES p.559-560. http://pilot-renewables.com/pdf_docs/KOWL_EnvironmentalStatement_Issued_v2.pdf [Accessed 16/04/018]	FoF Phase 1 ES Table 19.14, 19.16, 19.18, and para 19.137.	NNG ES Table 23.8 and 23.10. Figure 23.12 and 23.14. Derived average over 4 year construction, 25 year operational and 3 year decommissioning periods.	Levenmouth Demonstration Turbine EIA Update Report, p.86. https://ore.catapult.org.uk/app/uploads/2018/01/2-2652_LDT_EIA-Update-Report_V3-1_KM_FM_171220.pdf [Accessed 16/04/018]	Hywind Pilot Park ES, Chapter 18, p.3. http://marine.gov.scot/datafiles/lot/hywind/Environmental_Statement/Environmental_Statement.pdf [Accessed 16/04/018]	EOWDC Aberdeen Bay EIA. http://www.gov.scot/Topics/marine/Licensing/marine/scoping/EOWDC [Accessed 16/04/018]	MORL ES Section 8.6, 11.6. Table 12.1-19 and 12.1-20. Derived average over 5 year construction, 25 year operational and 4 year decommissioning periods.	BOWL ES Table 20.19 and 20.20, Average over each period from Plate 20.6 and 20.7. http://sse.com/media/341029/ES-Volume-1-ES-Sections.pdf [Accessed 16/04/018]	No information on GVA and FTE jobs during O&M and decommissioning available	

129 Table 16.17 sets out the assessed impact of the Development cumulatively with other wind farm projects off the east coast of Scotland in relation to the Economic Study Area and drive time catchments.

Table 16.17: CIA of construction phase in relation to Economic Study Area

	Leith	Rosyth	Dundee	Montrose	Methil	Burntisland	Cromarty	Aberdeen
	60min	**60min**	**60min**	**60min**	**60min**	**60min**	**60min**	**60min**
Working age population (Source - NOMIS)	1,144,030	1,854,496	402,385	324,703	860,676	1,220,849	13,127	272,718
Economically active (16-74 years) (Source -NOMIS	891,626	1,407,628	307,113	254,131	666,117	941,318	11,139	224,244
Potentially available labour pool (Source - NOMIS)	37,361	63,792	13,416	11,477	27,333	40,684	409	9,038
Manufacture and construction related workforce (Source - NOMIS)	95,742	142,006	37,358	32,660	71,070	104,998	1,195	30,825
Low scenario: Net Additional Jobs Total = 5,533								
As % of working age population	0.48	0.30	1.38	1.70	0.64	0.45	42.15	2.03
As % of economically active	0.62	0.39	1.80	2.18	0.83	0.59	49.67	2.47
As % of potentially available labour pool	14.81	8.67	41.24	48.21	20.24	13.60	1,352.81	61.22
Manufacture and construction related workforce	5.78	3.90	14.81	16.94	7.79	5.27	463.01	17.95
High scenario: Net Additional Jobs Total = 16,725								
As % of working age population	1.46	0.90	4.16	5.15	1.94	1.37	127.41	6.13
As % of economically active	1.88	1.19	5.45	6.58	2.51	1.78	150.15	7.46
As % of potentially available labour pool	44.77	26.22	124.66	145.73	61.19	41.11	4,089.24	185.05
Manufacture and construction related workforce	17.47	11.78	44.77	51.21	23.53	15.93	1,399.58	54.26

16.9.1 Effects on Construction

130 Table 16.17 shows the potential cumulative effect of the Development, and the other offshore wind farms specified in the assessment, on the eight catchments that make up the Economic Study Area.

131 Under the 'Base' scenario the magnitude of change experienced for the Leith, Rosyth, Methil and Burtisland labour market catchments would only be low on low sensitivity catchments, resulting in a minor positive non-significant effect as the level of demand for construction labour would not result in any pressure on labour market capacity in either the 'Base' or 'High' scenarios.

132 For Dundee under the 'Base' scenario, the effect upon the potentially available labour pool (41.24 per cent) would have a moderate magnitude of change on a low sensitivity receptor, resulting in a minor/moderate positive non-significant effect upon the potentially available labour pool.

133 For Montrose under the 'Base' scenario, the effect upon the potentially available labour pool (48.21 per cent) would have a moderate magnitude of change on a low sensitivity receptor, resulting in a minor/moderate positive non-significant effect upon the potentially available labour pool.

134 For Aberdeen under the 'Base' scenario, the effect upon the potentially available labour pool (61.22 per cent) would have a moderate magnitude of change on a moderate sensitivity receptor, resulting in a moderate positive non-significant effect upon the potentially available labour pool.

135 For the Cromarty Firth under the 'Base' scenario, the effect upon the potentially available labour pool (1352.81 per cent) would have a high magnitude of change on a high sensitivity receptor, resulting in a M**ajor** positive significant effect upon the potentially available labour pool. However, given that the potentially available labour pool would be unable to meet the cumulative labour force requirements if all projects were developed concurrently using facilities in this area, the percentage impact on those 'economically active' would result in a moderate magnitude of change on a moderate sensitivity receptor, resulting in a moderate negative non-significant effect in this regard. However, this could be addressed through skills and training initiatives and the import of such labour into the catchment area attracted by the available jobs. In these circumstances this would result in a moderate positive non-significant effect.

136 For the Rosyth catchment area under the 'High' scenario, the effect upon the potentially available labour pool (26.22 per cent) would have a low magnitude of change on a low sensitivity receptor, resulting in a minor positive non-significant effect upon the potentially available labour pool.

137 For the Leith and Burntisland catchment area under the 'High' scenario, the effect upon the potentially available labour pool (44.77 per cent and 41.11 per cent respectively) would have

a moderate magnitude of change on a low sensitivity receptor, resulting in a minor/moderate positive non-significant effect upon the potentially available labour pool.

138 For Methil under the 'High' scenario, the effect upon the potentially available labour pool (61.19 per cent) would have a moderate magnitude of change on a moderate sensitivity receptor, resulting in a moderate positive non-significant effect upon the potentially available labour pool.

139 For Dundee, Montrose and Aberdeen under the 'High' scenario the sensitivity would be high given that the demand would be higher than the potentially available labour pool (124.66 per cent, 145.73 per cent and 185.05 per cent respectively) and the magnitude would be high, resulting in a **Major** positive significant effect. Despite the demand being more than the potentially available labour pool the impact on those 'economically active' in the catchment area would not result in a negative effect.

140 In the 'High' scenario, the Cromarty Firth would experience considerable pressure on the potentially available labour pool (4,089.24 per cent) and those economically active within the population (150.15 per cent). Currently, the local labour market would be unable to meet these labour requirements, which would lead to labour shortages and 'over-heating' in the economy. Were this to occur, the result would be **Major** negative significant effects for the local economy in this regard (high magnitude of change on high sensitivity receptor). However, this could be addressed through skills and training initiatives and the import of such labour into the catchment area attracted by the available jobs. In these circumstances this would result in **Major** positive significant effects.

141 In practice not all of the offshore wind farm projects would be located at a single facility for the duration of their construction phases for a variety of market, logistical and geographic reasons. Geographic proximity to a given project, developer and manufacturer infrastructure, along with labour force availability, would mean that the various offshore wind farm construction activities are likely to be distributed between these facilities or other more distant locations. This CIA therefore illustrates the 'worst case' for negative effects or 'best-case' for positive effects upon each of the facilities.

16.9.2 Effects of Operation and Maintenance

142 The Development would generate between 80 and 143 FTE net additional jobs, with the combined O&M employment of all the wind farms being between 903 and 1,298 FTE jobs. As this number is no more than 25 per cent of the cumulative construction employment, it is likely there will be negligible magnitude of change on a low sensitivity receptor, resulting in negligible negative non-significant effects within any catchment area within the Economic Study Area, with moderate positive non-significant effects (moderate magnitude of change on moderate sensitivity receptor) likely to arise over the O&M period depending on what combination of projects were supplied from facilities in each catchment areas.

16.9.3 Effects of Decommissioning

143 The Development is estimated to generate 110 FTE net additional jobs during decommissioning. Whilst estimates are not available for all projects, the cumulative impact of the decommissioning of all of the wind farm projects may result in between 1092 and 1559 FTE jobs over the temporary decommissioning phase. As this value is no more than 25 per cent of the cumulative construction employment, the magnitude of change experienced in all the labour market catchments (other than Cromarty Firth) would only be negligible on low sensitivity catchments, resulting in a negligible/minor positive non-significant effect. However, it is likely that there would be a considerable demand on the Cromarty Firth labour catchment area and the magnitude of change would be high, resulting in a Major positive significant effect. Despite the demand being more than the potentially available labour pool the impact on those 'economically active' in the catchment area would not likely result in a negative effect.

16.10 Impact Interactions

144 No impact interactions have been identified within the chapter between different areas or disciplines covered in this EIA Report. However, the results of the assessment will support *Chapter 8: Benefits of the Development* in its discussion of the economic benefits of the Development.

16.11 Conclusion and Effects

16.11.1 Development

145 Table 16.18 below provides a summary of the economic impacts and residual effects that have been assessed as being likely to occur as a result of the Development.

146 For one of the eight catchment areas within the Economic Study Area, significant beneficial effects are assessed as being likely to occur during the construction phase only, these being in the labour market catchment area around the Cromarty Firth.

147 For wider impacts it is considered feasible that during the construction process there will be opportunities for those employed to develop skills that will be of benefit to the Economic Study Area in the longer term, and indeed would be transferrable to other projects. Examples might include, the development of project management and engineering skills, which could be beneficial in terms of ensuring that local companies or individuals are much better placed to compete for future construction work in the wider area, or increasing the number of new starts and supporting small businesses that can benefit from work related to the Development. Once established, these firms or individuals will be in a stronger position to survive and benefit from ongoing work elsewhere. There is also a number of offshore wind farms on the east coast of Scotland at differing stages of construction, as such, there is existing trained resource within the economic study area that can be utilised further during the construction phase of the Development.

148 During the O&M phase, the Development will provide wider opportunities for the involvement of suppliers in the Economic Study Area and, more generally, Scottish suppliers in a range of activities including research and development, design, project management, engineering design, fabrication/manufacture, installation and maintenance.

149 The Development will have positive effects in terms of the development of the renewables sector in the Economic Study Area, and more generally in Scotland. Demand resulting from advancement of the Development would further support production and employment in Scotland, providing a boost to Scottish industry and production capacity. Strengthening Scotland's industrial base, particularly in an industry where global demand is growing, will improve the ability of Scottish firms to compete in world markets, further boosting Scotland's economy.

150 With an increasing number of offshore wind projects under development in Scotland, the potential for long term commercial viability and growth prospects for Scottish firms will increase. Cluster benefits in the industry increase where firms are supported by final demand and intermediate demand. The net effect is to increase business and employment opportunities within both the local and regional renewable energy sector, boosting the performance of local and national economies.

151 For wider impacts, those derived from the decommissioning phase would be similar to those which would arise from the construction phase.

Table 16.18: Summary of effects

Impact	Receptor	Embedded Mitigation and commitments	Effect
Construction			
Moderate/major (positive)	Cromarty Firth ('Base' Scenario)	National, regional and local initiatives involving the Scottish Government and regional and local development agencies with the aim of providing enhanced skills training, supply chain enhancement, and support for business improvement working in the offshore wind industry will assist in realising and maximising the opportunities in the Economic Study Area and where appropriate ICOL will support these initiatives. These would contribute to enhancing the likelihood of employment and output being based within the Economic Study Area.	**Moderate/major significant (positive)**
Major (positive)	Cromarty Firth ('High' Scenario)	See above	**Major significant (positive)**
Negligible/minor (positive)	Economic Study Area ('Base' and 'High' Scenario minus Cromarty Firth)	See above	Negligible/minor non-significant positive)
O&M			
Negligible/minor (positive)	Economic Study Area ('Base' and 'High' Scenario)	See above	Negligible/minor non-significant (positive)
Decommissioning			
Minor (positive)	Economic Study Area (('Base' and 'High' Scenario minus Cromarty Firth)	See above	Minor non-significant (positive)
Minor/moderate (positive)	Cromarty Firth ('Base' and 'High' Scenario)	See above	Minor/moderate non-significant (positive)

16.11.2 Cumulative Impacts

152 The following economic impacts and residual effects are assessed as being likely to occur as a result of the cumulative effect of the Development and the OnTW, and the other offshore wind farms specified in the assessment (*Section 16.9*), on the eight catchments that make up the Economic Study Area.

Table 16.19: Summary of effects and mitigation

Impact	Receptor	Pre-mitigation Effect	Mitigation	Post-Mitigation Effect
Construction				
Minor (Positive)	Leith, Rosyth, Methil and Burtisland ('Base' Scenario)	Minor (Positive)	National, regional and local initiatives involving the Scottish Government and regional and local development agencies with the aim of providing enhanced skills training, supply chain enhancement, and support for business improvement working in the offshore wind industry will assist in realising and maximising the opportunities in the Economic Study Area and where appropriate ICOL will support these initiatives. These would contribute to enhancing the likelihood of employment and output being based within the Economic Study Area.	Minor (Positive)
Minor/Moderate (Positive)	Dundee ('Base' Scenario)	Minor/ Moderate (Positive)	See above	Minor/Moderate (Positive)
Minor/Moderate (Positive)	Montrose ('Base' Scenario)	Minor/ Moderate (Positive)	See above	Minor/Moderate (Positive)
Moderate (Positive)	Aberdeen ('Base' Scenario)	Moderate (Positive)	See above	Moderate (Positive)
Major (Positive) on potentially available labour pool / Moderate (Negative) on those 'economically active'	Cromarty Firth ('Base' Scenario)	**Major (Positive)** / Moderate (Negative)	Addressed through skills and training initiatives and the import of such labour into the catchment area attracted by the available jobs.	Moderate (Positive)

Impact	Receptor	Pre-mitigation Effect	Mitigation	Post-Mitigation Effect
Minor (Positive)	Rosyth ('High' Scenario)	Minor (Positive)	National, regional and local initiatives involving the Scottish Government and regional and local development agencies with the aim of providing enhanced skills training, supply chain enhancement, and support for business improvement working in the offshore wind industry will assist in realising and maximising the opportunities in the Economic Study Area and where appropriate ICOL will support these initiatives. These would contribute to enhancing the likelihood of employment and output being based within the Economic Study Area.	(Minor Positive)
Minor/Moderate (Positive)	Leith and Burtisland ('High' Scenario)	Minor/ Moderate (Positive)	See above	Minor/Moderate (Positive)
Moderate (Positive)	Methil	Moderate (Positive)	See above	Moderate (Positive)
Major (Positive)	Dundee, Montrose and Aberdeen	**Major (Positive)**	See above	**Major (Positive)**
Major (Negative)	Cromarty Firth ('High' Scenario)	**Major (Negative)**	Addressed through skills and training initiatives and the import of such labour into the catchment area attracted by the available jobs.	**Major (Positive)**
Operation and Maintenance				
Negligible/Minor (Positive)	Economic Study Area ('Base' and 'High' Scenario)	Negligible/Minor (Positive)	National, regional and local initiatives involving the Scottish Government and regional and local development agencies with the aim of providing enhanced skills training, supply chain enhancement, and support for business improvement working in the offshore wind industry will assist in realising and maximising the opportunities in the Economic Study Area and where appropriate ICOL will support these initiatives. These would contribute to enhancing the	Negligible/Minor (Positive)

Impact	Receptor	Pre-mitigation Effect	Mitigation	Post-Mitigation Effect
			likelihood of employment and output being based within the Economic Study Area.	
Decommissioning				
Major (Positive)	Cromarty Firth ('Base' and 'High' Scenario)	**Major (Positive)**	See above	**Major (Positive)**
Negligible/Minor (Positive)	Economic Study Area (('Base' and 'High' Scenario minus Cromarty Firth)	Negligible/Minor (Positive)	See above	Negligible/Minor (Positive)

References

Aberdeen City Council (2017) *Aberdeen Local Development Plan 2017.* Available at: https://www.aberdeencity.gov.uk/services/planning-and-building/local-development-plan/aberdeen-local-development-plan [Accessed 19/04/2018].

Aberdeen City and Shire Economic Future (2013) *Aberdeen City and Shire Economic Action Plan 2013-2018.* Available at: https://www.aberdeenshire.gov.uk/media/11576/economic_action_plan2013-18.pdf [Accessed 19/04/2018].

Aberdeenshire Council (2017) *Aberdeenshire Local Development Plan 2017.* Available at: https://www.aberdeenshire.gov.uk/planning/plans-and-policies/aberdeenshire-local-development-plan-2017/ [Accessed 19/04/2018].

Angus Council (2016) *Angus Local Development Plan 2016.* Available at: http://www.angus.gov.uk/sites/angus-cms/files/Angus%20local%20development%20plan%20adopted%20September%202016.pdf [Accessed 19/04/2018].

Angus Economic Development Partnership (2013) *Angus Economic Development Strategy 2013-2020*. http://www.angus.gov.uk/sites/angus-cms/files/Angus_Economic_Development_Strategy_2013_2020.pdf [Accessed 19/04/2018].

Beatrice Offshore Windfarm Limited (BOWL)(2012). *Beatrice Offshore Wind Farm Environmental Statement.* Available at: https://www.beatricewind.com/es [Accessed 19/04/2018].

BVG Associates (2017) *A New Economic Impact Methodology for Offshore Wind*. Available at: https://bvgassociates.com/publications/ [Accessed 19/04/2018].

Cambridge Econometrics (2017) *Future UK Employment in the Wind Industry.* Available at: https://aurawindenergy.com/uploads/files/Cambride-Econometrics-Future-UK-Employment-in-Offshore-Wind-June-2017.pdf [Accessed 19/04/2018].

CEBR (2012) *The Macroeconomic Benefits of Investment in Offshore Wind: A Scenario Based Assessment of the Economic Impacts on the UK pf Alternative Realisations of Offshore Wind Capacity (Report for Mainstream Renewable Power).* Available at: http://www.mainstreamrp.com/content/reports/benefits-of-offshore-wind.pdf [Accessed 19/04/2018].

Clackmannanshire Council (2015) *Clackmannanshire Local Development Plan 2015*. Available at: http://www.clacks.gov.uk/property/developmentplanupdate/ [Accessed 19/04/2018].

Dundee City Council (2014) *Dundee Local Development Plan*. Available at: https://www.dundeecity.gov.uk/service-area/city-development/local-development-plan [Accessed 19/04/2018].

Dundee Partnership (2013) *Dundee's Economic Strategy and Action Plan 2013-2017*. Available at: http://www.dundeepartnership.co.uk/sites/default/files/Dundee%20Partnership%20Economic%20Strategy%20&%20Action%20Plan%20Final.pdf [Accessed 19/04/2018].

East Dunbartonshire Council (2017) *East Dunbartonshire Local Development Plan 2017*. Available at: https://www.eastdunbarton.gov.uk/LDP [Accessed 19/04/2018].

East Lothian Council (2008) *East Lothian Local Plan 2008.* Available at: http://www.eastlothian.gov.uk/info/204/local_development_plan/231/statutory_development_plans/3 [Accessed 19/04/2018].

East Lothian Council (2012) *East Lothian Economic Development Strategy 2012-2022*. Available at: http://www.eastlothian.gov.uk/downloads/download/1831/east_lothian_economic_development_strategy_2012_-2022 [Accessed 19/04/2018].

East Lothian Council (2016) *East Lothian Proposed Development Plan*. Available at: http://www.eastlothian.gov.uk/info/204/local_development_plan/1777/proposed_local_development_plan [Accessed 19/04/2018].

East Renfrewshire Council (2015) *East Renfrewshire Local Development Plan 2015* Available at: http://www.eastrenfrewshire.gov.uk/local-development-plan [Accessed 19/04/2018].

Falkirk Council (2015a) *Falkirk Local Development Plan 2015.* Available at: http://www.falkirk.gov.uk/services/planning-building/planning-policy/local-development-plan/ [Accessed 19/04/2018].

Falkirk Council (2015b) *Falkirk Economic Strategy 2015-2025*. Available at: https://www.falkirk.gov.uk/services/business-investment/policies-strategies/docs/Falkirk%20Economic%20Strategy%202015-2025.pdf?v=201605171307 [Accessed 19/04/2018].

Fife Council (2017) *FIFEplan 2017.* Available at: http://fife-consult.objective.co.uk/portal/fife_ldp/fifeplan_-_adopted_plan_13/adopted_fifeplan?pointId=4395822 [Accessed 18/04/2018].

Fife Economy Partnership, Opportunities Fife Partnership and Fife Council (2016) *Fife's Economic Development Strategy 2017-2027*. Available at: https://www.fifetourismpartnership.org/site/assets/files/2906/fifes-economic-strategy-2017-27.pdf [Accessed 19/04/2018].

Fife Local Economic Forum (2005) *Fife's Economic Development Strategy 2005-2015*. Available at: http://publications.fifedirect.org.uk/c64_mprze6.pdf [Accessed 19/04/2018].

Glasgow and the Clyde Valley Strategic Development Planning Authority (2017) *Glasgow and Clyde Valley Strategic Development Plan (Clydeplan) 2017*. Available at: https://www.clydeplan-sdpa.gov.uk/strategic-development-plan/current-plan/current-strategic-development-plan-july-2017 [Accessed 19/04/2018].

Glasgow City Council (2017) *Glasgow City Development Plan 2017.* Available at: https://www.glasgow.gov.uk/index.aspx?articleid=16186 [Accessed 19/04/2018].

Great Britain Parliament (2004). *Energy Act 2004*. Available at: http://www.legislation.gov.uk/ukpga/2004/20/contents [Accessed 05/04/2018]

Highlands and Islands Enterprise (2017*) Highlands and Islands Enterprise (HIE) Operating Plan 2017-2018.* Available at: http://www.hie.co.uk/about-hie/policies-and-publications/operating-plan.html [Accessed 19/04/2018].

HM Treasury (2003) *The Green Book Appraisal and Evaluation in Central Government.* Available at: https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-governent [Accessed 19/04/2018].

KOWL (2016) *Kincardine Offshore Wind Farm Environmental Statement.* Available at: http://pilot-renewables.com/pdf_docs/KOWL_EnvironmentalStatement_Issued_v2.pdf [Accessed 19/04/2018].

Mainstream Renewable Power (2012). *Neart na Gaoithe Offshore Wind Farm Environmental Statement. Edinburgh*. Available at: http://nngoffshorewind.com/downloads/offshore-environmental-statement/ [Accessed 19/04/2018].

Marine Scotland (2017a). *Marine Scotland – Licensing Operations Team Scoping Opinion*. Available at: http://www.gov.scot/Topics/marine/Licensing/marine/scoping/ICOLRevised-2017 [Accessed 19/04/2018].

Marine Scotland (2017b). *Marine Scotland Topic Sheet No. 99.* Available at: http://www.gov.scot/Resource/0052/00529390.pdf [Accessed 04/07/2018].

Midlothian Council (2017) *Midlothian Local Development Plan 2017*. Available at: https://www.midlothian.gov.uk/info/205/planning_policy/286/development_plans_and_policies [Accessed 19/04/2018].

Moray Council (2015) *Moray Local Development Plan 2015.* Available at: http://www.moray.gov.uk/moray_standard/page_100443.html [Accessed 19/04/2018].

Moray Offshore Renewables Ltd (MORL)(2013). *Moray Offshore Renewables [online]*. Available at: http://morayoffshorerenewables.com/Home.aspx [Accessed 19/04/2018].

National Records of Scotland (2017a) *Statistics and Data*. Available at: https://www.nrscotland.gov.uk/statistics-and-data [Accessed 19/04/2018].

National Records of Scotland (2017b) *Scotland's Census 2011 Area Profiles.* Available at: http://www.scotlandscensus.gov.uk/ods-web/area.html [Accessed 19/04/2018].

North Lanarkshire Council (2012) *North Lanarkshire Local Plan 2012*. Available at: https://www.northlanarkshire.gov.uk/index.aspx?articleid=16016 [Accessed 19/04/2018].

Office for National Statistics (2017a) *Office for National Statistics data covering the period 2016 to 2017*: https://www.ons.gov.uk/ [Accessed 19/04/2018].

Office for National Statistics (2017b) *NOMIS Official Labour Market Statistics 2017*. Available at: https://www.nomisweb.co.uk/ [Accessed 19/04/2018].

ORE Catapult (2017) *The Economic Value of Offshore Wind: Benefits to the UK of Supporting the Industry.* Available at: https://ore.catapult.org.uk/analysisinsight/the-economic-value-of-offshore-wind-benefits-to-the-uk-of-supporting-the-industry/ [Accessed 19/04/2018].

ORE Catapult (2017) *Levenmouth Demonstration Turbine EIA Update Report*. Available at: https://ore.catapult.org.uk/app/uploads/2018/01/2-2652_LDT_EIA-Update-Report_V3-1_KM_FM_171220.pdf [Accessed 19/04/2018].

Oxford Economics (2010) *Analysis of the Employment Effects of the Operation and Maintenance of Offshore Wind Parks in the UK*: Available at: https://www.oxfordeconomics.com/publication/open/240092 [Accessed 19/04/2018].

Perth and Kinross Council (2014) *Perth and Kinross Local Development Plan 2014.* Available at: http://www.pkc.gov.uk/article/15041/Adopted-Local-Development-Plan [Accessed 19/04/2018].

Renfrewshire Council (2014) *Renfrewshire Local Development Plan 2014*; Available at: http://www.renfrewshire.gov.uk/article/2478/Renfrewshire-Local-Development-Plan [Accessed 19/04/2018].

Scottish Borders Council (2016) *Scottish Borders Local Development Plan 2016.* Available at: https://www.scotborders.gov.uk/info/20051/plans_and_guidance/121/local_development_plan [Accessed 19/04/2018].

Scottish Borders Council (2013) *Scottish Borders Economic Strategy 2023*. Available at: https://www.scotborders.gov.uk/downloads/download/275/economic_strategy_2023 [Accessed 19/04/2018].

Scottish Enterprise (2008) *Additionality & Economic Impact Assessment Guidance Note. A Summary Guide to Assessing the Additional Benefit, or Additionality, of an Economic Development Project or Programme.* Available at: http://www.scottish-enterprise.com/~/media/SE/Resources/Documents/ABC/additionality-and-economic-impact-assessment-guidance.pdf [Accessed 19/04/2018].

Scottish Enterprise (2008) *Economic Appraisal Guidance Note. A Summary Guide to Developing the Economic Case for a Project or Programme. Appraisal & Evaluation Team* Available at: https://www.scottish-enterprise.com/~/media/se/resources/documents/def/economic-appraisal-guidance-note.ashx [Accessed 19/04/2018].

Scottish Enterprise (2010) *National Renewables Infrastructure Plan.* Available at: https://www.scottish-enterprise.com/knowledge-hub/articles/guide/national-renewables-infrastructure-plan-stage-2 [Accessed 19/04/2018]

Scottish Enterprise (2012) *National Renewables Infrastructure Fund*. Available at: https://www.scottish-enterprise.com/services/develop-new-products-and-services/nrif/overview [Accessed 19/04/2018]

Scottish Enterprise (2013) *Scotland's Offshore Wind Route Map*. Available at: https://www.scottish-enterprise.com/knowledge-hub/articles/guide/offshore-wind-route-map-jan-2013 [Accessed 19/04/2018]

Scottish Government (2013) *Scotland's Offshore Wind Route Map – Developing Scotland's Offshore Wind Industry to 2020 and Beyond*. Available at: http://www.gov.scot/Publications/2013/01/5856 [Accessed 19/04/2018]

Scottish Government (2014) *National Planning Framework 3*. Available at: http://www.gov.scot/Publications/2014/06/3539/0 [Accessed 19/04/2018].

Scottish Government (2015a) *2020 Routemap for Renewable Energy in Scotland – Update*. Available at: https://www.researchonline.org.uk/sds/search/download.do;jsessionid=942399EFAD8190C01304FEF220EE5FF0?ref=B46453 [Accessed 17/04/2018].

Scottish Government (2015b) *Scottish Marine Recreation and Tourism Survey 2015*. Available at: http://www.gov.scot/Topics/marine/seamanagement/national/RecandTourism [Accessed 19/04/2018].

Scottish Government (2015c) *Scotland's Economic Strategy*. Available at: http://www.gov.scot/Publications/2015/03/5984 [Accessed 19/04/2018].

Scottish Government (2015d). *Scotland's National Marine Plan*. Available at: http://www.gov.scot/Resource/0047/00475466.pdf [Accessed 19/04/2018].

Scottish Government (2016). *Draft Advice on Net Economic Benefit and Planning.* Available at: http://www.gov.scot/Topics/Built-Environment/planning/Policy/Principal-Policies/Sustainability/Net-Econ-Plan [Accessed 19/04/2018].

Scottish Government (2017a) *Europe 2020: Scottish National Reform Programme*. Available at: http://www.gov.scot/Publications/2017/04/7347 [Accessed 19/04/2018].

Scottish Government (2017b) *Scottish Government Input-Output Tables and Multipliers for Scotland.* Available at: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output [Accessed 19/04/2018].

Scottish Government (2017c). *Scottish Energy Strategy: The Future of Energy in Scotland.* Available at: http://www.gov.scot/Publications/2017/12/5661 [Accessed 17/04/2018].

Seagreen Wind Energy (2012). Firth of Forth, Environmental Statement.

Shafiee, M., Brennan, F., and Espinosa, I.A. (2016) *A Parametric Whole Life Cost Model for Offshore Wind Farms in The International Journal of Life Cycle Assessment.* Available at: https://link.springer.com/article/10.1007/s11367-016-1075-z [Accessed 19/04/2018].

South Lanarkshire Council (2015) *South Lanarkshire Local Development Plan 2015*. Available at: http://www.southlanarkshire.gov.uk/info/200172/plans_and_policies/39/development_plans/6 [Accessed 19/04/2018].

Statoil (2015) *Hywind Pilot Park ES*. Available at: http://marine.gov.scot/datafiles/lot/hywind/Environmental_Statement/Environmental_Statement.pdf [Accessed 19/04/2018].

Stirling Council (2014) *Stirling Local Development Plan 2014*. Available at: https://my.stirling.gov.uk/services/planning-and-the-environment/planning-and-building-standards/local-and-statutory-development-plans/local-development-plan [Accessed 19/04/2018].

TAYplan Strategic Development Planning Authority (2017) *TAYplan Strategic Development Plan 2016-2036*. Available at: https://www.tayplan-sdpa.gov.uk/strategic_development_plan [Accessed 19/04/2018].

The City of Edinburgh Council (2016) *Edinburgh Local Development Plan*. Available at: http://www.edinburgh.gov.uk/info/20013/planning_and_building/66/edinburgh_local_development_plan [Accessed 19/04/2018].

The City of Edinburgh Council (2012) *Edinburgh's Economic Strategy 2012-2017.* Available at: http://www.edinburgh.gov.uk/info/20220/economic_development/385/a_strategy_for_jobs [Accessed 19/04/2018].

The Strategic Development Planning Authority for Edinburgh and South East Scotland (2013) *The Strategic Development Plan*. Available at: http://www.sesplan.gov.uk/assets/SESplan%20Strategic%20Development%20Plan%20Approved%2027%20June%202013.pdf [Accessed 19/04/2018].

Vattenfall (2011) *EOWDC Aberdeen Bay EIA*. Available at: http://www.gov.scot/Topics/marine/Licensing/marine/scoping/EOWDC [Accessed 19/04/2018].

West Dunbartonshire Council (2010) *West Dunbartonshire Local Plan 2010*. Available at: https://www.west-dunbarton.gov.uk/council/strategies-plans-and-policies/local-development-planning/local-plan/ [Accessed 19/04/2018].

West Lothian Council (2009) *West Lothian Local Plan 2009.* Available at: https://www.westlothian.gov.uk/WLLP [Accessed 19/04/2018].

West Lothian Economic Partnership (2010) *West Lothian Economic Strategy 2010-2020*. Available at: https://www.westlothian.gov.uk/media/4212/Economic-Strategy-2010-2020/pdf/economicstrategy201020.pdf [Accessed 19/04/2018].

Contents

List of Tables

List of Figures

Glossary

Air Defence Radar (ADR)	A series of fixed air defence radars feed data into a central Control and Reporting Centre (CRC) providing surveillance information for air defence controllers.
Civil Aviation Authority (CAA)	The statutory regulatory body which oversees and regulates all aspects of civil aviation in the United Kingdom (UK).
Civil Aviation Publication (CAP)	A series of documents published by the CAA containing aviation policy and guidance.
Defence Infrastructure Organisation (DIO)	Responsible for MOD Safeguarding (see below)
Control and Reporting Centre (CRC)	A location where ADR is used to police airspace, scrambling fighter jets where necessary to intercept and identify any aircraft that are deemed to be suspicious.
Helicopter Main Route (HMR)	A route where civilian helicopters operate on a regular and frequent basis.
Military Aeronautical Information Publication	A document which provides comprehensive information on general and en-route procedures together with information on UK military aerodromes.
Primary Surveillance Radar (PSR)	A radar system used in Air Traffic Control (ATC) that detects objects by means of reflected radio signals.
Safeguarding	Safeguarding ensures operational facilities such as aerodromes, explosive stores, radar facilities and range areas are not compromised by either onshore or offshore development.
Safeguarding (MOD)	Wind turbines can adversely affect a number of MOD operations including radars, seismological recording equipment, communications facilities, naval operations and low flying. These effects are not limited to specific geographical areas. MOD Safeguarding is undertaken by the DIO and is the formal consultation process through which MOD is engaged on development proposals, including those for wind energy developments. https://www.gov.uk/government/publications/wind-farms-ministry-of-defence-safeguarding/wind-farms-mod-safeguarding
Secondary Surveillance Radar (SSR)	A radar system used in ATC that detects aircraft position through communication with an on-board radar transponder. It also requests additional information from the aircraft such as identity and altitude
Temporary Reserved Area (TRA)	Airspace of defined dimensions allocated for a specific user during a determined period of time.

UK Integrated Aeronautical Information Package (UK IAIP)	A publication, updated every 28 days, which contains information of lasting (permanent) character essential to air navigation.

Abbreviations and Acronyms

ACC	Area Control Centre
AOC	Aircraft Operator Certificate
ADR	Air Defence Radar
agl	above ground level
AIP	Aeronautical Information Publication
AIRAC	Aeronautical Information Regulation and Control
AIS	Aeronautical Information Service
ALARP	As low as reasonably practicable
amsl	Above Mean Sea Level
ANSP	Air Navigation Service Provider
ASACS	Air Surveillance and Control Systems
ATC	Air Traffic Control
ATS	Air Traffic Service
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CAS	Controlled Airspace
CIA	Cumulative Impact Assessment
CRC	Control and Reporting Centre
DGC	Defence Geographic Centre
DIO	Defence Infrastructure Organisation
DOC	Declared Operational Coverage
DS	Deconfliction Service
DSLP	Development and Specification Layout Plan

EIA	Environmental Impact Assessment
ERCoP	Emergency Response Co-operation Plan
ES	Environmental Statement
FIR	Flight Information Region
FL	Flight Level
ft	Feet
GAAC	General Aviation Awareness Council
GPS	Global Positioning System
HAT	Highest Astronomical Tide
HMR	Helicopter Main Route
IAIP	Integrated Aeronautical Information Package
ICAO	International Civil Aviation Organisation
ICOL	Inch Cape Offshore Limited
IFP	Instrument Flight Procedure
km	Kilometre
LARS	Lower Airspace Radar Service
LAT	Lowest Astronomical Tide
LOS	Line of Sight
m	Metre
MAA	Military Aviation Authority
MADS	Manual of Aerodrome Design and Safeguarding
MCA	Maritime and Coastguard Agency
MGN	Maritime Guidance Note
Mil AIP	Military Aeronautical Information Publication

MOD	Ministry of Defence
MORL	Moray Offshore Renewables Limited
MRCC	Maritime Rescue Co-ordination Centre
MS-LOT	Marine Scotland Licensing Operations Team
NAIZ	Non-Automatic Initiation Zone
NATS	National Air Traffic Control Services
NM	Nautical Mile
NnG	Neart na Gaoithe
NOTAM	Notice to Airmen
O&M	Operation and Maintenance
OfTW	Offshore Transmission Works
OREI	Offshore Renewable Energy Installation
OSP	Offshore Substation Platform
PAR	Precision Approach Radar
PSR	Primary Surveillance Radar
RAF	Royal Air Force
RAG	Range Azimuth Gating
RAP	Recognised Air Picture
RCS	Radar Cross Section
RDDS	Radar Data Display System
RDP	Radar Data Processor
RRH	Remote Radar Head
SAR	Search and Rescue
SSR	Secondary Surveillance Radar

SLVIA	Seascape, Landscape and Visual Impact Assessment
TMZ	Transponder Mandatory Zone
TRA	Temporary Reserved Area
U	Upper
UIR	Upper Information Region
UK	United Kingdom
UK IAIP	UK Integrated Aeronautical Information Package
UKHO	United Kingdom Hydrographic Office
UKLFS	United Kingdom Low Flying System
VFR	Visual Flight Rules
WTG	Wind Turbine Generator

17 Aviation

17.1 Introduction

1 This chapter presents the assessment of potential impacts on aviation interests predicted to arise from the Inch Cape Wind Farm and associated Offshore Transmission Works (OfTW).

2 It describes the existing environment and presents the results of desk top studies and consultations with key stakeholders, followed by an assessment on the impacts resulting from the operation phase (for the purposes of this assessment please see the definition below) of the Development regarding aviation infrastructure and operations within and around the Wind Farm. Details of any required mitigation are also presented.

3 The following appendices and chapters, as well as the *introductory chapters (1-8)* should be read in conjunction with this chapter:

- *Appendix 17A: Aviation and Lighting Requirements;* and
- *Chapter 12: Seascape, Landscape and Visual Impact Assessment (SLVIA)*

17.2 Potential Impacts

4 The potential impacts of wind farms on aviation fall into two scenarios:

- Physical obstruction: infrastructure can present a physical obstruction at, or close to, an aerodrome, flight path or other landing/take off point; and
- Radar/air traffic services: clutter resulting from infrastructure, appearing on a radar display, can affect the safe provision of air traffic services as it can mask unidentified aircraft from air traffic controllers and/or prevent accurate identification of aircraft under their control. In some cases, radar reflections from Wind Turbine Generators (WTG) can affect the detection performance of the radar system itself.

5 The worst-case design scenario used for the impacts assessment on aviation radar services assumes that the entirety of the Development Area will be populated with WTG at the maximum blade tip height being considered (291 metres (m)) (955 feet (ft)) above Lowest Astronomical Tide (LAT).

6 As elements of the OfTW are below sea level and Offshore Substation Platforms (OSPs) are below the height of the WTGs, the OfTW will not have an impact on aviation interests and therefore has been scoped out of this chapter. However, the Ministry of Defence (MOD) Defence Infrastructure Organisation (DIO) may request aviation lighting to be fitted to structures featured in the Development (such as OSPs) where there is no mandatory requirement for installation. For impacts of lighting resulting from the installation of the aviation lighting requirements please refer to *Chapter 12.*

7 During the construction phase, stationary elements, such as the tower of the WTG will not be processed and presented onto a Radar Data Display System (RDDS) by the associated

aviation radar. Likewise, during the gradual decommissioning of above sea level infrastructure at the Development Area, the impact on radar would be incrementally reduced until the final WTG is incapable of rotation. Any agreed mitigation, where required, will be maintained until the last WTG is decommissioned. Therefore, for the purpose of this aviation assessment, the operational phase is taken to be from the point at which WTG blades are capable of rotating to the point at which the last WTG ceases to have the capability to rotate.

8 In aviation terms, the standard measurement of altitude or vertical distance is in feet, and nautical miles (NM) are used for navigational distances: one foot equates to 0.305 m; and one nautical mile equates to 1.852 kilometres (km).

17.3 Consultation and Scoping

9 Inch Cape Offshore Limited (ICOL) has consulted a number of aviation stakeholders throughout the scoping of the Development, and these consultations are summarised in Table 17.1 below. It is acknowledged as consultation progresses, that a number of impacts will be resolved post consent through applicable consent conditions.

Table 17.1: Consultation and Scoping responses and actions

Consultees	Scoping Response	ICOL Response
MODDIO	DIO, whom safeguard MOD infrastructure, indicated by email to ICOL on the 7 June 2017 that an assessment is being conducted on the Inch Cape Wind Farm consisting of WTGs of the worst-case scenario of 301 m blade tip height above LAT. The Scoping response from DIO stated that DIO will continue to work with ICOL to ensure that the MOD (DIO) concerns are addressed. The MOD (DIO) has not conducted a new technical and operational assessment of the updated parameters of the proposed development, and as such is unable to comment on whether conditions 20 and 21[1] of the original 2014 consent would be applicable. MOD (DIO) provided the results of their assessment by email on the 13 December 2017. The assessment was completed on the basis that there would be up to 72 WTGs at a	ICOL is keen to know the potential impacts of the Inch Cape Wind Farm on MOD infrastructure in order to understand what operational effects would be presented and what mitigation may be required. To that end, the MOD (DIO) were contacted by email on 6 June 2017 with details of the updated Development design envelope for assessment of a maximum WTG tip height of 301 m above LAT. On receipt of the MOD (DIO) Scoping response ICOL contacted DIO by email on the 12 July 2017, in which, an enquiry was made on the intention of the MOD (DIO) to complete the aforementioned assessment was made. ICOL are further engaging with the MOD (DIO) to understand the extent of the potential impacts and understand the detail of appropriate mitigation that would meet MOD (DIO) requirements. The MOD (DIO)

[1] Consent conditions relate to the submission of an ATC Radar Mitigation Scheme and technical mitigation scheme for RAF Leuchars and RRH Buchan respectively

Consultees	Scoping Response	ICOL Response
	maximum of 301 m from ground level[2] to blade tip and located in the boundary indicated by grid reference provided to them. Results of the assessment stated that the Development would cause unacceptable interference to the Leuchars Station Air Traffic Control (ATC) Primary Surveillance Radar (PSR) and the Remote Radar Head (RRH) Air Defence Radar (ADR) at Buchan and Brizlee Wood.	were contacted again on 29 August 2017 and the 14 September 2017 requesting an update on when ICOL might be presented with the results of the MOD (DIO) assessment for the application. In order for the MOD (DIO) to complete its assessment (as indicated in the scoping response), details of WTG coordinates and WTG blade tip height of 291 m above LAT were provided to the MOD (DIO) by email on the 6 October 2017. However, the assessment was completed on the basis that there would be up to 72 WTGs at a maximum of 301 m from ground level[3] to blade tip and located in the boundary indicated by grid reference provided to them. ICOL have completed within this Chapter an assessment on the potential of the Leuchars PSR and RRH Buchan and Brizlee Wood ADRs to be impacted by the Development Area.
National Air Traffic Control Services (NATS)	The results of a NATS technical safeguarding assessment have concluded that NATS has no safeguarding objection to the Inch Cape Wind Farm.	Impact to NATS infrastructure has been scoped out of this assessment.
Aberdeen International Airport	The Aberdeen International Airport Safeguarding Team were contacted by email on 4 September 2017 and provided details of the Inch Cape Wind Farm with a request for the Safeguarding Team to provide comment on any safeguarding concerns that they may have.	Aberdeen International Airport responded by email on the 29 September 2017 informing that the Development is located out-with their consultation zone and is not visible to radars utilised by the airport and therefore had no comment to make and need not be consulted further. Impacts on the Aberdeen International Airport have therefore been scoped out of this assessment.

[2] MOD (DIO) stated in their response that the content of their letter is applicable to WTGs of heights 291 m or 301 m (blade tip).
[3] MOD (DIO) stated in their response that the content of their letter is applicable to WTGs of heights 291 m or 301 m (blade tip).

17.4 Scope of Assessment

10 As part of this application, ICOL have drawn on the detail presented in the Scoping Report and Scoping Opinion from Marine Scotland Licensing Operations Team (MS-LOT) and subsequent consultee responses to agree on those impacts that may lead to a significant effect on identified Aviation Stakeholder infrastructure or operations. Therefore, this chapter focusses on those impacts on aviation that have been agreed throughout this process as being necessary to be assessed.

11 For further information reference should be made to the Scoping Report and the Scoping Opinion which can be found on Marine Scotland's website[4].

12 Whilst not definitive, Civil Aviation Authority (CAA), Civil Aviation Publication (CAP) 764 *Policy and Guidelines on Wind Turbines* (CAA, 2016) provides criteria for assessing whether a WTG development might have an impact on civil aerodrome related operations. Consideration of the applications potential to impact on aviation stakeholders and receptors has been undertaken in accordance with the standard consultation distances stated in CAP 764. A number of potential consultees and receptors were scoped out from the consultation process as they were out-with the CAP 764 consultation zones or criteria which include:

- Within 30 km of an aerodrome with surveillance radar – although it is acknowledged that the distance quoted in CAP 764 can be greater than 30 km dependent on a number of factors at individual aerodromes, including type and coverage of radar utilised. For example, Aberdeen International Airport and Edinburgh Airports[5] are located outside of 30 km; however, dependent on radar operating range, flight procedures and detectability of WTGs consideration of impact through consultation has be completed;
- Airspace coincident with published Instrument Flight Procedures (IFPs) to take into account the requirement for an aerodrome's requirement to protect its IFP's; there is no such airspace within the Development Area; and
- Within 17 km of a non-radar equipped licensed aerodrome with a runway of 1,100 m or more; there are no such aerodromes within 17 km of the proposed Development Area.

13 The offshore location of the Inch Cape Wind Farm excludes consideration of other minor aerodrome related distances included within CAP 764.

14 Radar detectable WTGs are a significant cause of radar false plots, or clutter, as the rotating blades can trigger the Doppler threshold (e.g., minimum shift in signal frequency) of the Radar Data Processor (RDP) and therefore may be interpreted as aircraft movements/returns. While the reflected radar signal from stationary elements of the WTG can be removed using stationary clutter filters, significant effects have been observed on radar sensitivity caused by the substantial Radar Cross Section (RCS) of the WTG structural

[4] Available at: http://www.gov.scot/Topics/marine/Licensing/marine/scoping/ICOLRevised-2017 [Accessed 25/04/2018]

[5] In response to Scoping Edinburgh Airport sent a nil return; therefore, had no comment to make.

components (blades, tower and nacelle) which can exceed that of a large aircraft; the effect 'blinds' the radar (or the operator) to wanted targets in the immediate vicinity of the WTG.

15 False plots and reduced radar sensitivity may reduce the effectiveness of radar to an unacceptable level and compromise the provision of a safe and expeditious radar service to participating aircraft.

16 It is mainly for these reasons that Air Navigation Service Providers (ANSPs) utilising radar, object to wind farm developments that are within radar Line of Sight (LOS) to their radar. However, it is worth noting that detectability of WTGs does not automatically constitute a valid reason for objection as dependent on the class and operational use of airspace, the extent of WTG induced clutter and impact to operations; in a small amount of instances aviation stakeholders may operationally mitigate impacts dependent on cumulative effects.

17 The Development study area depends on the maximum operating range of each of the radar systems scoped in to the assessment and the potential of the radar system to detect the WTGs. The operational range of the radar system is dependent on the type of radar used, its function and its operational requirement.

18 Where relevant, the maximum operating range of the radar system identified is used within the baseline study and is as follows:

- The Leuchars Station Primary Surveillance Radar (PSR) is located on the Leuchars Station airfield and has a standard operating range of 40 NM (74.1 km) radius; and
- The RRH Brizlee Wood and RRH Buchan Air Defence Radar (ADR) systems are long range radar systems, which have an estimated operational range of 200 NM (370 km); however, due to their strategic value to national security their specific operating parameters are not known to Osprey. The Development is located inside the expected operational range of both the Brizlee Wood and Buchan ADRs and therefore there is no limitation of the assessment of impact on these two ADR systems.

19 Table 17.2 below provides the scope of the assessment and Table 17.3 those impacts that have been scoped out.

Table 17.2: Scope of assessment covered in this chapter

Potential Impact	Scope of Assessment	Reason
Operation & Maintenance (O&M) Phase[6]		
Detectability of the WTGs by the Leuchars Station PSR during the operational phase may create clutter to be produced on a Radar Data Display Screen (RDDS) and impact the provision of radar services to aircraft.	The MOD (DIO) have objected to the Development based on radar detectability of the WTGs by the Leuchars Station PSR. Therefore, an assessment on the likely impacts and mitigation requirements are presented.	WTGs detectable by radar might degrade the system by creating false targets, reduce system sensitivity, create radar shadowing behind the WTGs and saturate the radar receiver leading to clutter potentially concealing real aircraft targets.
Detectability of the WTGs by the RRH Brizlee Wood ADR system during the operational phase may create clutter to be produced on an RDDS and impact the provision of radar services to aircraft.	The MOD (DIO) have objected to the Development based on radar detectability of the WTGs by RRH Brizlee Wood ADR. Therefore, an assessment on the likely impacts and mitigation requirements are presented.	WTGs detectable by radar might degrade the system by creating false targets, reduce system sensitivity, create radar shadowing behind the WTGs and saturate the radar receiver leading to clutter potentially concealing real aircraft targets.
Detectability of the WTGs by the RRH Buchan ADR system during the operational phase may create clutter to be produced on an RDDS and impact the provision of radar services to aircraft.	The MOD (DIO) have objected to the Development based on radar detectability of the WTGs by RRH Buchan ADR. Therefore, an assessment on the likely impacts and mitigation requirements are presented.	WTGs detectable by radar might degrade the system by creating false targets, reduce system sensitivity, create radar shadowing behind the WTGs and saturate the radar receiver leading to clutter potentially concealing real aircraft targets.

[6] NB. During the gradual construction of above LAT infrastructure in the Development Area, the effect on radar would be incrementally increased as the WTGs are commissioned and the blades are capable of turning. However, since it is not known at this stage in what WTG order this will occur, for the purposes of this aviation assessment, the operational phase is taken to be from the point when the first WTGs are capable of turning, until the last WTG ceases to turn, during that time any agreed mitigation will need to be in place and maintained.

Table 17.3: Impacts scoped out of this chapter

Potential Impact	Justification for Scoping Out of the Environmental Impact Assessment (EIA)
Construction (& Decommissioning) Phase	
Radar detectability of the WTGs by NATS Perwinnes and Allanshill PSRs causing unacceptable interference to the radar.	NATS have no safeguarding objection to the Development.
Radar detectability of the WTGs by Edinburgh Airport PSR causing unacceptable interference to the radar.	Edinburgh Airport have no safeguarding objection to the Development.
Radar detectability of the WTGs by Aberdeen International Airport PSR causing unacceptable interference to the radar.	The Aberdeen International Airport safeguarding team have stated that the Development is outside of their safeguarded area and that they have no concerns.
Radar detectability of the WTGs by the Leuchars Station Precision Approach Radar (PAR) causing unacceptable interference to the radar.	The Developable Area of the Inch Cape Wind Farm is outside of the safeguarded area of the Leuchars Station PAR system which extends 20 NM from the touchdown point on the runway and 20° either side of the centreline of the runway in use. In response to scoping the MOD(DIO) have not objected to the Development based on effect to the Leuchars Station PAR system.
Helicopters Operating in Support of Offshore Oil and Gas Operations.	ATC services are available to helicopters operating offshore in support of the oil and gas industries and to other aircraft operating to and from their operating base or transiting the area. There are no offshore oil and gas installations in the vicinity of the Development. In the northern North Sea helicopters operating in support of offshore oil and gas platforms are likely to operate on Helicopter Main Routes (HMRs) between Aberdeen Airport and the offshore installations. All of the HMRs are located approximately 40 NM north of the Development Area and outside of any CAA recommended consultation range.
Physical obstruction to Search and Rescue (SAR) Flight Operations.	When on an operational mission, SAR aircraft are not constrained by the normal rules of the air, and operate in accordance with their Aircraft Operator Certificate (AOC). This allows SAR pilots total flexibility to manoeuvre using best judgement thus making them highly adaptable to the environment and conditions in which they are operating. Pilots are obliged to plan their flying activities in advance and to be familiar with any en-route obstacles they may encounter; however, during flight, weather conditions or operational requirements may necessitate route adjustments. Pilots are ultimately responsible for seeing and avoiding obstructions such as WTGs and will be aware through notification procedures of the proposed project. Embedded mitigation and notification of construction, operation and decommissioning of the wind farm and the lighting and promulgation on aviation charts will reduce

Potential Impact	Justification for Scoping Out of the Environmental Impact Assessment (EIA)
	any physical obstruction effect on SAR flight operations.
Physical obstruction to military low flying activities.	The presence and movement of certain vessels (e.g. tall cranes) may present a potential collision risk to military low flying aircraft. A range of embedded mitigation measures relating to lighting, notification, promulgation and the inclusion of the Development on relevant aviation material and charts will reduce impact to low flying aircraft.
O&M Phase	
Radar detectability of the WTGs by NATS Perwinnes and Allanshill PSRs causing unacceptable interference to the radar.	NATS have stated within their Scoping response that there will be no safeguarding impact to their systems.
Radar detectability of the WTGs by Edinburgh Airport PSR causing unacceptable interference to the radar.	Edinburgh Airport have no safeguarding objection to the Development.
Radar detectability of the WTGs by Aberdeen Airport PSR causing unacceptable interference to the radar.	Aberdeen International Airport have no safeguarding objection to the Development.
Radar detectability of the WTGs by the Leuchars Station PAR causing unacceptable interference to the radar.	As per the construction and decommissioning phases.
Helicopters Operating in Support of Offshore Oil and Gas Operations.	As per the construction and decommissioning phases.
Physical obstruction to SAR Flight Operations.	As per the construction and decommissioning phases.
Physical obstruction to military low flying activities.	As per the construction and decommissioning phases.

17.5 Regulation and Guidance

20 Policy of specific relevance to this chapter includes *The Scottish Government Planning Policy (2014)*, paragraph 169 notes that considerations in the determination of applications for energy infrastructure developments are likely to include impacts on aviation and defence interests.

21 A variety of aviation publications contain information and guidance relating to the potential effects of wind energy development on aviation stakeholders. Baseline characterisation data has been collated combining a thorough desk-based study of extant data supplemented with a detailed literature review. The following documents informed the assessment of the potential impacts of the Development on aviation interests.

- CAA CAP 764 (CAA, 2016) provides assistance to aviation stakeholders to help understand and address wind energy related issues, thereby ensuring greater consistency in the consideration of the potential impact of proposed wind farm developments on aviation systems and flight operations;
- *CAA CAP 168 Licensing of Aerodromes* (CAA, 2014) sets out the standards required at United Kingdom (UK) licensed aerodromes relating to its management systems, operational procedures, physical characteristics, assessment and treatment of obstacles, and visual aids;
- *CAA CAP 393 The Air Navigation Order 2016 and Regulations (Fifth Edition Amendment 3)* (CAA, 2018) sets out the provisions of the Air Navigation Order as amended together with regulations made under the Order. It is prepared for those concerned with day to day matters relating to air navigation that require an up to date version of the air navigation regulations and is edited by the Legal Advisers Department of the CAA;
- *CAA CAP 670 Air Traffic Services Safety Requirements* (CAA, 2014a) sets out the safety regulatory framework and requirements associated with the provision of an Air Traffic Service (ATS); and
- *CAA CAP 437 Standards for Offshore Helicopter Landing Areas* (CAA, 2016a) provides guidance on standards and the criteria applied by the CAA in assessing helicopter landing areas for worldwide use by helicopters registered in the UK. It includes design of winching area arrangements located on WTG platforms to represent current best practice.

22 Other guidance considered under the review of the baseline environment definition included the following:

- *Military Aeronautical Information Publication (Mil AIP)* (MOD, 2018) provides details of military aerodromes in the UK and abroad together with military Air Traffic Control (ATC) procedures and facilities;
- The Military Aviation Authority (MAA) *Manual of Aerodrome Design and Safeguarding (MADS)* (MAA, 2014) provides details of safeguarding of military aerodromes and the management of obstacles on or around a military aerodrome;

- CAA *CAP 032 The UK Integrated Aeronautical Information Package* (UK IAIP) (National Air Traffic Control Services (NATS), 2018) is the main resource for information and flight procedures at all licensed UK airports as well as airspace, en-route procedures, charts and other air navigation information; and
- Maritime and Coastguard Agency *(MCA) Maritime Guidance Note (MGN) 543: Safety of Navigation Offshore Renewable Energy Installations (OREIs*) (MCA, 2016) provides guidance on UK navigational practice, safety and emergency response for operators and developers in formulating their emergency response plans and site safety management.

17.6 Design Envelope and Embedded Mitigation

17.6.1 Design Envelope

23 The project parameters and scenarios are defined as a design envelope and presented in *Chapter 7: Description of Development*. The assessment of potential impacts on aviation is based upon the worst-case scenario as identified from this design envelope, and is specific to the potential impacts assessed in this chapter.

24 As discussed in the footnote to Table 17.2, during the gradual construction of above LAT infrastructure in the Development Area, the effect on radar due to unmitigated radar clutter and on the full provision of an unlimited ATS would be incrementally increased as WTGs are commissioned and the blades are capable of turning. However, since it is not known at this stage in what WTG order this will occur, for the purposes of this aviation assessment, the operational phase is taken to be from the point when the first WTGs are capable of turning, until the last WTG ceases to turn, during that time any agreed mitigation, if required, will need to be in place and maintained. On this basis, construction and decommissioning effects are scoped out of this assessment and therefore no worst-case design scenario is identified for these phases. Notification procedures for cranes and lifting equipment are likely to be required as they are likely to cause an obstruction to radar.

25 For this aviation assessment, the worst-case scenario for all impacts being assessed is the maximum number of WTGs in the Development Area (72 WTGS) at the largest height to blade tip (291 m). The worst-case scenario also assumes that the entirety of the Development Area will be populated by WTGs. This is because the largest area of WTGs will create the largest impact from a radar detectability perspective, leading to a greater effect on radar and aviation services. Any aspects of the infrastructure that are lower in height than the WTGs and within the Development Area (e.g. OSPs) will not create an incremental effect on aviation interests.

17.6.2 Embedded Mitigation

26 A range of embedded mitigation measures to minimise effects were identified during the development of the Inch Cape Wind Farm. These will comply with current guidelines as follows:

- *CAP 393 Article 223* (CAA, 2018) sets out the mandatory requirements for lighting of offshore WTGs.
    - Legislation requires the fitting of obstacle lighting on offshore WTGs with a height of 60 m or more above the level of the sea at the Highest Astronomical Tide (HAT);
    - When four or more WTGs are located together in the same group, with the permission of the CAA only those on the periphery of the group need to be fitted with at least one medium intensity steady red light positioned as close as reasonably practicable to the top of the fixed structure; and
    - The obstruction light or lights must be fitted to show when displayed in all directions without interruption. The requirements of the angle of the plane of the beam and peak intensity levels are defined within *CAP 393* (CAA, 2018).
- *CAP 437* (CAA, 2016a) sets out a procedure to indicate to a helicopter operator that the WTG blades and nacelle are safely secured in position prior to helicopter hoist operations commencing.
    - *CAP 437* states that this is best achieved through the provision of a helihoist status light located on the nacelle of the WTG within the pilot's field of view, which is capable of being operated remotely and from the platform itself or from within the nacelle;
    - A steady green light is displayed to indicate to the pilot that the WTG blades and nacelle are secure and it is safe to operate. A flashing green light is displayed to indicate that the WTG is in a state of preparation to accept hoist operations or, when displayed during hoist operations, that parameters are moving out of limits. When the light is extinguished this indicates to the operator that it is not safe to conduct helicopter hoist operations; and
    - Obstruction lighting in the vicinity of the winching area that has a potential to cause glare or dazzle to the pilot or to a helicopter hoist operations crew member should be switched off prior to, and during, helicopter hoist operations.

27 A Lighting and Marking Plan will be submitted for approval to MS-LOT outlining the Development's lighting and marking strategy to mitigate the risk to aviation safety during all phases of the Development and will be in line with *CAP 393* (CAA, 2018) and *CAP 437* (CAA, 2016a).

28 Appropriate information about the site construction and any associated lighting (where applicable), for example the height and temporary location of construction cranes, will be provided to the UK Aeronautical Information Service (NATS AIS) for promulgation within the UK IAIP (NATS, 2018).

29 Prior to commencement of the Development, information will be circulated to relevant aviation stakeholders, including the UK Hydrographic Office (UKHO), which will include the positions and maximum heights of the WTGs and construction equipment above 150 ft above LAT for inclusion on aviation charts. The UK IAIP is updated on a monthly basis under the Aeronautical Information Regulation and Control (AIRAC) system. Information provided

under the AIRAC system shall be distributed by AIS at least 42 days in advance of the effective date with the objective of reaching recipients at least 28 days in advance of the effective date.

30 Further to the embedded mitigation it is also recognised practice to notify aviation stakeholders of the location and dimension of any wind energy development and the associated construction activities. Information regarding construction should be passed to the Defence Geographic Centre (DGC) and the General Aviation Awareness Council (GAAC) at least 10 weeks in advance of the erection of the first WTG and to follow up on the day with a confirmation that the activity has taken place. The data should include:

- Location, height (of all structures over 150 ft (45.7 m), date of erection, date of removal and lighting type (none, infra-red or lighting brightness); and
- Local aerodromes identified during consultation should be notified, particularly any police helicopter or air ambulance unit.

31 Appropriate liaison with NATS AIS will be completed to ensure information on the construction of the wind farm is circulated in a Notice to Airmen (NOTAM) and other appropriate media.

32 The Wind Farm will be designed, operated and decommissioned as per MGN 543, including Annex 5 which details '*Standards and procedures for generator shutdown and other operational requirements in the event of a SAR, counter pollution or salvage incident in or around an Offshore Renewable Energy Installation (OREI)*'. An Emergency Response Co-operation Plan (ERCoP) based on the MCA template and site Safety Management Systems, in consultation with the MCA will be created. Procedures will be the followed in the event of an emergency during all phases of the Development.

17.6.3 Consent Conditions

33 As well as the embedded mitigation measures, ICOL proposes to commit to the purpose of the relevant consent conditions granted for the Inch Cape 2014 Consent, as they are still relevant to this application. This will provide reassurance to stakeholders that the relevant issues will be addressed and secured by way of appropriate conditions.

34 ICOL recognises that the wording and detail of the consent conditions will be at the discretion of the Scottish Ministers. For Aviation interests, ICOL propose that the consent conditions address matters surrounding, but not limited to, the following;

- Submit an ATC Radar Mitigation Scheme in order to mitigate adverse impacts on the ATC radar at Leuchars Station and the operations of the MOD;
- Submit a technical proposal to mitigate the MODs concern on RRH Buchan; and
- Provide an approved Development and Specification Layout Plan (DSLP) noting the positions and maximum heights of the WTGs, construction equipment over 150 ft in height (measured above LAT).

17.7 Baseline Environment

17.7.1 Aviation Study Area – Existing Airspace Environment

35 In the UK Flight Information Region (FIR) and Upper Information Region (UIR), airspace is classified as A to G in accordance with International Civil Aviation Organisation (ICAO) standards (note: there is no airspace designated as Class B or Class F in UK airspace). Airspace Classes A to E are variants of Controlled Airspace (CAS) in which aircraft require an ATC clearance. Class G airspace is airspace in which aircraft can operate autonomously without any clearance required. The Development Area will be situated in an area of predominately class G uncontrolled airspace, which is established from sea level up to Flight Level (FL) 195 (approximately 19,500 ft), there are also discrete areas of Class C CAS above FL 195.

36 The classification and the controlling authority of the various airspace sectors above the Development Area are described and categorised as follows:

- Class G uncontrolled airspace: any aircraft can operate in this area of uncontrolled airspace without any mandatory requirement to be in communication with, or receive an ATS from any ATC establishment. Pilots of aircraft operating under Visual Flight Rules[7] (VFR) in Class G airspace are ultimately responsible for seeing and avoiding other aircraft and obstructions; and
- Class C CAS: only aircraft that have filed a flight plan can operate within CAS. ATC applies the required levels of separation to aircraft operating in CAS and generally instructions issued to the pilot flying in CAS are mandatory. Aircraft operating in CAS must be in receipt of an ATS from NATS or an authorised military service provider.

37 The Class C CAS above FL 195 contains a number of airways which are designated by a letter and number sequence. Airways P18, Upper (U) P18 and UP59 are located above the Development Area. Airway P18 is classified as a lower airway located below FL 245 and is only activated during discrete operating hours; UP18 and UP59 are located above FL 245 and are designated as upper airways. Airways are predominantly used by en-route civil aircraft, an ATS to pilots operating on the airways above the Development Area is provided by NATS controllers operating from the Prestwick Area Control Centre (ACC) utilising remote long-range radar systems (NATS responded within their Scoping Response that they have no safeguarding concerns to the Inch Cape Wind Farm). The width of a lower airway is generally 5 NM either side of the airway centreline, upper air routes (above FL 245) have no declared width but for the purpose of ATS provision are deemed to be 5 NM either side of a straight line joining each two consecutive points.

38 Figure 17.1 and Figure 17.2 below provide a graphical representation of the Development Area and the location of the adjacent airways.

[7] A set of regulations under which a pilot operates an aircraft in weather conditions clear enough to allow the pilot to see where the aircraft is going; the pilot must be able to operate the aircraft with visual reference to the ground, and by visually avoiding obstructions and other flying machines.

Figure 17.1: Position of Airway P18 relative to Development Area

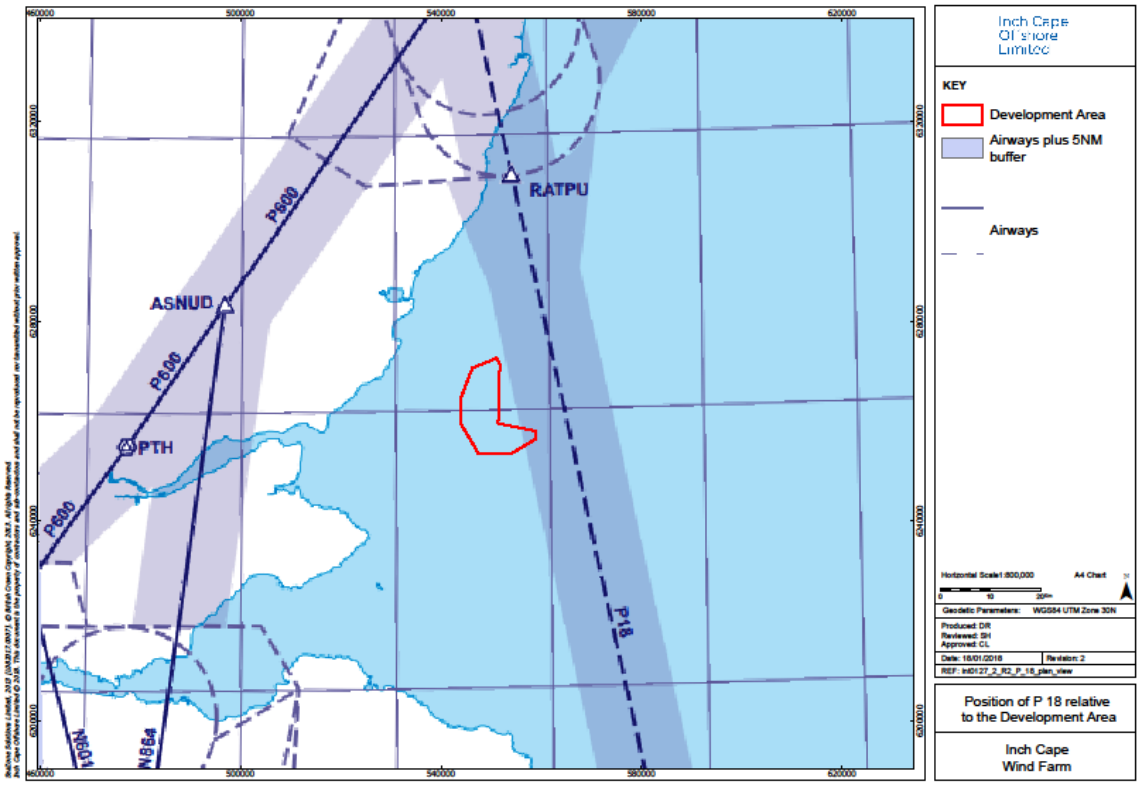
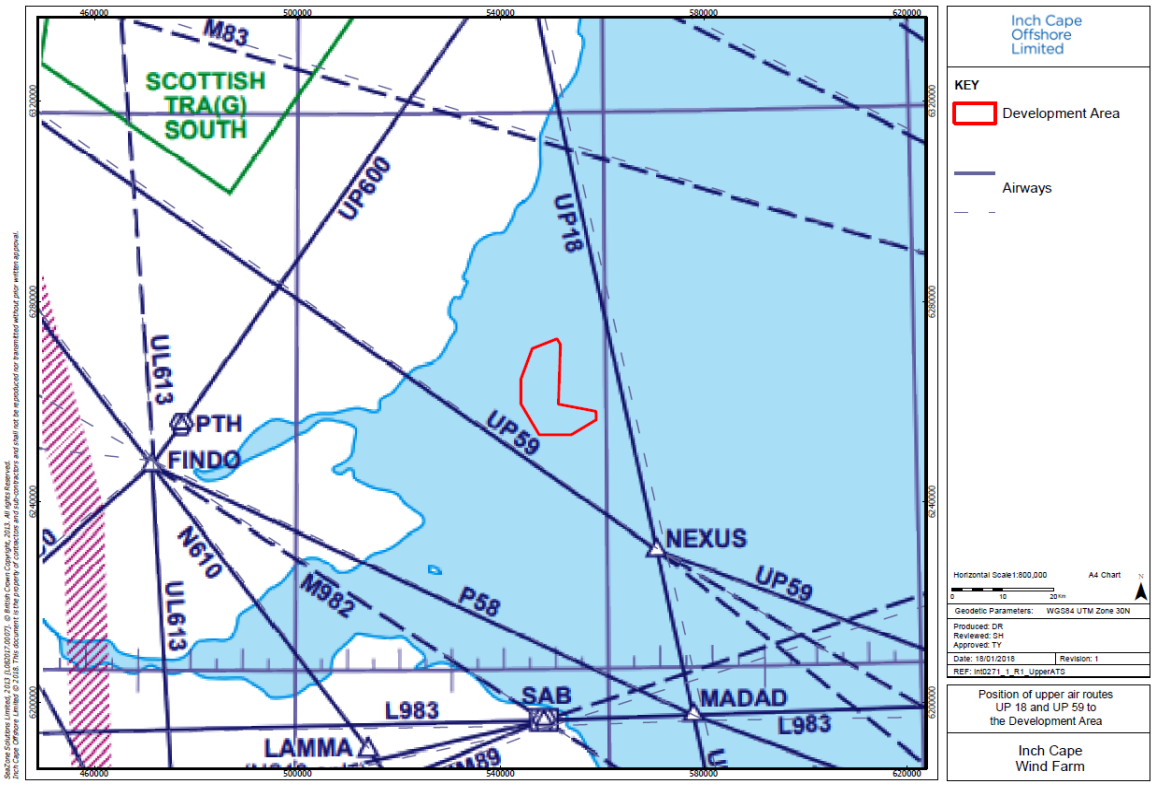


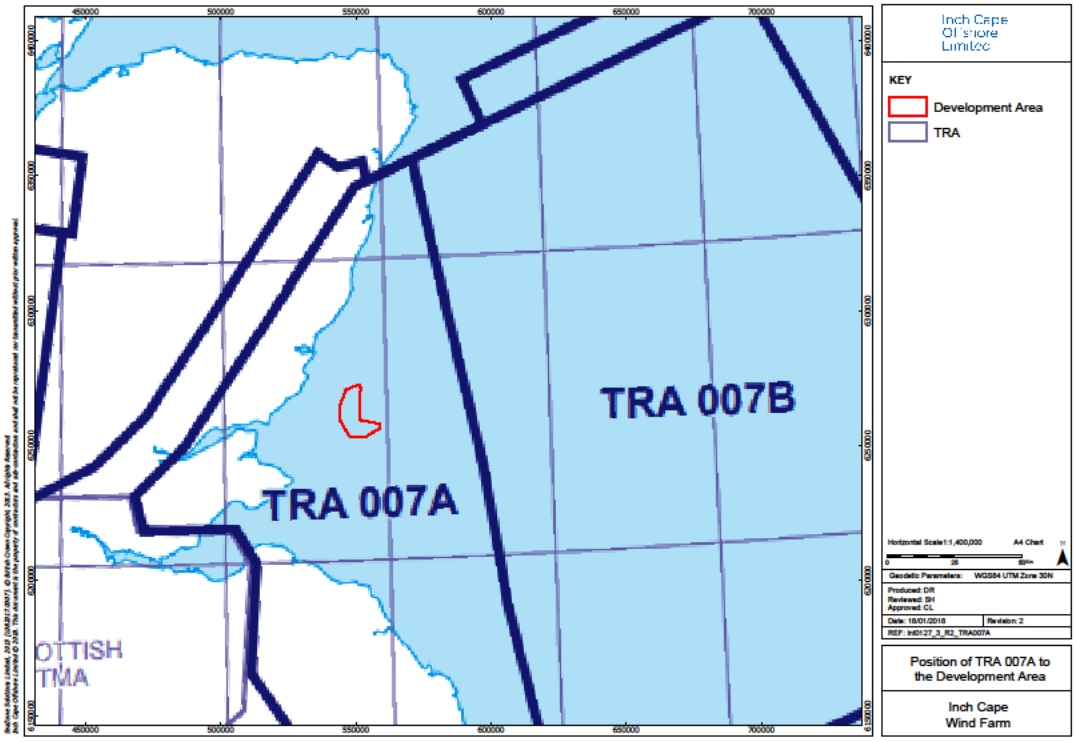
Figure 17.2: Position of UP18 and UP59 relative to the Development Area



39 Military air defence controllers utilising radar data from ADRs are able to provide an airways crossing service to aircraft under air defence control, utilising ADR systems, and are likely to operate in the airspace above the Develoment. Figure 17.2 also shows the location of a portion of the Scottish Temporary Reserved Area (TRA) (G) South, which is a temporary allocated piece of airspace used for Gliding (G). The Pink hatching on the left side of the figure, illustrates an eastern boundary of the Hebrides Upper Control Area (UTA) where specific rules apply, an explanation although not relevant to the Development, is provided for completeness.

40 TRA 007A is used by military aircraft for activities including air combat training, training exercises and supersonic flight. A portion of TRA 007A is established above the Development Area from FL 195 (19,500 ft) to FL 245 (24,500 ft) and is activated Monday to Friday 0830 to 1700 (0730 to 1700 during the months of summer). TRA 007A does not include CAS within airway P18 during the published hours of the airway. TRAs allow military aircraft to work autonomously or to be in receipt of an ATS from approved military ATS units, to avoid operational restrictions to the pilot. Air defence controllers using radar data from ADR systems and airborne radar assets may be responsible for navigation services and support to aircraft activity within TRA 007A during its opening hours. Figure 17.3 below shows the position of TRA 007A.

Figure 17.3: Position of TRA 007A relative to the Development Area



41 There would be no direct impact to the TRA airspace created by the Development Area; the impact on the TRA would be as a consequence of the radar detectability of the Development Area by radar utilised for the identification and control of aircraft operating in the TRA.

17.7.2 Identified Radar Receptors

Leuchars Station ATC PSR

42 Leuchars Station operates a Watchman PSR system, which is located on the airfield at the Station; the radar has an operating range of 40 NM (74.1 km) radius of the radar location. The PSR is located approximately 20.1 NM (37.3 km) from the western edge of the Development Area and is utilised by Leuchars Station ATC in the provision of air traffic services to aircraft operating in and out of the airfield and in addition the provision of a Lower Airspace Radar Service (LARS) below FL 100 to transitory civil and military aircraft within a radius of 40 NM (74.1 km) of the airfield every day of the year, 24 hours per day.

43 In 2014 the MOD appointed a service provider to identify and evaluate options for the future delivery of their military terminal Air Traffic Management (ATM) capability, which ensures that all flights are safely and efficiently managed and sequenced for take-off and landing; this is known as Project Marshall. The current military ATM infrastructure is approaching obsolescence and to be compliant with mandatory international regulations, Project Marshall will deliver enhanced capability and significant cost savings to military ATM provision.

44 A request for information under the Freedom of Information (FOI) Act led to a response from the MOD (MOD, 2015) [8] which listed those MOD radar systems included within the primary radar replacement programme of Project Marshall and whether the radar system was to be replaced or upgraded. At the time of publication of the response to FOI (which remains currently available online), no time period was set for the replacement or upgrade of the Leuchars PSR; however, it was stated that Leuchars is undergoing an assessment to determine its inclusion within the Marshall Contract and until this assessment concludes, the site will continue to be safeguarded.

45 The Leuchars Safety Assessment (SA) which was completed by the MOD for the Neart na Gaoithe (NnG) and Inch Cape Transponder Mandatory Zone (TMZ) makes several references to the Watchman PSR being replaced within Project Marshall. The Defence Equipment and Support (DE&S) which is a trading entity and joint-defence organisation within the UK MOD, stated that the *"DE&S Windfarm Delivery Team will commence activities to implement the Range Azimuth Gating (RAG) blanking at Royal Air Force (RAF) Leuchars and subsequent equivalent RAG blanking capability that will be required to be installed if the Watchman PSR is replaced"* (MOD, 2017). There are currently no known plans for the Leuchars Station PSR to be upgraded or replaced as part of the Project Marshall programme. In addition, it is understood that the Watchmen PSR replacement programme has been extended until 2021.

46 Leuchars Station used to be known as RAF Leuchars however, on the 31 March 2015 the Station was handed over to the British Army. Based Typhoon aircraft were relocated to RAF Lossiemouth, Morayshire and continued their Quick Reaction Alert in defence of the UK from their new base. The airfield at Leuchars Station remains open with a number of based aircraft and is administered by RAF personnel who also provide ATC with a number of skilled personnel in specific roles. The proximity of the airfield to the military practice Danger Areas to the east and southeast makes Leuchars Station airfield an attractive, and possibly the only military aerodrome option, for aircraft diverting in following an inflight emergency or due to inclement weather conditions at their home base.

47 In its response to Scoping the MOD (DIO) objected[9] to the Development as the Development Area WTGs will be detectable and cause unacceptable interference to the Leuchars Station ATC PSR.

RRH Brizlee Wood and RRH Buchan ADRs

48 The MOD through the Air Surveillance and Control Systems (ASACS Force) is responsible for compiling a Recognised Air Picture (RAP) to monitor the airspace in and around the UK in order to launch a response to any potential airborne threat. This is achieved through the utilisation of a network of long-range ADR, some of which are located along the east coast of

[8] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/453017/20150807-FOI2015_06386_radar_replacement_publish-O.pdf [Accessed on 25/4/2018]

[9] Please note that the applicant is aware that the MOD (DIO) technically cannot object to the project until the formal application has being submitted.

the UK and include RRH Brizlee Wood and RRH Buchan ADRs. Any identified effect of WTGs on the ASACS radars that serve the airspace above the Development Area would reduce the capability of aircraft detection by the ASACS Force. ASACS radar resources are also used in support of military training and exercises on an almost daily basis. Within the lateral and vertical confines of TRAs, aircraft completing air combat training, high energy manoeuvres and supersonic flight can be provided a radar service utilising data from ADR systems.

49 ADR are considered to have an operational range in excess of 200 NM, although due to the sensitivity of this information to national security, actual operational capabilities of the radar systems are not known. RRH Brizlee Wood is located on Alnwick Moor, Northumberland approximately 63.3 NM (117.3 km) from the southern edge of the Development Area. RRH Buchan ADR is located near Peterhead, Scotland approximately 53.2 NM (98.5 km) from the northern edge of the Development Area.

17.7.3 Other Receptors

50 ICOL has considered the potential for impacts on a number of other receptors upon which it has been concluded the potential for impacts are unlikely. As such, they are scoped out of the impact assessment and only detailed in the baseline for completeness.

Helicopters Operating in Support of Offshore Oil and Gas Operations

51 Offshore oil and gas platforms in the Northern North Sea are supported by a number of helicopter operators who ferry crews and supplies to and from the mainland. The routes taken by helicopters on such flights may follow HMRs which form a network of corridors between offshore platforms and their operating base. HMRs, which are concentrated in the northern North Sea, east and northeast of Aberdeen Airport (in excess of 40 NM from the Development Area), are all situated outside of CAA recommended consultation distances which states that there should be no obstacles within 2 NM either side of a HMR.

Physical Obstruction to Search and Rescue (SAR) Flight Operations

52 The physical presence of the WTGs within the Development Area has the potential to represent a collision risk to airborne SAR operations, operating in the vicinity of the Development Area. The SAR force provides 24-hour aeronautical SAR cover in the UK. The SAR role is operated from ten strategically located bases across the UK. The bases are positioned close to SAR hotspots so that aircraft can provide support as quickly and efficiently as possible. Bristow helicopters were awarded the contract to provide SAR helicopter services for the UK in 2013.

53 The development of the Inch Cape Wind Farm will lead to a change of the operating environment should an airborne SAR operation be required within or close to the proposed development. When on an operational mission, SAR aircraft are not constrained by the normal rules of the air, and operate in accordance with their (Bristow) AOC. This allows SAR pilots total flexibility to manoeuvre using best judgement thus making them highly adaptable to the environment and conditions in which they are operating.

54 An ERCoP will be in place for the construction, operation and decommissioning phases of the proposed development. The ERCoP is completed initially in discussion between the developer and the MCA, SAR and Navigation Safety Branches. Detailed completion of the plan will then be in cooperation with the Maritime Rescue Co-ordination Centre (MRCC), responsible for maritime emergency response. The ERCoP must then be submitted to and approved by the MCA. The ERCoP will detail specific marking and lighting of the WTGs. The SAR helicopter bases will be supplied with an accurate chart of the Development Area WTG Global Positioning System (GPS) positions. The requirements for the lighting of WTGs are contained in Article 223 of *CAP 393* (CAA, 2018).

Physical Obstruction to Military Low Flying Activities

55 Military low flying takes place within the United Kingdom Low Flying System (UKLFS) which utilises all Class G airspace below 2,000 ft above ground level (agl) or above mean sea level (amsl), with the exception of certain specified designated areas. A range of embedded mitigation measures detailed in *Section 17.5.2*, relating to lighting, notification, promulgation and the inclusion of the Development on relevant aviation material will reduce impact to low flying aircraft operating in the vicinity of the Development Area. When operating in the Class G airspace above the Development Area pilots are ultimately responsible for seeing and avoiding other aircraft and obstructions. Operations will be conducted in VFR conditions which dictate a minimum in-flight visibility of 5 km (approximately 3 NM). In the response to scoping, the MOD (DIO) have not raised concerns with regard to low flying other than to request aviation lighting of WTGs in accordance with the *Air Navigation Order* (CAA, 2018). The MOD (DIO) may request aviation lighting to be fitted to structures featured in the Development (such as OSPs) where there is no mandatory requirement for installation, to mitigate any effect to military low flying aircraft operating over the sea.

17.7.4 Summary of the Baseline

56 This section has identified the aviation and radar receptors which had the potential to interact with the Development and associated works within the Development Area. Those with no identifiable interaction are not considered further in the assessment. The following Table 17.4 summarises the receptors which are taken forward to the impact assessment.

Table 17.4: Summary of the receptors taken forward to the assessment

Receptor Group	Receptors	Impact Assessment
ATC Radar	Aberdeen Airport PSR	No
	Edinburgh Airport PSR	No
	Leuchars Station PSR	Yes
	NATS Perwinnes and Allanshill PSR	No
PAR	Leuchars Station PAR	No
ADR	RRH Brizlee Wood ADR	Yes
	RRH Buchan ADR	Yes
Physical Obstruction to Aviation	Helicopters Supporting Offshore Oil and Gas Operations	No
	SAR Flight Operations	No
	Military Low Flying	No

17.7.5 Baseline without the Development

57 In the future, it is anticipated that the airspace above the Development Area would continue to be utilised by those aviation stakeholders described earlier and the baseline would remain as detailed.

17.8 Assessment Methodology

17.8.1 Sensitivity of Receptor

58 The sensitivity of a receptor is subjective in aviation terms and therefore difficult to quantify. Whereas an ADR system would be an obvious high value and high sensitivity receptor (due to its role in UK national security), the sensitivity of a local aerodrome can also often be rated high if the body making the determination considers the receptor to be a significant asset to the local area. The identified aviation receptors in this assessment are considered to have a high sensitivity to effects, given their safety critical function. Table 17.5 below provides the criteria for classifying the sensitivity of the receptor.

Table 17.5: Criteria for classifying sensitivity of receptor

Sensitivity	Definition
High	Receptor provides a service, which is of major importance to the local, regional or national economy, and/or the receptor is generally vulnerable to impacts that may arise from the Development, and/or recoverability is slow and/or costly.
Medium	Receptor provides a service, which is of moderate value to the local, regional or national economy, and/or the receptor is somewhat vulnerable to impacts that may arise from the Development, and/or has moderate to high levels of recoverability.
Low	Receptor provides a service, which is of minor value to the local, regional or national economy, and/or the receptor is not generally vulnerable to impacts that may arise from the Development, and/or has high recoverability.
Negligible	Receptor provides a service, which is of negligible value to the local, regional or national economy, and/or the receptor is not vulnerable to impacts that may arise from the Development, and/or has high recoverability.

17.8.2 Magnitude of Impact

59 The magnitude criterion of the potential impacts on aviation and radar receptors is assessed using the method and terminology given in Table 17.6 below.

Table 17.6: Classification of magnitude of impact

Magnitude	Definition
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.
Medium	Loss of resource, but not adversely affecting integrity of resource; partial loss of damage to key characteristics, features or elements.

Magnitude	Definition
Low	Some measurable change in attributes, quality or vulnerability, minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements.
No Change	No loss or alteration or characteristics, features or elements; no observable impact in either direction.

17.8.3 Method for Assigning Significance of Effect

60 In assessing the significance of the effects from the Development, it was necessary to identify whether or not there would be an impact on aviation operations. The aviation industry is highly regulated and subject to numerous mandatory standards, checks and safety requirements, many international in nature and requiring the issue of operating licences.

61 For the purpose of the aviation assessment any effect that is considered major or moderate is considered significant, which represents a slight deviation from the standard methodology presented in *Chapter 4: Process and Methodology*, whereby moderate is classed as non-significant. Any effect that is minor or below is not considered significant. Table 17.7 below provides the significance of potential effects. With the definitions of what this significance means in terms of aviation presented in Table 17.8 below.

Table 17.7: Significance of potential effects

		Magnitude of Impact			
		High	**Medium**	**Low**	**Negligible**
Sensitivity	**High**	Major	Major	Moderate	Minor
	Medium	Major	Moderate	Minor	Negligible
	Low	Moderate	Minor	Negligible	Negligible
	Negligible	Minor	Negligible	Negligible	Negligible

Table 17.8: Definitions applied to the Significance

Significance	Definition
Major	Receptor unable to continue safe operations or safe provision of air navigation services (radar) or effective air defence surveillance in the presence of wind turbines. Technical or operational mitigation of the impact is required.
Moderate	Receptor able to continue safe operations but with some restrictions or non-standard mitigation measures in place.
Minor	The proposed project would have little impact on the aviation stakeholder or the level of impact would be acceptable to the aviation stakeholder.
Negligible/ No Change	The proposed project would have no impact on the aviation stakeholder and would be acceptable to the aviation stakeholder.

62 In the instance where impacts are significant then ICOL will work with the relevant stakeholders to find appropriate mitigation solutions. These solutions should be agreed between ICOL and the Scottish Ministers in consultation with the infrastructure owner/operator.

17.9 Impact Assessment - Development Area

17.9.1 Introduction

63 The impacts resulting from the operation of the Inch Cape Wind Farm have been assessed on aviation receptors identified within the maximum operating range of the radar system identified and as defined under *Section 17.2* and described under *Section 17.6*. A discussion of the likely significance of each effect resulting from each impact is presented below.

17.9.2 Effects of the Operational Phase

Leuchars Station PSR

64 Radar propagation modelling, also known as radar LOS, between the Development Area and the Leuchars Station PSR was completed for the Inch Cape 2013 Environmental Statement (ES) at a blade tip height of 215 m above LAT the results of which indicated that the Leuchars Station PSR would theoretically detect the WTGs within the Development Area. As WTGs in the Development design envelope are taller than those in the Inch Cape 2013 ES there was no requirement to repeat the radar propagation modelling. The MOD (DIO) has confirmed that WTGs within the Development Area will be detectable by, and will cause unacceptable interference to the ATC PSR at Leuchars Station. This direct, permanent effect of clutter as generated by WTGs within the Development Area may hamper the radar operator's ability to distinguish actual aircraft returns from those created by the WTGs, and therefore degrade the safety and efficiency of the ATS being provided.

65 In the vicinity of the Development Area, aircraft under the control of Leuchars Station ATC will be operating in Class G airspace and may request a Deconfliction Service (DS). DS is the highest level of radar service provided to pilots in Class G uncontrolled airspace: essentially the controller must provide instructions to the pilot to ensure the aircraft remains adequately separated from 'unknown traffic' or clutter. For a pilot requesting a DS, on a flight path within five NM of the unmitigated WTGs, the air traffic controller will likely be unable to provide the five NM separation (between clutter created by the WTGs and an aircraft) required for the safe provision of an ATS without turning the aircraft away from the clutter.

66 The sensitivity of the receptor is high. The magnitude of impacts is also assessed as high. Consequently, the significance of effect has been assessed to be **major** which therefore is significant for the purposes of this assessment.

Remote Radar Head (RRH) Brizlee Wood and RRH Buchan Air Defence Radar (ADR)

67 The original EIA radar LOS assessment at a WTG blade tip height of 215 m above LAT provided mixed results, whilst the RRH Buchan ADR would theoretically detect WTGs placed in the Development Area; the RRH Brizlee Wood ADR would theoretically detect WTGs in the south eastern part of the Development Area. Due to the increase in blade tip height to 291 m above LAT increased detectability of WTGs to the ADR systems was possible however, due to the fact that the exact operating parameters of the RRH Buchan and RRH Brizlee Wood ADRs are not known the radar LOS was not rerun. However, the results of assessment by the MOD (DIO) provided confirmation that both the ADR systems would detect the WTGs at the increased blade tip height creating unacceptable interference to both the ADR systems.

68 The MOD (DIO) have objected to the Development as the Development Area WTGs will be detectable to both the RRH Buchan and RRH Brizlee Wood ADR systems and are predicted to cause unacceptable interference to the radar systems exceeding their "cumulative effect" thresholds. Radar detectable WTGs in radar coverage areas of ASACS ADRs could potentially shield the radar from genuine aircraft targets and/or hide genuine aircraft targets, in displayed clutter, from the air defence controller. Furthermore, a degree of 'shadowing' could be created behind detectable WTGs. These direct and permanent effects would affect the air defence controller's ability to detect an airborne threat and to provide a safe service to aircraft in support of air defence activities. Consequently, any identified effect of WTGs on the ASACS ADRs that serve the airspace above the Development Area would potentially reduce the capability of the ASACS Force.

69 The sensitivity of the receptor is high. The magnitude of impacts is assessed as high. Consequently, the significance of effect has been assessed to be **major** which therefore is significant for the purposes of this assessment.

17.10 Cumulative Impact Assessment (CIA)

17.10.1 Introduction

70 In assessing the potential cumulative impact(s) for the Development Area, it is important to bear in mind that for some projects, predominantly those 'proposed' or identified in development plans etc. may or may not actually be taken forward. There is thus a need to build in some consideration of certainty (or uncertainty) with respect to the potential impacts which might arise from such proposals. For example, relevant projects/plans that are already under construction are likely to contribute to cumulative impact with the Wind Farm (providing effects or spatial pathways exist), whereas projects/plans not yet approved or not yet submitted are less certain to contribute to such an impact, as some may not achieve approval or may not ultimately be built due to other factors. In this context, the term 'projects' is considered to refer to any project with comparable effects and is not limited to offshore wind projects.

71 The full list of projects considered within the CIA are listed below:

- Worst-case scenario of the NnG Wind Farm (consented 2014) or as per the 2017 Scoping Report;
- Worst-case scenario for the Seagreen Alpha and Bravo Wind Farm (consented 2014) or Seagreen 2017 Scoping Report (see paragraph below);
- Hywind Scotland Park;
- Blyth Offshore Demonstrator Wind Farm (Phase 1 to 3);
- Beatrice Offshore Wind Farm;
- Moray Offshore Renewables Ltd (MORL) Eastern Development Area or MORL Eastern Development Area (Alternative Design) Scoping Report;
- Moray West Offshore Wind Farm;
- European Offshore Wind Deployment Centre;
- Kincardine Floating Offshore Wind Farm;
- Forthwind Offshore Wind Farm Phase 1 and 2; and
- Offshore Renewable Energy Catapult Levenmouth.

72 As the baseline and status for cumulative projects are ever evolving a cut-off date of November 2017 was used to allow the EIA and CIA to progress. ICOL appreciates and acknowledges that the status of some of these projects may have changed since this date and note however that the individual status of projects has not been updated in the EIA Report due to the time restrictions associated with the assessment.

73 It is assumed that those offshore wind farms, that have been consented, or are operational, have (or will have) technical mitigation in place (if required), which will mitigate effects to any relevant radar systems.

74 In assessing the cumulative impacts for the Inch Cape Wind Farm, the worst-case scenario with respect to the consented design envelopes for the NnG and Seagreen offshore wind farm projects has been considered. A second scenario which incorporates the design envelopes for the proposed NnG and Seagreen projects as detailed in the Scoping Reports submitted to MS-LOT in 2017 is considered to be the likely worst-case scenario as any increase in WTG blade tip height above LAT, is likely to increase detectability to regional radar systems.

17.10.2 Operational Phase Impacts

Leuchars Station PSR

75 The Leuchars Station PSR has a Declared Operational Coverage (DOC) of 40 NM. Therefore, the potential for cumulative effect is limited to those developments, within 40 NM of the PSR, which unmitigated could create a cumulative impact. The parameters which make up the worst-case scenario are those which would cause the greatest cumulative impact on the Leuchars PSR i.e. largest number of tallest WTGs within radar LOS.

76 Radar LOS indicates that the Development Area will be theoretically detectable by the Leuchars Station PSR. It is expected that due to lack of intervening terrain that the NnG and Seagreen Phase 2 wind farms will also be detectable by the radar. As per the Development alone, increased radar clutter may hamper the controllers' ability to distinguish actual aircraft returns from those created by the wind farms. Radar detectability of the wind farms would create, in effect, a larger area within which significant clutter can be expected from detectable WTGs. It is evident that, as larger areas are covered and the extent of the clutter increases, the availability of uncluttered airspace reduces.

77 The sensitivity of the receptor is high. The magnitude of impacts is assessed as high. Consequently, the cumulative impact has been assessed to be **major** which therefore is a significant effect for the purposes of this assessment.

RRH Brizlee Wood and RRH Buchan ADRs

78 The RRH Brizlee Wood and Buchan ADRs are thought to have an operational range of 200 NM although due to the sensitivity of the role completed by the radar systems, exact operating parameters are not known. Other unmitigated developments which are within radar LOS to the radar systems within operational range could create a cumulative impact. The MOD (DIO) response to scoping indicates that the quantity of the WTGs detectable to the ADRs of the proposed project alone will exceed the MOD's cumulative effect threshold. It is implicit that the more sites that are proposed or built, the greater the impact on the provision of radar services. In effect, a larger area within which significant clutter can be expected will be created from unmitigated developments.

79 The sensitivity of the receptor is high. The magnitude of impacts is assessed as high. Consequently, the cumulative impact has been assessed to be **major** which therefore is a significant effect for the purposes of this assessment.

17.11 Impact Interactions

80 The potential for individual impacts from the Development alone and from other projects to interact and create new, or more significant or greater long-term effect has been reviewed. No such interactions have been identified.

17.12 Additional Mitigation

Leuchars Station PSR

81 The Leuchars Station PSR will theoretically detect the Development Area WTGs; this detection will result in an unacceptable impact to the radar system and the provision of an ATS and will require the application of an agreed mitigation strategy.

82 The airspace regulator, the CAA, has approved an Airspace Change Proposal for the introduction of a TMZ over the Development Area in relation to the Inch Cape 2014 consented parameters. The Airspace Change would occur in two stages; stage one includes radar blanking of the Leuchars Station PSR; stage two is the introduction of the TMZ covering the Development Area.

83 The carriage and operation of transponder equipment in the aircraft is mandatory whilst flying within a TMZ, this enables a controller to track the aircraft using the data from its Secondary Surveillance Radar (SSR) transponder and provide a SSR Alone radar service. As identified in the Leuchars SA NnG and Inch Cape Offshore Wind Farm TMZ (MOD, 2017), the TMZ airspace will allow Leuchars ATC to continue to provide safe and expeditious air traffic services within its area of responsibility when the offshore wind turbines are operational, using SSR only.

84 The Hazard/Risk Owner (Station Commander RAF Lossiemouth) has noted contentment with the proposals for the Leuchars TMZ and that the risk is Tolerable and 'As Low As Reasonably Practicable' (ALARP). Furthermore, the Hazard/Risk Owner notes that *"…aircraft would have to enter the zones unseen and that they are over the sea making undetected entry less likely. This is to be reviewed on usual timescales or with the introduction of any Project Marshall changes".* Therefore, ICOL consider the TMZ as an enduring solution, removing any impact created by the Wind Farm; however, the MOD considers that this option as an interim solution. Therefore, if an improved, enduring PSR technical solution is identified, tested and implemented, ICOL consider that this solution must be cost effective, time bound and subject to the usual MOD approach to mitigation (ALARP principle).

85 With the agreed two stage TMZ mitigation in place, the sensitivity of the receptor is high, and the magnitude of impact is negligible; therefore, the residual impact would be of minor significance, which is not significant effect for the purposes of this assessment.

86 With regard to cumulative effects, it is understood that a TMZ has also been approved for the NnG Wind Farm. It is assumed that such an arrangement will also be agreed for Seagreen Phase 1 Offshore Wind Farm if required.

Enduring Technical Solution

87 Previous technical mitigation solutions accepted by the MOD for radar impacts have included 'in-fill' solutions. An in-fill solution involves the removal of PSR data where radar clutter is anticipated in the vicinity of the WTGs, and replacing it with data from an alternate radar source which is not affected by radar clutter. The MOD has previously stated a requirement for 'seamless integration' to be an integral factor in the acceptability of any technical in-fill mitigation solution for ATC radar. A number of emerging technologies may potentially offer acceptable technical mitigation for ATC radar impacts and have been considered by some airports across the UK in wind farm mitigation procurement activities. As noted above, should an improved technical solution be identified, tested and implemented by the MOD, ICOL consider that this solution must follow the ALARP principle.

RRH Brizlee Wood and Buchan ADRs

88 The RRH Brizlee Wood and RRH Buchan ADR systems will theoretically detect WTGs of 291 m above LAT blade tips within the Development Area. The MOD (DIO) have stated in their response to scoping that several of the WTGs within the Development Area are within radar LOS to both RRH Brizlee Wood and RRH Buchan ADR systems.

89 RRH Brizlee Wood and RRH Buchan (which have been upgraded to TPS-77 radar standard) have an inherent resilience, utilising hardware and software, to WTG induced clutter through the use of pulse Doppler processing. However, where the inherent radar performance is not considered satisfactory for ADR purposes, the TPS-77 has an enhanced signal processing capability, which enables the implementation of a Non-Automatic Initiation Zone (NAIZ).

90 A NAIZ prevents the radar from automatically creating tracks from any returns that originate within the lateral confines of the NAIZ. In creating a NAIZ around a wind farm, none of the WTG radar returns will be processed, thereby significantly reducing the possibility of unwanted tracks. Mature tracks, which have been formed from returns originating outside the NAIZ (an aircraft transiting through the NAIZ) will still be tracked and updated. If it is concluded that the addition of NAIZ to the TPS-77 at RRH Brizlee Wood and RRH Buchan is not suitable, a technical solution/mitigation will be agreed with the MOD prior to construction.

91 It is likely that the MOD (DIO) would need to consider the cumulative effects of multiple wind farms in the region as there might be limitations on the signal processing capability of the ADR TPS-77 radar system to implement a technical solution for other offshore wind farms within the area (consented and in development) which are also detectable by the RRH Brizlee Wood and RRH Buchan ADRs. If this mitigation solution is not acceptable an alternative technical mitigation solution will be agreed with the MOD before construction.

92 It is the desire of ICOL that a collaborative approach to mitigating the effects of the Development with adjacent developments is undertaken to ensure an acceptable effect on the Leuchars ATC PSR and Brizlee Wood and Buchan ADRs. ICOL will continue to work with

other developers and the MOD to ensure that opportunities are identified, and where possible, mitigation proposals are aligned.

93 With mitigation in place, the sensitivity of the receptor is high and the magnitude of impact is negligible; therefore, the impact would be of minor significance, which is not significant effect for the purposes of this assessment.

17.13 Conclusion and Residual Effects

17.13.1 Development Area

94 In the absence of mitigation, significant effects on the following identified receptors will occur:

- Leuchars Station PSR;
- RRH Brizlee Wood ADR; and
- RRH Buchan ADR.

95 When suitable technological mitigation is procured and in operation, there will be a minor residual effect on the Leuchars Station PSR and the RRH Brizlee Wood and RRH Buchan ADR systems.

Table 17.9: Summary of effects and mitigation

Impact	Receptor	Pre-mitigation Effect	Mitigation	Post-Mitigation Effect
O&M				
ATC Radar	Leuchars Station PSR	Significant	Mitigation in the form of the regulator approved TMZ and associated radar blanking will remove the WTG radar returns from the Leuchars Station PSR, or if an enduring technical solution is identified (which has to be cost effective, time bound and subject to the usual MOD approach to mitigation (ALARP principle)) or should the ATC PSR no longer be operational, no mitigation will be required.	Not Significant
ADR	RRH Brizlee Wood and RRH Buchan ADRs	Significant	Subject to stakeholder approval technical mitigation will most likely be in the form of modifications to the Brizlee Wood and Buchan ADRs in the form of a NAIZ which will	Not Significant

Impact	Receptor	Pre-mitigation Effect	Mitigation	Post-Mitigation Effect
			remove impact to the Brizlee Wood and Buchan ADRs. If this mitigation solution is not acceptable a technical mitigation solution will be agreed with the MOD before construction.	

17.13.2 Cumulative Impacts

96 The conclusions for the Development with other projects are the same as the Development Area in isolation.

References

Civil Aviation Authority, (2014). Civil Aviation Publication 168 *Licensing of Aerodromes* .

Civil Aviation Authority, (2014a). Civil Aviation Publication 670 *Air Traffic Services Safety Requirements*.

Civil Aviation Authority, (2016). Civil Aviation Publication 764 *Policy and Guidelines on Wind Turbines*.

Civil Aviation Authority, (2016a). Civil Aviation Publication 437 *Standards for Offshore Helicopter Landing Areas*.

Civil Aviation Authority, (2018). Civil Aviation Publication 393 *The Air Navigation Order 2016 and Regulations.*

Military Aviation Authority, (2014). *Manual of Aerodrome Design and Safeguarding*.

Maritime and Coastguard Agency, (2016). MGN 543 *Safety of Navigation Offshore Renewable Energy Installations.*

Ministry of Defence, (2015). Response under the Freedom of Information Act.

Ministry of Defence (2017). Leuchars Safety Assessment Transponder Mandatory Zone.

Ministry of Defence (2018). Military Aeronautical Information Publication.

NATS. (2018). Civil Aviation Publication 032 *UK Integrated Aeronautical Information Package*.

Scottish Government (2014). Scottish Planning Policy. Available at: http://www.gov.scot/publications/2014/06/5823. [Accessed 25/04/2018

Contents

List of Tables

Abbreviations and Acronyms

ADR	Air Defence Radar
ATC	Air Traffic Control
CAA	Civil Aviation Authority
FoF	Firth of Forth
GDL	Gardens and Designated Landscape
HRA	Habitats Regulations Appraisal
ICOL	Inch Cape Offshore Limited
MoD	Ministry of Defence
NCN	National Cycle Network
O&M	Operation and Maintenance
OfTW	Offshore Transmission Works
OSP	Offshore Substation Platform
PSR	Primary Surveillance Radar
SLVIA	Seascape Landscape and Visual Impact Assessment
SPA	Special Protection Area
WTG	Wind Turbine Generator

18 Summary of Effects

18.1 Introduction

1 This chapter presents a summary of the key findings of the assessment of the environmental effects of the Wind Farm and Offshore Transmission Works (OfTW) (the Development), alone and cumulatively with other relevant projects. The predicted residual environmental impacts of the proposals are reported for each receptor assessed, taking account of the potential for significant positive and negative environmental effects, and mitigation which has been committed to by Inch Cape Offshore Limited (ICOL). In terms of mitigation, the embedded mitigation and proposed commitment to the purpose of the relevant Inch Cape 2014 consent conditions for each topic can be found in each chapter (9 to 17).

2 As ICOL requires a separate consent under the *Town and Country Planning (Scotland) Act 1997* (as amended) for the Onshore Transmission Works (OnTW), a separate application was made to East Lothian Council for Planning Permission in Principle (PPP). An Environmental Impact Assessment (EIA) was submitted as part of the application in February 2018. At the time of writing the application this has not been determined.

3 As part of the assessment for the Development, and as documented in *Chapters 9 to 17* of this EIA report, any relevant impacts associated with the OnTW have been taken into consideration during this assessment (Development and OnTW impact assessment).

4 For more detailed information on the OnTW impacts, the EIA for this can be found on ICOL's website[1]

5 This chapter also includes all of the mitigation measures taken into account during the assessment of each technical chapter (Chapters 9 to 17). This information can be found in section 18.4 below.

18.1.1 Inch Cape Offshore Limited Offshore Environmental Statement (ES) 2013

6 A full and competent EIA was carried out and submitted to Marine Scotland Licensing Operations Team (MS-LOT) in 2013. In 2014 ICOL received consent for a scheme that was reduced in turbine numbers from what was assessed in the EIA. The reason for these changes related only to potential impacts on ornithology. Whilst it can be seen below that the EIA in 2013 for ornithology assessed non-significant effects, RSPB and SNH raised concerns of cumulative effects with other projects thus resulting in the reduced turbine numbers.

7 As the reduction in turbine numbers related only to ornithology the impacts assessed in the 2013 Inch Cape ES have been presented for all receptors to contextualise the impacts associated with the consented scheme with those associated with this Development, a

[1] At the time of writing the Onshore Substation EIA can be found here: http://www.inchcapewind.com/publications/Onshore_Environmental_Statement/introduction2018 [Accessed: 10/08/18]

summary of the differences have also been provided. For ornithology, the impact assessment outcomes for the 2013 Inch Cape ES have been provided for completeness. For ornithology, due to the reduction in turbine numbers, it is also appropriate to compare the outcomes of the Appropriate Assessment (AA) carried out in 2014 by Marine Scotland as the Competent Authority with the outcomes of the Habitat Regulations Appraisal (HRA) presented in the HRA Report. As for the HRA report associated with this new application, the 2014 AA Marine Scotland considered the potential for adverse effects to site integrity for the following four SPAs – Buchan Ness to Collieston Coast, Fowlsheugh, Forth Islands and St Abb's Head to Fast Castle and reached a conclusion of no adverse effects for each of these four SPAs, for both the Project-alone (or Development-alone in the case of the HRA report) and in-combination scenarios that were considered.

8 The following topics were assessed in the 2013 ES and were scoped out of this EIA for the Development, as the design changes proposed in the new application, coupled with no material changes to the baseline were unlikely to change the impact assessment, which were assessed as not significant. Therefore, the information presented for these topics has not been reproduced for the purposes of this EIA:

- Metocean and Coastal Processes;
- Underwater Noise; and
- Benthic Ecology.

18.2 Development Area- Summary of Effects

9 Table 18.1 below shows impacts scoped in to this EIA Report and assessed in relation to the Development Area unless where otherwise stated.

10 For reference the residual significance of impacts as concluded in the Inch Cape 2013 ES are presented.

11 For each impact, a summary of the differences between that assessed in 2013 and for this EIA report has been provided by the relevant expert professional in each field.

Table 18.1: Summary of Effects – Development Area

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
Natural Fish - *Construction (and Decommissioning)*				
Barrier effects disturbance or physical injury associated with	Hearing specialists	(Mortality and injury) = Minor (not significant) (Behavioural responses)	Not significant (Hearing Specialists)	Despite the increase in hammer energy between the design envelope proposed in the 2013 ES and the design envelope in this

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
construction noise (piling) –		Herring = Moderate (not significant) Cod & sprat = Minor/Moderate (not significant)		EIA report the impacts on hearing specialist fishes remain non-significant. The impact has been assessed on its own merits using a different noise model to that used in the original EIA report. Due to the inherent differences between the original and new model parameters, model outputs are not comparable.
Marine Mammals - *Construction (and Decommissioning)*				
Disturbance from increased noise from geophysical survey systems	All marine mammals	Not assessed	Not significant (Minor)	Impacts from geophysical survey systems were not assessed in the Inch Cape 2013 ES. However, the sound emitted by some systems has the potential to induce the onset of PTS if source levels are high and disturb marine mammals if the frequency/ frequencies used are audible to them. An EPS Risk Assessment will be conducted to determine whether an EPS licence will be required (in relation to the potential for disturbance) and current best practice mitigation will be used to minimise the risk of injury.

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
Displacement/ PTS from piling	All marine mammals	Not significant (Minor-Major in the medium term, Minor in the long term)	Not significant (Minor)	The residual effects of PTS and displacement from piling at the Development are predicted to be of minor significance and less than those which were assessed as not significant in the 2013 Inch Cape ES (ICOL, 2013) and deemed acceptable for the 2014 Inch Cape Consent. Displacement from pile driving at Inch Cape is unlikely to affect the size or growth of the bottlenose dolphin population off the east coast of Scotland. While displacement from pile driving/ blasting at the cumulative projects may affect the size and growth of the population, the outputs from iPCoD suggest that the size of this effect is likely to be small. The precision of estimates from the current monitoring programme for this population (and other similar populations) suggest that an effect of this size is unlikely to be detectable.
Ornithology - *Operation and Maintenance (O&M) – Wind Farm and Export Cable Corridor (to Near Shore)*				
Displacement and barrier effects	Kittiwake (regional breeding population only)	**Development Alone** Not Significant	**Development Alone** Not Significant	The impacts of displacement and barrier effects remain not significant although the

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
		Negligible **Cumulative** Not Significant Minor/moderate	Minor **Cumulative** Not Significant Moderate (as assessed together with collision impacts)	significance level is now classed as minor for the Development alone and moderate for the cumulative (but noting that the cumulative assessment is for the combined effects of displacement/barrier effects with collisions). Changes to the advised approaches for assessing impacts from displacement and barrier effects and in the reference population sizes against which impacts are assessed mean that direct comparisons between the outcome of the assessments for the 2013 ES and this EIA report are difficult.
	Guillemot (regional breeding population only)	**Development Alone** Not Significant Minor **Cumulative** Not Significant Minor/moderate	**Development Alone** Not Significant Minor **Cumulative** Not Significant Minor/moderate	The impacts of displacement and barrier effects remain not significant, with the significance level classed as minor for Development alone and minor/moderate for cumulative (the same as for the assessment in the 2013 ES). Changes to the advised approaches for assessing impacts from displacement and barrier effects and in the reference population sizes against which impacts are assessed mean that direct comparisons between the outcome of the

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
				assessments for the 2013 ES and this EIA report are difficult.
	Razorbill (regional breeding population only)	**Development Alone** Not Significant Minor **Cumulative** Not Significant Minor/moderate	**Development Alone** Not Significant Minor **Cumulative** Not Significant Minor/moderate	The impacts of displacement and barrier effects remain not significant, with the significance level classed as minor for Development alone and minor/moderate for cumulative (the same as for the assessment in the 2013 ES). Changes to the advised approaches for assessing impacts from displacement and barrier effects and in the reference population sizes against which impacts are assessed mean that direct comparisons between the outcome of the assessments for the 2013 ES and this EIA report are difficult.
	Puffin (regional breeding population only)	**Development Alone** Not Significant Minor **Cumulative** Not Significant Minor/moderate	**Development Alone** Not Significant Minor **Cumulative** Not Significant Minor	The impacts of displacement and barrier effects remain not significant, with the significance level now classed as minor (for both Development alone and cumulative). Changes to the advised approaches for assessing impacts from displacement and barrier effects and in the reference population sizes against which impacts are assessed mean that direct comparisons between

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
				the outcome of the assessments for the 2013 ES and this EIA report are difficult.
Collision risk impacts	Gannet (regional breeding population only)	**Development Alone** Not Significant Minor **Cumulative** Not Significant Minor	**Development Alone** Not Significant Minor **Cumulative** Not Significant Moderate	The impacts of collisions remain not significant although the significance level is now classed as minor for the Development alone and moderate for cumulative (although note that the design envelope in this EIA report is associated with a lower collision impact than that proposed in the 2013 ES in absolute terms). Changes to the advised approaches for estimating and assessing impacts from collisions and in the reference population sizes against which impacts are assessed mean that direct comparisons between the outcome of the assessments for the 2013 ES and this EIA report are difficult.
	Kittiwake (regional breeding population only)	**Development Alone** Not Significant Minor **Cumulative** Significant Major	**Development Alone** Not Significant Minor **Cumulative** Not Significant Moderate (as assessed together with displacement /	The impacts of collisions remain not significant although the significance level is now classed as minor for the Development alone and moderate for the cumulative (but noting that the cumulative assessment is for the combined effects of displacement/barrier effects with collisions). The conclusion of a

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
			barrier effect impacts)	non-significant cumulative impact does, in part at least, reflect the reduction in collision impacts associated with the design envelope in this EIA report (compared to that proposed in the 2013 ES). However, changes to the advised approaches for estimating and assessing impacts from collisions and in the reference population sizes against which impacts are assessed mean that direct comparisons between the outcome of the assessments for the 2013 ES and this EIA report are difficult.
	Herring Gull (regional breeding population only)	**Development Alone** Not Significant N/A – not assessed due to small numbers recorded in flight during boat surveys **Cumulative** Not Significant N/A – due to lack of effects considered from the Development-alone	**Development Alone** Not Significant Negligible **Cumulative** Not Significant Negligible	The impacts of collisions remain not significant and are classed as negligible for both the Development alone and cumulatively. The design envelope in this EIA report is associated with a lower collision impact than that proposed in the 2013 ES. However, changes to the advised approaches for estimating and assessing impacts from collisions and in the reference population sizes against which impacts are assessed mean that direct comparisons between the outcome of the assessments for the

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
				2013 ES and this EIA report are difficult.
Seascape Landscape and Visual Impact Assessment (SLVIA) – *O & M*				
Physical presence of Wind Turbine Generators (WTGs), Met Masts and Offshore Substation Platforms (OSPs)may affect:	Key characteristics of seascape and/ or landscape character	Significant Negligible/minor – major Significant impacts predicted for: SA3: Cove Bay to Milton Ness (partial) SA4: Montrose Bay SA5: Long Craig SA6: Lunan Bay SA7: Lang Craig to the Deil's Head SA8: Arbroath to Monifieth SA12: St Andrews to Fife Ness SA13: East Neuk of Fife (partial) TAY13: Dispslope Farmland	Significant Negligible/minor - moderate/major -major Significant impacts predicted for: SA3: Cove Bay to Milton Ness (partial) SA4: Montrose Bay SA5: Long Craig SA6: Lunan Bay SA7: Lang Craig to the Deil's Head SA8: Arbroath to Monifieth SA11: St Andrews Bay SA12: St Andrews to Fife Ness SA13: East Neuk of Fife (partial) TAY12: Low Moorland Hills (partial) TAY13 Dipslope Farmland (partial) TAY15: Lowland Basis (partial)	Despite the increase in the height of the proposed turbines, the geographic extent of predicted significant seascape and landscape character effects is broadly similar to those assessed in the 2013 ES. Significant effects on seascape and landscape character are also predicted for SA11: St Andrews Bay, and parts of TAY12 and TAY15.

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
	Landscape designations	Significant Minor-moderate/major Significant impacts for: St Andrews to Fife Ness LLA Forth Islands LLA (Isle of May) Cambo Garden and Designated Landscape (GDL)	Significant Moderate-moderate/major Significant impacts for: South Aberdeenshire Coast SLA (partial) Forth Islands LLA (Isle of May) St Andrews to Fife Ness LLA St Andrews Links LLA Tentsmuir Coast LLA Cambo GDL	Despite the increase in the height of the proposed turbines, the geographic extent of predicted significant effects on designated landscape is broadly similar to those assessed in the 2013 ES. Significant effects are also predicted for parts of the South Aberdeenshire Coast LLA; as well the St Andrews Links and Tentsmuir Coast LLAs.
	Visual amenity	Significant Moderate/Major -Major for coastal settlements in Aberdeenshire, Angus and Fife and for inland settlements in Fife. Moderate/Major for A92, Fife Coastal Path and Edinburgh to Aberdeen train line and Major for National Cycle Network (NCN) Route 1.	Significant Moderate/Major -Major for coastal settlements in Aberdeenshire, Angus and Fife and for inland settlements in Fife. Moderate/Major for A92, Fife Coastal Path, NCN Route 1 and Edinburgh to Aberdeen train line.	Despite the increase in the height of the proposed turbines, the significant effects on visual amenity are broadly similar to those assessed in the 2013 ES.

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
Cultural Heritage - *O&M*				
Setting changes associated with the WTGs and OSPs	Bell Rock Lighthouse Signal Tower, Bell Rock Lighthouse, Tentsmuir Coastal Defences, St Andrews Cathedral and adjacent ecclesiastical remains, St Andrews Castle and Crail Airfield pillbox.	Not Significant Minor-Moderate	Not Significant Minor-Moderate	Setting effects upon the identified onshore receptors were assessed individually and cumulatively The potential indirect impacts upon the setting of the selected cultural heritage assets have resulted in no residual significance for the 2013 ES and the design envelope in this EIA report.
Commercial Fisheries – *Construction (and Decommissioning)*				
Temporary loss or restricted access to fishing grounds	Scallop fishery	Moderate/Major	Moderate	The significance of the impacts for the Development Area alone has reduced from 2013 to 2018 The significance of this impact for the Cumulative assessment has remained the same from 2013 to 2018
	Creel fishery	Minor/Moderate	Minor	The impact for this fishery for both the Development Area alone and the Cumulative assessments have reduced because there are less turbines and cables to install so

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
				reduced construction time and less infrastructure. Also Scotmap and the Creeling Study show less creeling on the site compared to the fishing maps identified by the fishermen.
	Squid fishery	Minor/Moderate	Minor	The significance of the impacts for the Development Area alone has reduced from 2013 to 2018 The impacts for the cumulative assessment have reduced because there are less turbines and cables to install. So reduced construction time and less infrastructure. Also Scotmap and VMS show less squid fishing on the site compared to the fishing maps identified by the fishermen.
Increased steaming times to fishing grounds	Scallop fishery	Minor	Minor	The significance of this impact for the Development Area alone has remained the same from 2013 to 2018. The significance of this impact for the Cumulative assessment has remained the same from 2013 to 2018.
	Creel fishery	Minor	Minor	The significance of this impact for the Development Area alone has remained the same from 2013 to 2018.

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
				The significance of this impact for the Cumulative assessment has remained the same from 2013 to 2018.
	Squid fishery	Minor	Minor	The significance of this impact for the Development Area alone has remained the same from 2013 to 2018. The significance of this impact for the Cumulative assessment has remained the same from 2013 to 2018.
Displacement of fishing activity	Scallop fishery	Moderate	Minor/Moderate	The significance of this impact for the Development Area alone has reduced because there is less fishing in the Development Area compared to 2013 (with scallop grounds moving to the north and north east as identified by Kafas *et al* (2013)). The reduction in infrastructure being installed also contributes to this reduction in impact. The significance of this impact for the Cumulative assessment has remained the same from 2013 to 2018.
	Creel fishery	Minor/Moderate	Minor/Moderate	The significance of this impact for the Development Area alone has reduced because there are less

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
				cables and less turbines to install. So reduced construction time and less infrastructure. Also Scotmap and the Creeling Study show less creeling on the site compared to the maps identified by the fishermen. The significance of this impact for the Cumulative assessment was not assessed in 2013. It was assigned a Minor/Moderate significance in 2018 because the majority of creel fishing is coastal with only less creeling within the developments.
	Squid fishery	Minor/Moderate	Minor/Moderate	The significance of this impact for the Development Alone has remained the same from 2013 to 2018. The significance of this impact for the Cumulative assessment is no worse than 2013.
Commercial Fisheries - *O&M*				
Complete loss or restricted access to fishing grounds	Scallop fishery	Moderate/Major	Moderate	The significance of this impact for the Development Alone has remained the same from 2013 to 2018. The significance of this impact for the Cumulative assessment has

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
				remained the same from 2013 to 2018.
	Creel fishing	Minor/Moderate	Minor/Moderate	The significance of this impact for the Development Alone has remained the same from 2013 to 2018. The significance of this impact for the Cumulative assessment was not assessed in 2013. It was assigned a Minor/Moderate significance in 2018 because the majority of creel fishing is coastal with less creeling within the developments.
	Squid fishery	Minor/Moderate	Minor/Moderate	The significance of this impact for the Development Alone has remained the same from 2013 to 2018. The significance of this impact for the Cumulative assessment is lower for 2018 because there is less infrastructure and also Scotmap and VMS (including Kafas et al 2013) would not support a Moderate significance
Increased steaming times to fishing grounds	Scallop fishery	Minor	Minor	The significance of this impact for the Development Alone has remained the same from 2013 to 2018. The significance of this impact for the

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
				Cumulative assessment has remained the same from 2013 to 2018.
	Creel fishing	Minor	Minor	The significance of this impact for the Development Alone has remained the same from 2013 to 2018. The significance of this impact for the Cumulative assessment has remained the same from 2013 to 2018.
	Squid fishery	Minor	Minor	The significance of this impact for the Development Alone has remained the same from 2013 to 2018. The significance of this impact for the Cumulative assessment has remained the same from 2013 to 2018.
Displacement of fishing activity into other areas	Scallop fishery	Moderate	Moderate	The significance of this impact for the Development Alone has remained the same from 2013 to 2018. The significance of this impact for the Cumulative assessment has remained the same from 2013 to 2018.
	Creel fishing	Minor/Moderate	Minor/Moderate	The significance of this impact for the Development Alone has remained the

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
				same from 2013 to 2018. The significance of the Cumulative assessment was not assessed in 2013. It was assessed in 2018 as Minor/Moderate because the majority of creel fishing is coastal with less creeling within the developments.
	Squid fishery	Minor/Moderate	Minor/Moderate	The significance of this impact for the Development Alone has remained the same from 2013 to 2018. The significance of this impact for the Cumulative assessment is lower in 2018 because there is less infrastructure and also Scotmap and VMS would not support a Moderate significance
Shipping and Navigation - *O&M*				
Increased vessel to vessel collision risk	Commercial vessels	Not Significant Minor	Not Significant Minor	Given the similar levels of commercial vessel traffic when compared to the data analysed in the 2013 ES and the lack of change to the Development Area boundary, the output of the collision modelling from the 2013 ES remains valid.
	Commercial fishing vessels	Not Significant Minor	Not Significant Minor	Although levels of fishing vessel traffic were greater in the winter period compared to the data

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
				analysed in the 2013 ES, when considering additional mitigation measures such as marine traffic coordination to manage project vessels there is considered to be no change to the residual effect.
	Recreational vessels	Not Significant Negligible/Minor	Not Significant Negligible/Minor	Given the similar levels of recreational vessel traffic when compared to the data analysed in the 2013 ES and the lack of change to the Development Area boundary, the conclusions from the 2013 ES remain valid.
Creation of vessel to structure allision risk	Commercial vessels	Not Significant Minor	Not Significant Minor	Given the similar levels of commercial vessel traffic when compared to the data analysed in the 2013 ES and the lack of change to the Development Area boundary, the output of the allision modelling from the 2013 ES remains valid.
	Commercial fishing vessels	Not Significant Minor	Not Significant Minor	Although levels of fishing vessel traffic were greater in the winter period compared to the data analysed in the 2013 ES, when considering additional mitigation measures such as ensuring mariners are aware of the Wind Farm structures so that they can passage plan effectively, there is considered to be no

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
				change to the residual effect.
	Recreational vessels	Not Significant Negligible/Minor	Not Significant Negligible/Minor	Given the similar levels of recreational vessel traffic when compared to the data analysed in the 2013 ES and the lack of change to the Development Area boundary, the conclusions from the 2013 ES remain valid.
Socioeconomics – *Construction of the Development*				
Construction Employment	Cromarty Firth ('Base' Scenario)	Not Significant Moderate (positive)	Significant Moderate/major significant (positive)	Despite the capacity used in the 2018 assessment being less than that of the 2013 assessment and the associated reduction in CAPEX, the residual significance for the Cromarty Firth is now Significant (positive) for the 'Base' scenario during construction. This is a result of supply chain capacity capabilities increasing within the Economic Study Area and particularly within the Cromarty Firth, meaning that more expenditure is spent within the area during the construction period, which could potentially result in an increase in the number of FTE jobs.
Construction Employment	Cromarty Firth ('High' Scenario)	Not Significant Moderate (positive)	Significant Major significant (positive)	Despite the capacity used in the 2018 assessment being less than that of the 2013 assessment and the associated reduction in

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
				CAPEX, the residual significance for the Cromarty Firth is now Significant (positive) for the 'High' scenario during construction. This is a result of supply chain capacity capabilities increasing within the Economic Study Area and particularly within the Cromarty Firth, meaning that more expenditure is spent within the area during the construction period, which could potentially result in an increase in the number of FTE jobs.
Construction Employment	Economic Study Area ('Base' and 'High' Scenario minus Cromarty Firth)	Not Significant Minor (positive)	Not Significant Negligible/minor non-significant positive)	Despite the capacity used in the 2018 assessment being less than that of the 2013 assessment and the reduction in the associated CAPEX, the residual significance for the Economic Study Area ('Base' and 'High' Scenario minus Cromarty Firth) remains Not Significant during construction. This is a result of supply chain capacity capabilities increasing within the Economic Study Area.
Socioeconomics – *O&M of the Development*				
O&M Employment	Economic Study Area ('Base' and 'High' Scenario)	Not Significant Minor (positive)	Not Significant Negligible/minor non-significant (positive)	Despite the capacity used in the 2018 assessment being less than that of the 2013 assessment and the reduction in the

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
				associated OPEX, the residual significance for the Economic Study Area ('Base' and 'High' Scenario) remains Not Significant during O&M. This is a result of supply chain capacity capabilities increasing within the Economic Study Area.
Aviation - ***O&M***				
Air Traffic Control (ATC) Radar	Leuchars Station Primary Surveillance Radar (PSR)	Not Significant	Not Significant	The expected impact to the Leuchars PSR has not changed from the 2013 assessment. The residual significance remains not significant during O&M as the Civil Aviation Authority (CAA) have approved an Airspace Change Proposal in the form of a Transponder Mandatory Zone (TMZ) and associated radar blanking which will remove WTG radar returns and impact to the Leuchars Station PSR.

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
Air Defence Radar (ADR)	Remote Radar Head (RRH) Brizlee Wood and RRH Buchan ADRs	Not Significant	Not Significant	Due to the increase in WTG blade tip height increased detectability of WTGs to the Brizlee Wood and Buchan ADR systems has been confirmed by the Ministry of Defence (MOD). The residual significance remains not significant as the ADRs have an enhanced signal processing capability which may enable specific mitigation to be implemented if this solution is not suitable, a technical solution will be agreed with the MOD prior to construction.

18.3 Offshore Export Cable Corridor - Summary of Effects

12 Table 18.2 below only shows impacts scoped in to this EIA Report in relation to the Offshore Export Cable Corridor.

13 For reference the residual significance of impacts as concluded in the Inch Cape 2013 ES are presented.

Table 18.2: Summary of Effects – Offshore Export Cable Corridor

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
Marine Mammals - *Construction (and Decommissioning)*				
Disturbance from increased noise from geophysical survey systems	All marine mammals	Not assessed	Not Significant (Minor)	Impacts from geophysical survey systems were not assessed in the Inch Cape 2013 ES. However, the sound emitted by some systems has the potential to induce the onset of PTS if source levels are high and disturb marine mammals if the frequency/ frequencies used are audible to them. An EPS Risk Assessment will be conducted to determine whether an EPS license will be required (in relation to the potential for disturbance) and current best practice mitigation will be used to minimise the risk of injury.

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
Ornithology - *Construction (and Decommissioning)*				
Direct disturbance/ displacement	Species and populations which are qualifying features of the Outer FoF and St Andrews Bay Complex pSPA	Not significant Negligible	Not significant Minor/moderate	The impact of disturbance/displacement is not significant. The significance level for the Development alone is classed as minor/moderate in this EIA report. However, this is on the basis of a negligible magnitude of impact for a receptor of high sensitivity. Given that the impact is identified to be of negligible magnitude, there is considered to be no potential for cumulative impacts of ecological significance.
Indirect disturbance of habitats and prey	Species and populations which are qualifying features of the Outer FoF and St Andrews Bay Complex pSPA	Not significant Negligible	Not significant Minor/moderate	The impact of indirect disturbance of habitats and prey is not significant. The significance level for the Development alone is classed as minor/moderate in this EIA report. However, this is on the basis of a negligible magnitude of impact for a receptor of high sensitivity. Given that the impact is

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
				identified to be of negligible magnitude, there is considered to be no potential for cumulative impacts of ecological significance.
Ornithology -*O&M*				
Direct disturbance/ displacement	Species and populations which are qualifying features of the Outer FoF and St Andrews Bay Complex pSPA	Not significant Negligible	Not significant Minor/moderate	The impact of disturbance/displacement is not significant. The significance level for the Development alone is classed as minor/moderate in this EIA report. However, this is on the basis of a negligible magnitude of impact for a receptor of high sensitivity. Given that the impact is identified to be of negligible magnitude, there is considered to be no potential for cumulative impacts of ecological significance.
Indirect disturbance of habitats and prey	Species and populations which are qualifying features of the Outer FoF and St Andrews Bay Complex pSPA	Not assessed	Not significant Minor/moderate	The impact of indirect disturbance of habitats and prey is not significant. The significance level for the Development alone is classed as minor/moderate in

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
				this EIA report. However, this is on the basis of a negligible magnitude of impact for a receptor of high sensitivity. Given that the impact is identified to be of negligible magnitude, there is considered to be no potential for cumulative impacts of ecological significance.
Habitat loss	Species and populations which are qualifying features of the Outer FoF and St Andrews Bay Complex pSPA	Not assessed	Not significant Minor/moderate	The impact of habitat loss is not significant. The significance level for the Development alone is classed as minor/moderate in this EIA report. However, this is on the basis of a negligible magnitude of impact for a receptor of high sensitivity. Given that the impact is identified to be of negligible magnitude, there is considered to be no potential for cumulative impacts of ecological significance.

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
SLVIA - *Construction (and Decommissioning)*				
Presence of installation vessels and related works, and trenching of cable at landfall location may affect seascape character area, designated landscape and visual amenity.		Significant Due to construction activities on or close to the foreshore there are likely to be significant effects on seascape and visual amenity, these will be localised and temporary in nature.	Significant Construction (and decommissioning) works at the landfall will result in localised significant effects on a small part of the Edinburgh to Gullane seascape character area. These impacts will be localised and temporary in nature.	The effects of the Offshore Export Cable Corridor on seascape character and visual amenity are the same as those assessed in the 2013 ES.
Commercial Fisheries - *Construction (and decommissioning)*				
Temporary loss or restricted access to fishing grounds	*Nephrops* fishery	Not Significant Moderate	Not Significant Moderate	The effects of the Offshore Export Cable Corridor are the same as those assessed in the 2013 ES.
	Scallop fishery	Not Significant Minor/ Moderate	Not Significant Minor/Moderate	The effects of the Offshore Export Cable Corridor are the same as those assessed in the 2013 ES.
	Creel fishing	n/a	Not Significant Minor/Moderate	The impacts were not assessed in 2013 ES, but are not assessed as significant.
	Squid fishery	Not Significant Minor/ Moderate	Not Significant Minor/Moderate	The effects of the Offshore Export Cable Corridor are the same as those

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
				assessed in the 2013 ES.
Increased steaming times to fishing grounds	*Nephrops* fishery	Not Significant Minor	Not Significant Minor	The effects of the Offshore Export Cable Corridor are the same as those assessed in the 2013 ES.
	Scallop fishery	Not Significant Minor	Not Significant Minor	The effects of the Offshore Export Cable Corridor are the same as those assessed in the 2013 ES.
	Creel fishing	Not Significant Minor	Not Significant Minor	The effects of the Offshore Export Cable Corridor are the same as those assessed in the 2013 ES.
	Squid fishery	Not Significant Minor	Not Significant Minor	The effects of the Offshore Export Cable Corridor are the same as those assessed in the 2013 ES.
Displacement of fishing activity into other areas	*Nephrops* fishery	Not Significant Moderate	Not Significant Moderate	The effects of the Offshore Export Cable Corridor are the same as those assessed in the 2013 ES.
	Scallop fishery	Not Significant Minor/ Moderate	Not Significant Minor/Moderate	The effects of the Offshore Export Cable Corridor are the same as those assessed in the 2013 ES.
	Creel fishing	n/a	Not Significant Minor/Moderate	The impacts were not assessed in 2013 ES, but are not assessed as significant.

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
	Squid fishery	Not Significant Minor/ Moderate	Not Significant Minor/Moderate	The effects of the Offshore Export Cable Corridor are the same as those assessed in the 2013 ES.
Commercial Fisheries - *O&M*				
Complete loss or restricted access to fishing grounds	*Nephrops* fishery	Not Significant Negligible/ Minor	Not Significant Minor	The effects of the Offshore Export Cable Corridor are not significant as per the 2013 ES.
	Scallop fishery	Not Significant Negligible/ Minor	Not Significant Negligible/Minor	The effects of the Offshore Export Cable Corridor are the same as those assessed in the 2013 ES.
	Creel fishing	Not Significant Negligible/ Minor	Not Significant Negligible/Minor	The effects of the Offshore Export Cable Corridor are the same as those assessed in the 2013 ES.
	Squid fishery	Not Significant Negligible/ Minor	Not Significant Negligible/Minor	The effects of the Offshore Export Cable Corridor are the same as those assessed in the 2013 ES.
Increased steaming times to fishing grounds	*Nephrops* fishery	Not Significant Negligible/ Minor	Not Significant Negligible/Minor	The effects of the Offshore Export Cable Corridor are the same as those assessed in the 2013 ES.
	Scallop fishery	Not Significant Negligible/ Minor	Not Significant Negligible/Minor	The effects of the Offshore Export Cable Corridor are the same as those assessed in the 2013 ES.

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
	Creel fishing	Not Significant Negligible/ Minor	Not Significant Negligible/Minor	The effects of the Offshore Export Cable Corridor are the same as those assessed in the 2013 ES.
	Squid fishery	Not Significant Negligible/ Minor	Not Significant Negligible/Minor	The effects of the Offshore Export Cable Corridor are the same as those assessed in the 2013 ES.
Displacement of fishing activity into other areas	*Nephrops* fishery	Not Significant Negligible/ Minor	Not Significant Negligible/Minor	The effects of the Offshore Export Cable Corridor are the same as those assessed in the 2013 ES.
	Scallop fishery	Not Significant Negligible/Minor	Not Significant Negligible/Minor	The effects of the Offshore Export Cable Corridor are the same as those assessed in the 2013 ES.
	Creel fishing	Not Significant Negligible/ Minor	Not Significant Negligible/Minor	The effects of the Offshore Export Cable Corridor are the same as those assessed in the 2013 ES.
	Squid fishery	Not Significant Negligible/ Minor	Not Significant Negligible/Minor	The effects of the Offshore Export Cable Corridor are the same as those assessed in the 2013 ES.
Shipping and Navigation - *O&M*				
Effects on anchoring operations	Commercial vessels	Not Significant Negligible/Minor	Not Significant Negligible/Minor	Given that the Offshore Export Cable will be charted, that the depth of cover

Impact	Receptor	Residual Significance Inch Cape 2013 ES	Residual Significance Inch Cape 2018 EIA Report	Discussion
				should provide protection against anchors and given the large anchors used by commercial vessels (which means that snagging is unlikely) there is considered to be no change to the residual effect.
	Recreational vessels	Not Significant Negligible/ Minor	Not Significant Negligible/Minor	Given that the export cables will be charted, that the depth of cover should provide protection against anchors and the very low number of recreational vessels which will be affected, there is considered to be no change to the residual effect.
Fishing Gear snagging risk (navigational safety risk)	Commercial fishing vessels	Not Significant Negligible/ Minor	Not Significant Negligible/Minor	Given that the Offshore Export Cable will be buried or protected where burial is not practicable, that the penetration depth of fishing gear is typically low and the low level of fishing vessel traffic which will be affected, there is considered to be no change to the residual effect.

18.4 Mitigation Measures

14 Table 18.3 below identifies all the mitigation measures, that have both been embedded into the design (and thus taken into account in the baseline assessment), and those additional

mitigation measures that have been proposed, to reduce the environmental effects of the Development on those receptors assessed.

15 As well as the mitigation measures, ICOL proposes to commit to the purpose of the relevant consent conditions granted for the Inch Cape 2014 Consent, as they relate to this application. Where the purpose of a consent condition is being proposed these have been identified in each relevant technical chapter and have not specifically been included below.

16 ICOL recognises that the Licensing Authority may wish to apply different or amended conditions to any consents that may ultimately be granted for this application, but would expect the main requirements, where still relevant, demonstrated by these conditions to remain a requirement in some form.

Table 18.3 Embedded Mitigation Measures and Additional Mitigation Measures Included in the EIA

Chapter	Title	Mitigation Measure
9	Natural Fish and Shellfish	Piling operations will incorporate a soft start procedure (build-up of hammer energy over a set time-frame) which will reduce the potential for noise-related fatality for all species.
10	Marine Mammals	Piling operations will incorporate a soft start procedure (build-up of hammer energy over a set time-frame) which will reduce the potential for noise-related fatality for all species.
		Implementation of marine mammal protection plans (MMPPs) for pile driving and use of geophysical survey systems, which will be finalised in the construction method statement (CMS)/ environmental management plan (EMP).
11	Ornithology	Development design has taken into account minimising the rotor swept area below 50 metres above mean sea level to reduce collision risk for birds
		A suitably qualified Ecological Clerk of Works (ECoW) will be appointed to the Development during construction. This will ensure compliance with mitigation and best practice is followed relating to disturbance of birds (notably qualifying features from the SPAs with connectivity to the Development).
		Develop effective post-consent monitoring programmes and share ornithology data, with a view to informing and further developing best practice measures.
12	Seascape, Landscape and Visual	WTGs will all be of similar dimensions regarding hub height and blade tip subject to WTG and substructure design and installation specification
		WTGs will all be pale grey in colour with a semi-matt finish.
		Grid or Offset Grid pattern to be the preferred starting point (based on FTOWDG 2011 design sensitivity analysis) for layout evolution

Chapter	Title	Mitigation Measure
		Avoid continuous gaps larger than the grid spacing on the perimeter WTGs which create channels and appear to separate the wind farm into groups
		Avoid single outlier WTGs (there will always be corner turbines)
		OSP positions to be within the main area of WTGs and not on the western peripheral edge of the Development Area
		ICOL note that there may be different types of mitigation possible to reduce the lighting visible associated with the operation of the WTGs. ICOL will continue to discuss these mitigation possibilities, which include engineering mitigation, to reduce the amount of light visible along the coast.
13	Cultural Heritage and Marine Archaeology	Development specific WSI will be prepared, in consultation with HES, once the final layout of the Development Area and OfTW infrastructure is established (which will be post consent, will take into account all known features insofar as possible). The WSI will set out the design and implementation of a programme of detailed mitigation works. This will comply with guidance current at the time of its development (presently The Crown Estate, 2010).
		Analysis of pre-construction survey data will be undertaken to refine the identified potential marine archaeology assets at infrastructure locations. Appropriate micro-siting allowance for identified assets will be agreed in consultation with HES. Known features will be avoided (with appropriate buffer) insofar as possible.
		Both the micro-siting allowance and AEZs will be detailed in the WSI described above. This will reduce any potential impacts on marine archaeology.
		The WSI will include a Protocol for Archaeological Discoveries (PAD) (The Crown Estate, 2014) which will be prepared in consultation HES. PAD will ensure that an agreed monitoring system is in place for unexpected or incidental archaeological finds. This will mitigate the risk of damage to any previously unrecorded archaeological remains.
		WTGs will all be pale grey in colour with a semi-matt finish.
		Grid or Offset Grid pattern to be the preferred starting point (based on FTOWDG 2011 design sensitivity analysis) for layout evolution
		Avoid continuous gaps larger than the grid spacing on the perimeter WTGs which create channels and appear to separate the wind farm into groups
		Avoid single outlier WTGs (there will always be corner turbines)
		OSP positions to be within the main area of WTGs and not on the western peripheral edge of the Development Area

Chapter	Title	Mitigation Measure
		ICOL note that there may be different types of mitigation possible to reduce the lighting visible associated with the operation of the WTGs. ICOL will continue to discuss these mitigation possibilities, which include engineering mitigation, to reduce the amount of light visible along the coast.
14	Commercial Fisheries	A Construction Management Plan (CMP) will be developed in consultation with Fishing Industry Representatives which establishes a protocol for engagement between ICOL and the fishing industry. This will include details on:
		o Communication channels between the fishing community and ICOL through all phases;
		o Protocol for the navigation of construction and operation / maintenance vessels to and from the site (e.g. use of transit lanes that will reduce interaction with fishing activities); and
		o Procedures in the event of interactions between wind farm construction and operation and fishing activities.
		500 m 'rolling' safety zones around working areas during construction, decommissioning and major maintenance activities will be applied for. Consultation will be undertaken with relevant stakeholders to ensure effective implementation and management of safety zones.
		Structures within the Development Area will be marked and lit in accordance with International Association of Lighthouse Authorities' (IALA) Recommendation O-139 on the Marking of Man-Made Offshore Structures (IALA, 2008). The final lighting and marking scheme will be agreed with the relevant stakeholders prior to construction.
		Cables will be suitably buried or will be protected by other means when burial is not practicable which will reduce the risk to fishing vessels from snagging.
		Cable burial plan, which will include monitoring and reporting of any exposures.
		Grid or offset grid layout of the WTG and OSPs.
		Commitment of use of concrete matting or rock dumping to reflect seabed conditions, where practical and appropriate.
		Commitment to picking up 'drop objects' from the seabed floor where possible.
		Commitment to an over-trawl-ability assessment.
		Promulgation of information and appropriate liaison will be carried out to ensure information on the works are circulated through agreed procedure e.g. Notices to Mariners, Kingfisher and other

Chapter	Title	Mitigation Measure
		appropriate media to allow vessels to effectively and safely navigate around the proposed sites.
		Suitable and sufficient assessment will be undertaken to ensure that all safety risks are reduced as far as reasonably practicable.
		Modifications to bottom towed fishing gear are being investigated in consultation by the offshore renewables industry and the fishing industry which may better enable fishing activities within and around operational wind farms.
		Defined navigational routes will be used by vessels. This will reduce the risk of disturbance to static gear.
		Participation in a regional CFWG to provide a forum for collaborative discussion and action in relation to offshore wind farm developments in the Forth and Tay area and their interactions with commercial fishing activities. ICOL will ensure the principle of the commitments (as identified below) will be:
		o Provide regular contact for representatives of commercial fishermen and the Forth and Tay Offshore Wind Developers Group (FTOWDG) developers to promote communication and understanding;
		o Provide a forum to manage engagement through a project(s) lifecycle with particular focus on consenting, pre-construction planning and construction activities;
		o Provide input to general approaches, procedures and protocols with respect to CMPs and potential mitigation options, promoting standardisation where possible;
		o Agree specific offshore working practices relating to Marine Licence conditions where required;
		o Agree and maintain a current regional assessment of commercial fishing activities;
		o Identify and develop opportunities between the fishing/renewables industries in the Forth and Tay area; and
		o Establish a protocol for the removal of temporary works post-construction including appropriate verification.
		ICOL have recognised that there is the potential for construction vessels outside the Development Area to cause issues for fishermen and inadequate communication between ICOL (including contractors) and the fishing industry. Appropriate mitigation will be included as part of the CFMS and through the appointment of a suitable FLO
15	Shipping and Navigation	WTGs will be designed in accordance with MGN 543 and procedures put in place for generator shut down and other operational

Chapter	Title	Mitigation Measure
		requirements in emergency situations to reduce impacts on SAR provision
		A 500 m 'rolling' Safety Zones will be established around working areas during construction, decommissioning and major maintenance activities to ensure vessels not associated with the works remain at a safe distance (further information can be found in Appendix 15C.1: Navigational Risk Assessment). Consultation will be undertaken with relevant stakeholders to ensure effective implementation and management of Safety Zones
		Inch Cape Wind Farm structures including the Offshore Export Cable will be marked on relevant United Kingdom Hydrographic Office (UKHO) Admiralty charts. Inter-array cables may also be charted depending upon the scale of the individual chart
		Inch Cape Wind Farm structures will be marked and lit in accordance with Recommendation O-139 on the Marking of Man-Made Structures (IALA, 2013) and the final lighting and marking scheme will be agreed with the relevant stakeholders prior to the commencement of construction though a lighting and marking plan
		WTGs will be designed and constructed to ensure that the minimum blade clearance is at least 22 m minimum above MHWS
		An Emergency Response Co-operation Plan (ERCoP) will be established for the Development and put in place for the construction, operations and maintenance (O&M) and decommissioning phases. The ERCoP will be based upon the MCA template and prepared in consultation with the MCA SAR safety branch
		Offshore Export Cables, Inter-array cables and the interconnector cables will be suitably buried or protected by other means when burial is not practicable in order to reduce the risk of snagging and mitigate any effect on magnetic compasses due to Electromagnetic Interference (EMF). Consultation will be undertaken with the appropriate stakeholders to ensure that safe Under Keel Clearance (UKC) requirements will be maintained and periodically monitored throughout the installation life
		Appropriate marine co-ordination (through a dedicated marine co-ordination function) of the Development's own vessels will be implemented in order to ensure that construction vessels do not create an additional risk to third parties
		A risk assessment will be carried out to determine any requirements for guard vessels during the construction phase or major maintenance (if necessary), any requirements will thereby be implemented accordingly
		Additional temporary buoyage, relating to partially constructed works, will be determined through risk assessment and agreed in consultation with the NLB

Chapter	Title	Mitigation Measure
		A monitoring plan will be determined for the Offshore Export Cables, which considers higher risk areas such as anchorage locations. Appropriate remedial action will be taken where required
		Vessel audits will be undertaken to ensure each such vessel is compliant with MCA, international and project safety management system requirement
		An advanced level of promulgation of information will be carried out for the O&M phase which is specifically targeted to receptors identified through consultation (including regular commercial operators, and fishing and recreational users). This will inform mariners of the location of the Wind Farm structures so that they can passage plan effectively. It will also ensure recreational and fishing users are aware of the potential for increased commercial vessel density inshore of the Wind Farm.
		Consideration will be given to any additional Aids to Navigation that result as a requirement of the finalised Development layout. This discussion will occur as part of the LMP and DSLP.
16	Socio economics	National, regional and local initiatives involving the Scottish Government and regional and local development agencies with the aim of providing enhanced skills training, supply chain enhancement, and support for business improvement working in the offshore wind industry will assist in realising and maximising the opportunities in the Economic Study Area and where appropriate ICOL will support these initiatives.
		Skills and training initiatives and the import of labour into the catchment area attracted by the available jobs.
17	Aviation	Compliance with CAP 393 Article 223 (CAA, 2018) which sets out the mandatory requirements for lighting of offshore WTGs.
		Legislation requires the fitting of obstacle lighting on offshore WTGs with a height of 60 m or more above the level of the sea at the Highest Astronomical Tide (HAT);
		o When four or more WTGs are located together in the same group, with the permission of the CAA only those on the periphery of the group need to be fitted with at least one medium intensity steady red light positioned as close as reasonably practicable to the top of the fixed structure; and
		o The obstruction light or lights must be fitted to show when displayed in all directions without interruption. The requirements of the angle of the plane of the beam and peak intensity levels are defined within CAP 393 (CAA, 2018).
		Compliance with CAP 437 (CAA, 2016a) which sets out a procedure to indicate to a helicopter operator that the WTG blades and nacelle

Chapter	Title	Mitigation Measure
		are safely secured in position prior to helicopter hoist operations commencing.
		CAP 437 states that this is best achieved through the provision of a helihoist status light located on the nacelle of the WTG within the pilot's field of view, which is capable of being operated remotely and from the platform itself or from within the nacelle;
		o A steady green light is displayed to indicate to the pilot that the WTG blades and nacelle are secure and it is safe to operate. A flashing green light is displayed to indicate that the WTG is in a state of preparation to accept hoist operations or, when displayed during hoist operations, that parameters are moving out of limits. When the light is extinguished this indicates to the operator that it is not safe to conduct helicopter hoist operations; and
		o Obstruction lighting in the vicinity of the winching area that has a potential to cause glare or dazzle to the pilot or to a helicopter hoist operations crew member should be switched off prior to, and during, helicopter hoist operations.
		A Lighting and Marking Plan will be submitted for approval to MS-LOT outlining the Development's lighting and marking strategy to mitigate the risk to aviation safety during all phases of the Development and will be in line with CAP 393 (CAA, 2018) and CAP 437 (CAA, 2016a).
		Appropriate information about the site construction and any associated lighting (where applicable), for example the height and temporary location of construction cranes, will be provided to the UK Aeronautical Information Service (NATS AIS) for promulgation within the UK IAIP (NATS, 2018).
		Prior to commencement of the Development, information will be circulated to relevant aviation stakeholders, including the UK Hydrographic Office (UKHO), which will include the positions and maximum heights of the WTGs and construction equipment above 150 ft above LAT for inclusion on aviation charts. The UK IAIP is updated on a monthly basis under the Aeronautical Information Regulation and Control (AIRAC) system. Information provided under the AIRAC system shall be distributed by AIS at least 42 days in advance of the effective date with the objective of reaching recipients at least 28 days in advance of the effective date.
		Notification of aviation stakeholders of the location and dimension of any wind energy development and the associated construction activities. Information regarding construction will be passed to the Defence Geographic Centre (DGC) and the General Aviation Awareness Council (GAAC) at least 10 weeks in advance of the erection of the first WTG and to follow up on the day with a confirmation that the activity has taken place. The data should include:

Chapter	Title	Mitigation Measure
		o Location, height (of all structures over 150 ft (45.7 m), date of erection, date of removal and lighting type (none, infra-red or lighting brightness); and
		o Local aerodromes identified during consultation should be notified, particularly any police helicopter or air ambulance unit.
		Appropriate liaison with NATS AIS will be completed to ensure information on the construction of the wind farm is circulated in a Notice to Airmen (NOTAM) and other appropriate media.
		The Wind Farm will be designed, operated and decommissioned as per MGN 543, including Annex 5 which details 'Standards and procedures for generator shutdown and other operational requirements in the event of a SAR, counter pollution or salvage incident in or around an Offshore Renewable Energy Installation (OREI)'. An Emergency Response Co-operation Plan (ERCoP) based on the MCA template and site Safety Management Systems, in consultation with the MCA will be created. Procedures will be the followed in the event of an emergency during all phases of the Development.
		Commitment to an Airspace Change Proposal for a Transponder Mandatory Zone (TMZ) with the airspace regulator.
		Commitment to an Enduring Technical solution in so long as the solution is cost effective, time bound and subject to the usual MOD approach to mitigation (ALARP principle).