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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

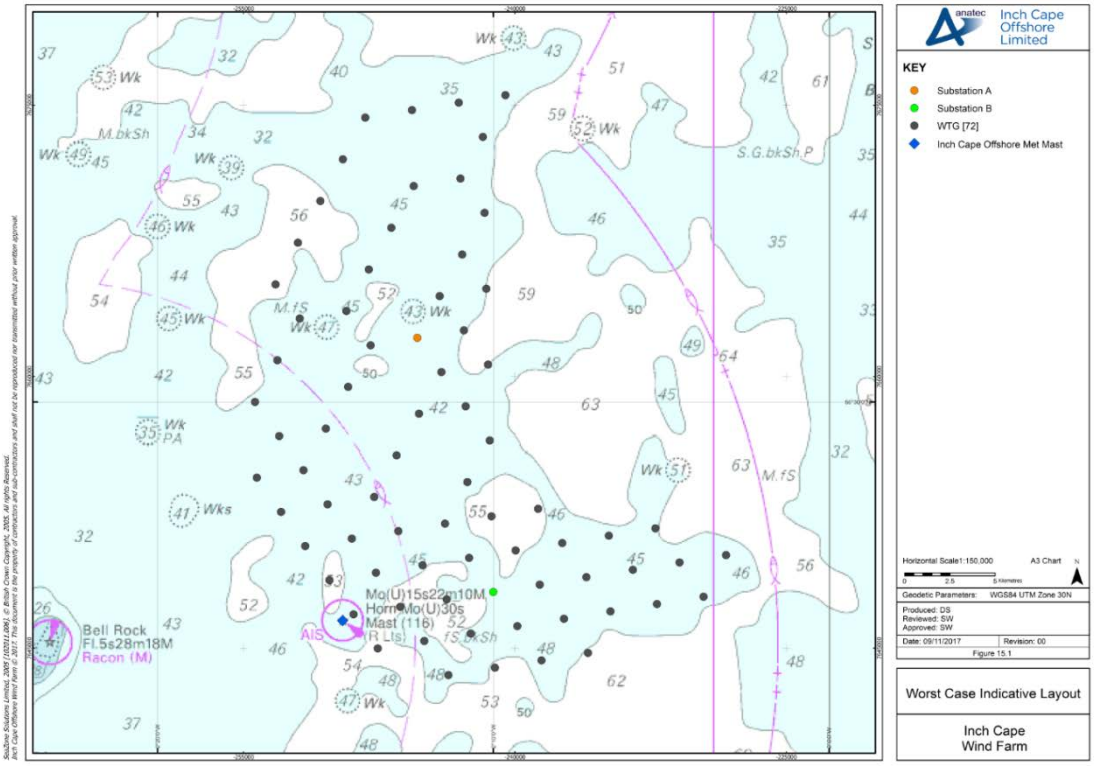
Potential Impact	Design Envelope Scenario Assessed
Operational Phase	
Increased vessel to vessel collision risk	• 72 WTGs compliant with *MGN 543*; • Two OSPs internal to the wind farm; • Micro siting ± 50 metres (m); • Closest average downwind spacing of 1,278 m; • Closest average crosswind spacing 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

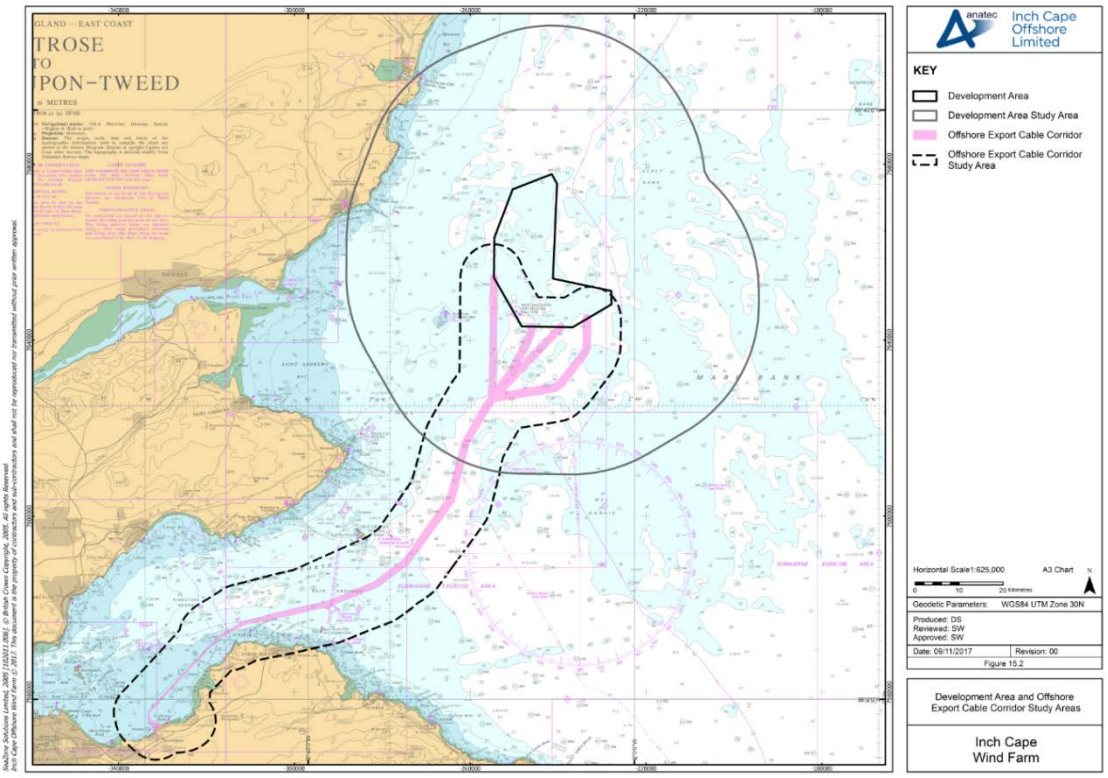
19 A 10-nautical mile (nm) buffer around the Development Area (the 'Development Area Study Area') has been defined in order to provide a sufficient distance within which to capture shipping movements and navigational features within and in the vicinity of the Development Area (as shown in Figure 15.2).

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.

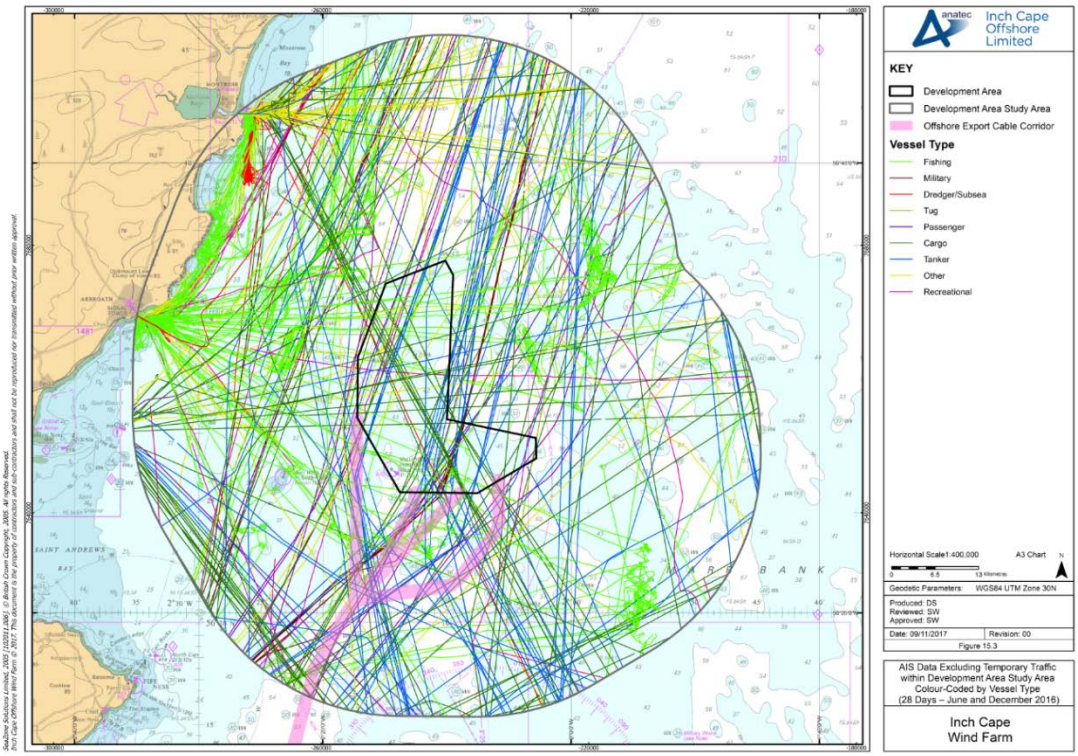
31 There are no oil and gas surface platforms or licensed aggregate dredging sites in proximity to the Development Area.

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

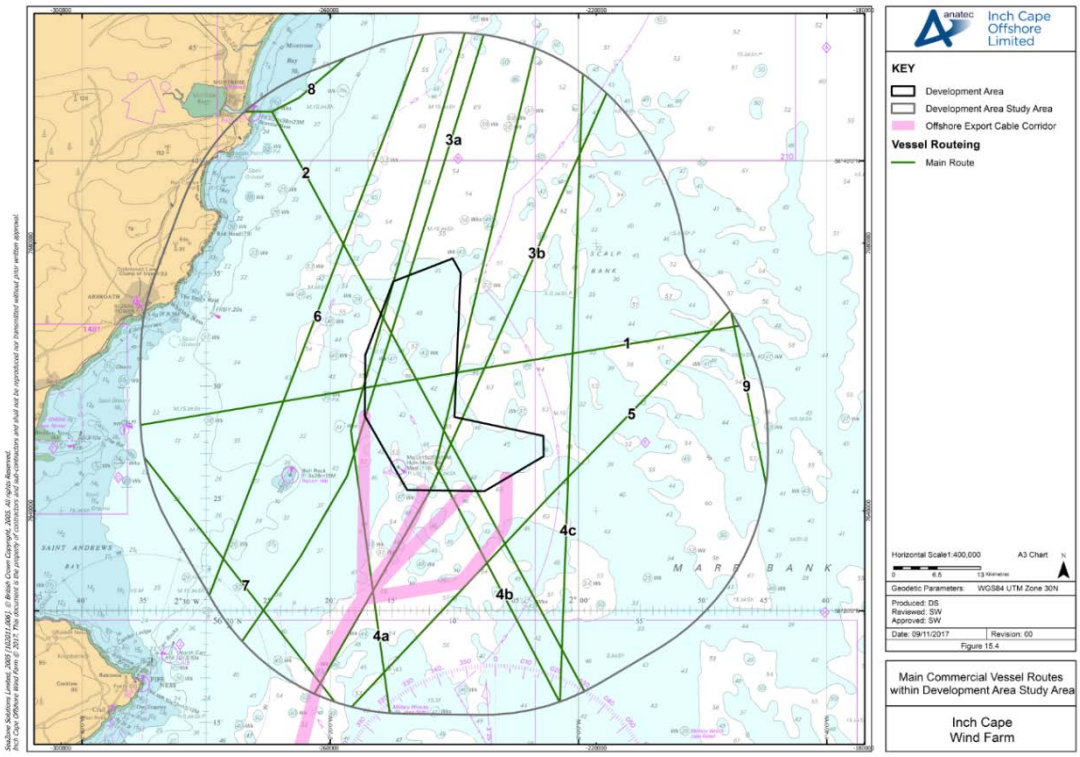


Table 15.8: Description of main commercial shipping routes

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

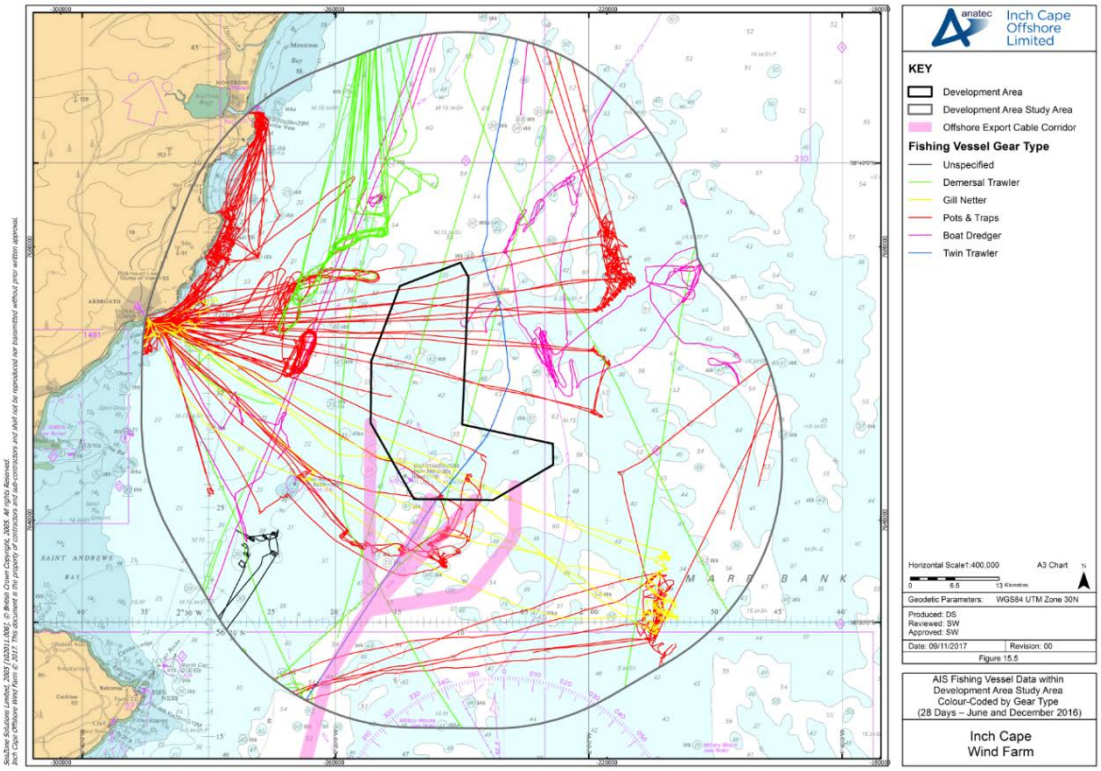
Route Number	Route Description	Vessel Numbers	Main Vessel Type(s)
6	Forth ports – northern UK coastal routes	1 vessel every 2 days	Fishing vessels, cargo vessels, tankers
7	River Tay ports – ports in northern Europe	1 vessel every 2 days	Cargo vessels
8	Montrose – northern UK coastal routes	1 vessel 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)

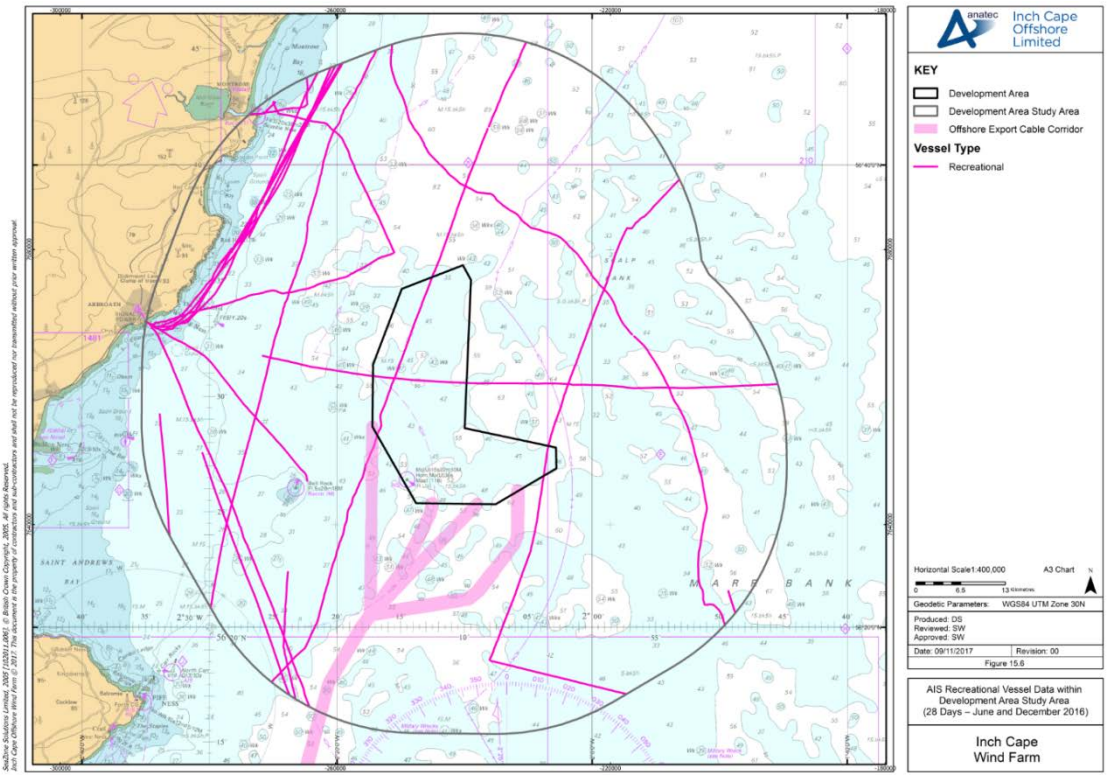


Recreational Vessels

39 Figure 15.6 presents the recreational vessels recorded on AIS within the Development Area Study Area for the combined 28-day survey period.

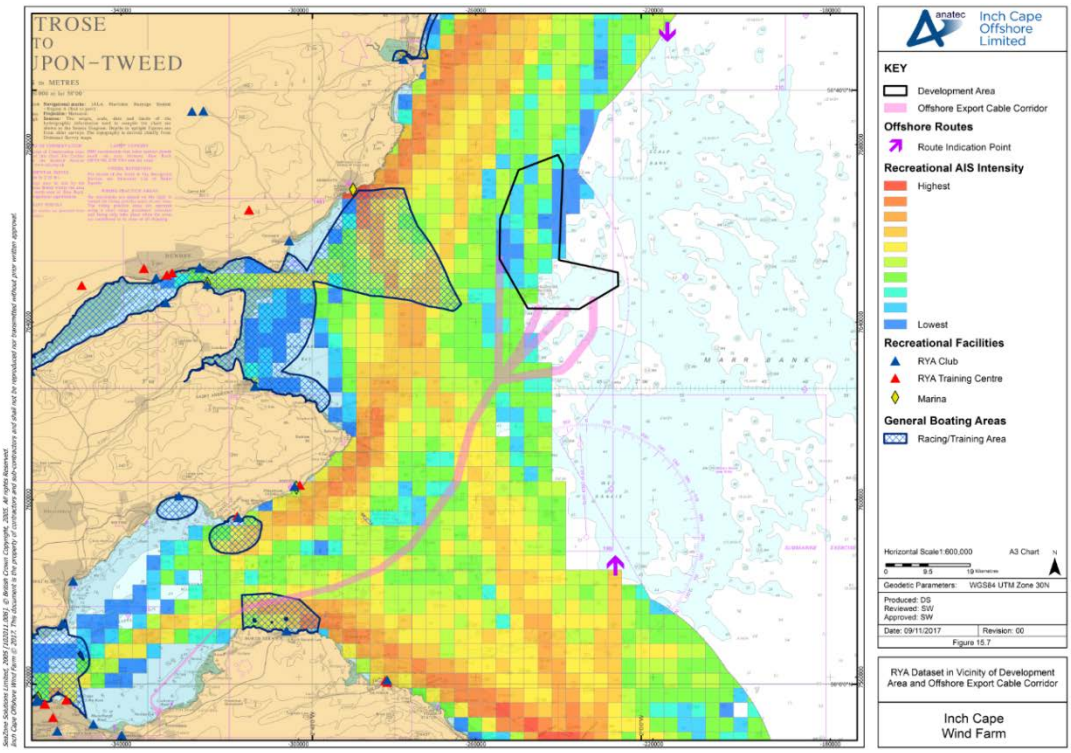
40 There was an average of two unique recreational vessels per day recorded within the Development Area Study Area, although no activity was recorded in December 2016. It can be seen that recreational vessels were recorded transiting past or within the Development Area, while a large proportion of the 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

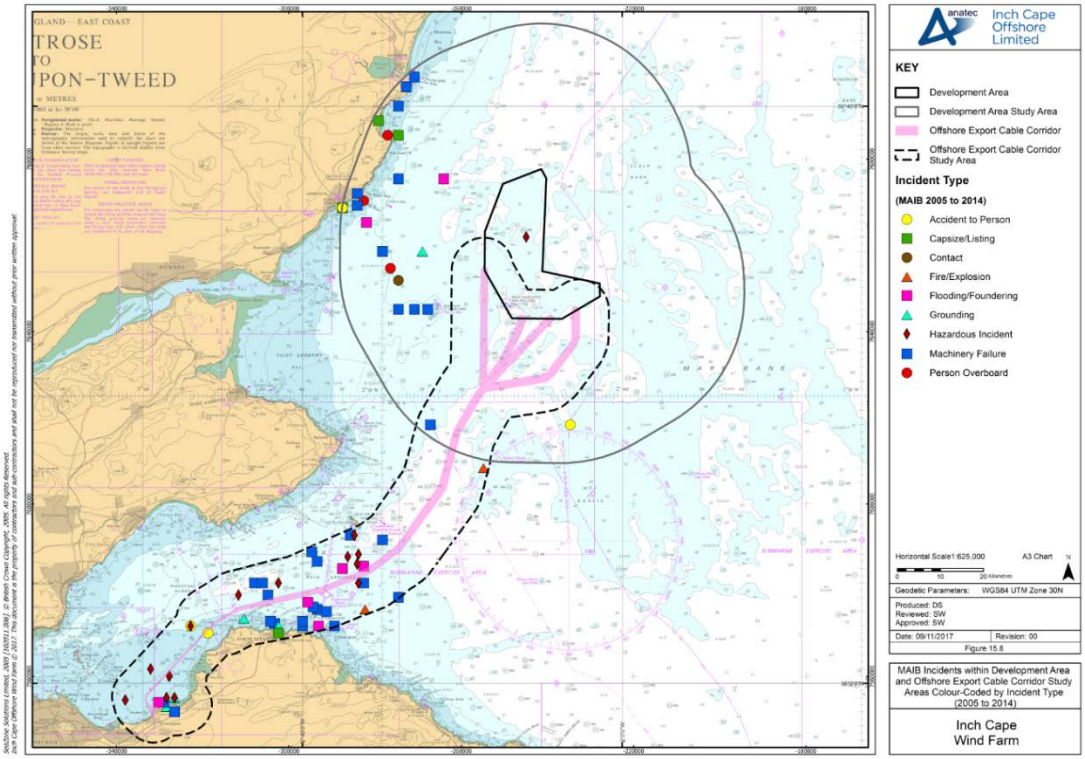
45 The RNLI maintains an active fleet of over 350 lifeboats (of various types ranging from five metres to 17 m in length) and a relief fleet of over 100 boats at more than 350 stations around the coast of the UK and the Republic of Ireland.

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.

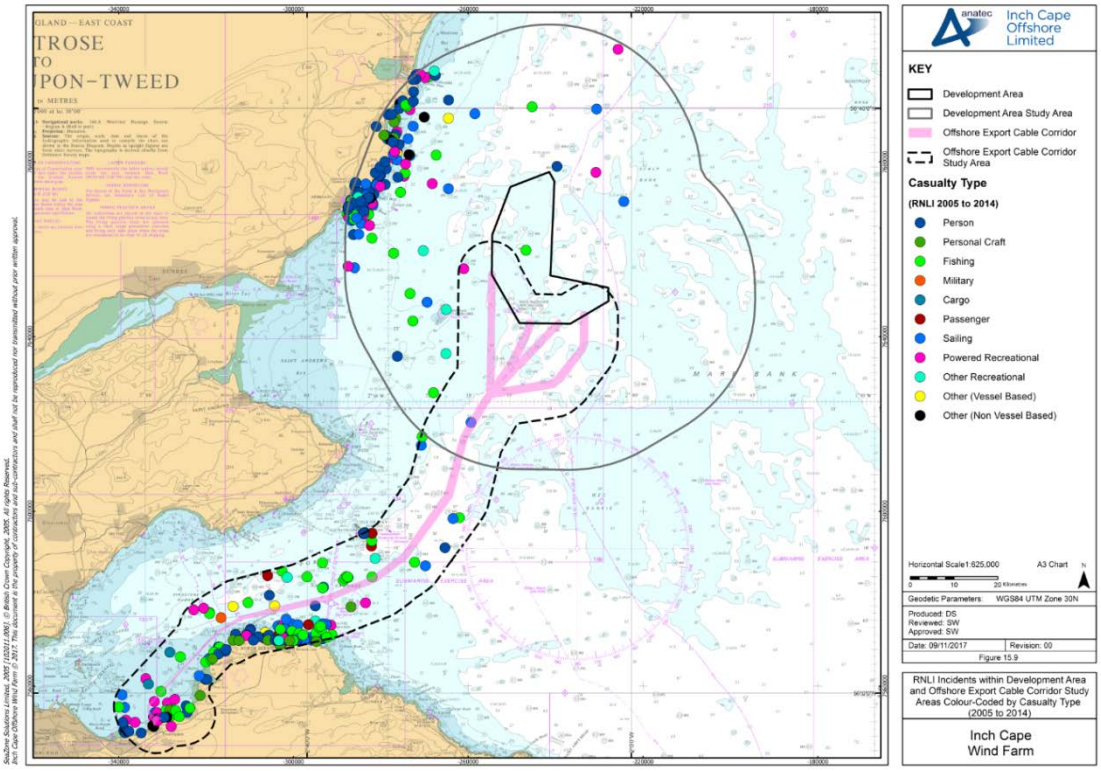
Figure 15.8: MAIB incidents within Development Area and Offshore Export Cable Corridor Study Areas colour-coded by incident type (2005 to 2014)



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.

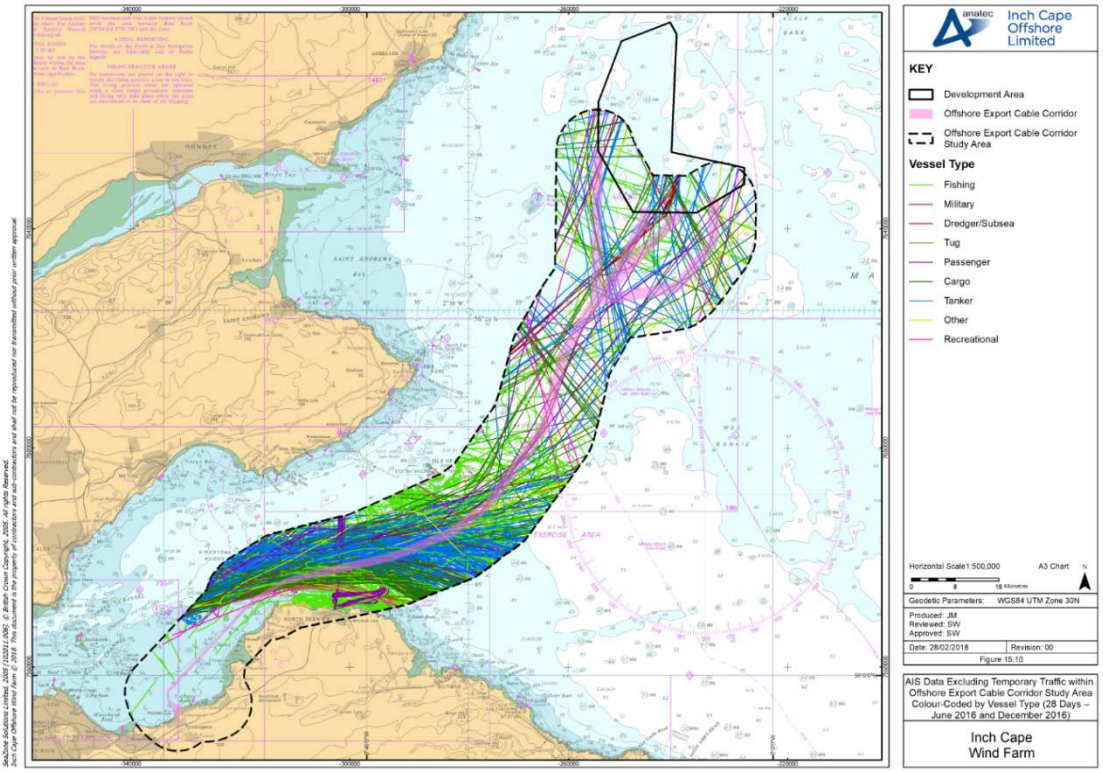
50 As with the Development Area, there are no oil and gas surface platforms or licensed aggregate dredging sites in proximity to the Offshore Export Cable Corridor.

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

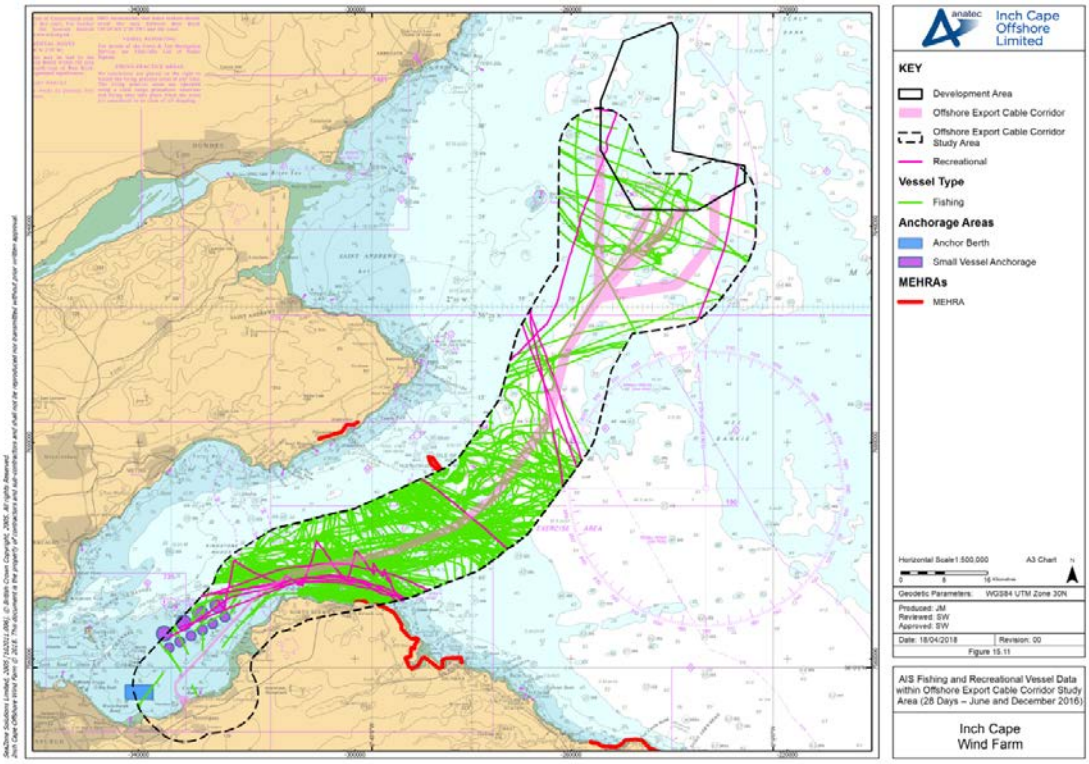
Export Cable Corridor for approximately 15 nm of its length. The majority of vessels on this route are cargo vessels and tankers with tugs, 'other' vessels and passenger vessels also recorded. Traffic is mainly headed between ports in the Firth of Forth (including Grangemouth, Leith and Braefoot Bay) 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

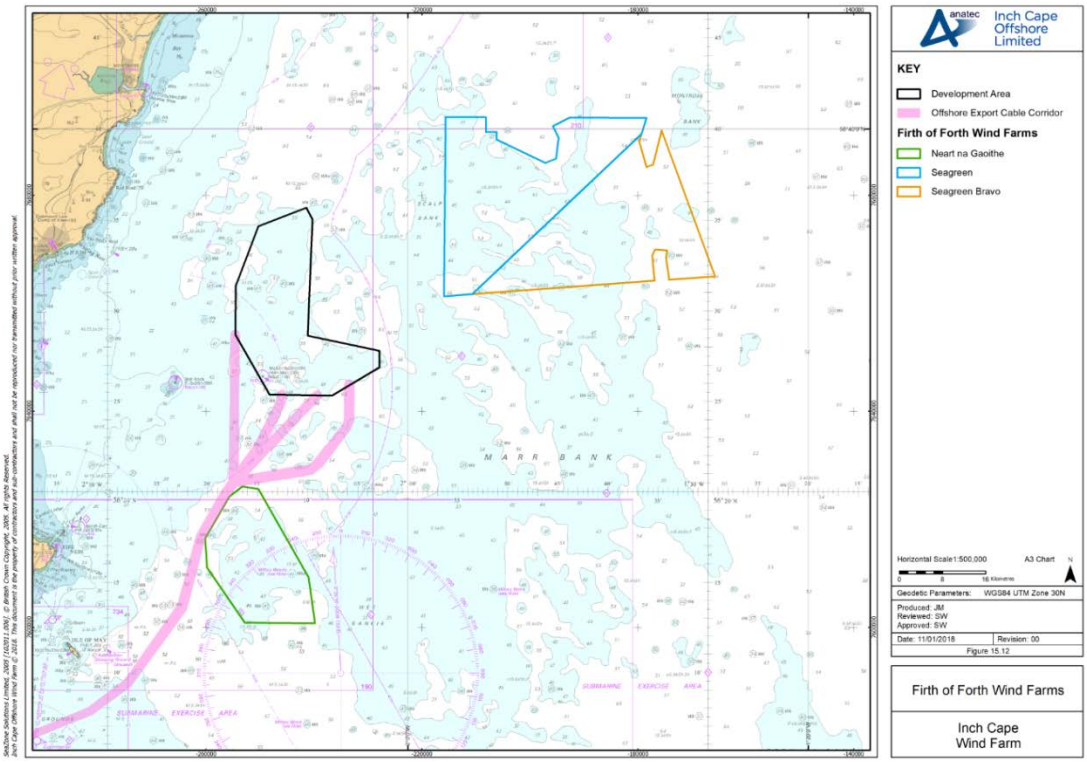
126 As the baseline and status for cumulative projects are ever evolving a cut-off date of November 2017 was used to allow the EIA and CIA to progress. ICOL appreciates and acknowledges that the status of some of these projects may have changed since this date and note however that the individual status 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.				

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