Inch Cape Offshore Wind Farm

New Energy for Scotland

Offshore Environmental Statement:
VOLUME 2H
Appendix 19B: Navigational Risk Assessment Offshore Export Cable Corridor

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Navigational Risk Assessment
Offshore Export Cable Corridor

Prepared by:	Anatec Limited
Presented to:	Inch Cape Offshore Limited
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Anatec **Aberdeen Office**
Address: 36 Upperkirkgate, Aberdeen, AB10 1BA, UK
Tel: 01224 633711
Fax: 0709 2367306
Email: aberdeen@anatec.com

Cambridge Office
Braemoor, No.4 The Warren, Witchford, Ely, Cambs, CB6 2HN, UK
01353 661200
0709 2367306
cambs@anatec.com

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Abbreviations

The following abbreviations are used in this report:

AIS	Automatic Identification System
ALB	All-weather Lifeboat
AtoN	Aid to Navigation
BPI	Burial Protection Index
CA	Cruising Association
DIO	Defence Infrastructure Organisation
EC	European Commission
EU	European Union
FAO	Food and Agricultural Organization of the United Nations
FTOWDG	Forth and Tay Offshore Wind Developers Group
GIS	Geographical Information System
GT	Gross Tonnage
IEC	International Electrotechnical Commission
ILB	Inshore Lifeboat
kg	Kilogram
KIS-CA	Kingfisher Information Services-Cable Awareness
km	Kilometre
m	Metre
MAIB	Marine Accident Investigation Branch
MCA	Maritime and Coastguard Agency
MEHRA	Marine Environmental High Risk Area
MMO	Marine Management Organisation
MOD	Ministry of Defence
nm	Nautical Mile

NLB	Northern Lighthouse Board
NRA	Navigational Risk Assessment
NtM	Notices to Mariners
PEXA	Practice and Exercise Area
PLN	Port Letter Number
RNLI	Royal National Lifeboat Institution
RoRo	Roll On Roll Off
RYA	Royal Yachting Association
SFI	Sea Fisheries Inspectorate
STW	Scottish Territorial Waters
UK	United Kingdom
UKHO	United Kingdom Hydrographic Office
VHF	Very High Frequency

19B.1 Introduction

19B.1.1 Background

Anatec was commissioned by Inch Cape Offshore Limited (ICOL) to undertake a Navigational Risk Assessment (NRA) for the Offshore Export Cable Corridor for the Inch Cape Offshore Wind Farm, which is being developed as part of the Scottish Territorial Waters (STW) developments.

This report presents the NRA for the Offshore Export Cable Corridor including the baseline marine activity and navigational features for the corridor. There are two landfall options for the Offshore Export Cable, located at Cockenzie or Seton Sands on the East Lothian coast.

A NRA for the Development Area (incorporating WTG, offshore substation platforms, met mast and inter-array cabling) has also been submitted as part of the Inch Cape Offshore Wind Farm Environmental Statement (ES), which analyses and concludes the navigational risk associated within the Development Area (see Appendix 19A: Navigational Risk Assessment Development Area).

19B.1.2 Study Scope

The assessment covers the following scope:

- Identify navigational features in the vicinity of the Offshore Export Cable Corridor;
- Establish existing environmental baseline conditions within the Offshore Export Cable Corridor, including both transiting and anchoring vessels;
- Identify and assess the levels of fishing and recreational activity along the Offshore Export Cable Corridor;
- Consult with navigational stakeholders;
- Provide an overview assessment of potential impacts on navigational safety during installation and operation and identify any hot spots; and
- Provide an overview of standard mitigations in line with regulator guidance.

19B.1.3 Study Area

Data in this report have been analysed within a buffer around the Offshore Export Cable Corridor to provide context.

19B.1.4 Data Sources

The main data sources used in this assessment are listed below:

- Automatic Identification System (AIS) Data;
- Fishing Surveillance Satellite Data (2009 – most recent year available) and Sightings Data (2005-09) converted to vessel density grids;

- Maritime Incident Data from the Marine Accident Investigation Branch (MAIB) 2001-2010 and Royal National Lifeboat Institution (RNLI) 2001-2010;
- Admiralty Sailing Directions;
- United Kingdom (UK) Admiralty Charts;
- UK Coastal Atlas of Recreational Boating, 2009 (RYA, 2009) and 2010 Geographical Information Systems (GIS) Shape Files; and
- Stakeholder consultation responses/comments.

19B.1.4.1 AIS Data

Two sets of AIS data have been used which demonstrate seasonal variation:

- AIS data collected from shore based stations located in proximity to the Offshore Export Cable Corridor (28 days in May 2012); and
- Forth and Tay Offshore Wind Developers Group (FTOWDG) AIS data from coastal survey sites located at Stonehaven, Dundee, Inner Forth and Dunbar (28 days in January/February 2011).

19B.1.4.2 Fishing Satellite and Sightings Data

Data on fishing vessel sightings were obtained from Marine Management Organisation (MMO), who ensure the fishing industry's compliance with UK, EU and international fisheries laws through the deployment of patrol vessels, surveillance aircraft and the sea fisheries inspectorate. Each patrol logs the positions and details of all fishing vessels (UK and non-UK) within the Rectangle being patrolled. Data were obtained for the five-year period 2005 to 2009.

Fishing satellite vessel monitoring is also carried out by MMO as part of the sea fisheries enforcement programme, to track the positions of fishing vessels in UK waters. It is also used to track all UK registered fishing vessels globally. Data were analysed for UK and non-UK vessels (2009).

19B.1.4.3 Maritime Incident Data

All UK-flagged commercial vessels are required to report accidents to the MAIB. Non-UK flagged vessels do not have to report unless they are within a UK port/harbour or within UK 12 nm territorial waters and carrying passengers to or from a UK port (including those in inland waterways). However, the MAIB will record details of significant accidents of which they are notified by bodies such as the Coastguard, or by monitoring news and other information sources for relevant accidents. The Maritime and Coastguard Agency (MCA), harbour authorities and inland waterway authorities also have a duty to report accidents to MAIB. Data have been analysed for the 10 year period 2001-2010.

The RNLI maintains an active fleet of over 300 lifeboats (of various types ranging from 5 m to 17 m in length) and a relief fleet of around 100 boats at 235 stations round the coast of the

UK and Ireland. Data on RNLI lifeboat responses in the vicinity of the Offshore Export Cable Corridor in the ten-year period between 2001 and 2010 have been analysed.

19B.1.4.4 Admiralty Sailing Directions

The principal navigational features and ports/harbours are those listed in Admiralty Sailing Directions for the corridor.

19B.1.4.5 UK Admiralty Charts

Admiralty charts have been used to consider approaches and entrances to ports and harbours in the area. The charts also include data on water depths (chart datum), coastline, buoyage, land and underwater contour lines, seabed composition (for anchoring), hazards, tidal information ("tidal diamonds"), traffic separation schemes, lights, and in short anything which could assist navigation in this area to ensure it is fully considered within this regional work. The following are the main charts used in this study:

- 1407-0 Montrose to Berwick-upon-Tweed.
- 734-0 Firth of Forth Isle of May to Inchkeith.

19B.1.4.6 UK Coastal Atlas of Recreational Boating

The Royal Yachting Association (RYA), supported by the Cruising Association (CA), have identified recreational cruising routes, general sailing and racing areas around the UK in the Coastal Atlas (RYA, 2009). This work was based on extensive consultation and qualitative data collection from RYA and CA members, through the organisations' specialist and regional committees and through the RYA affiliated clubs. The consultation was also sent to berth holder associations and marinas.

19B.2 Navigational Risk Assessment (NRA) Methodology

This NRA has primarily considered the baseline environment and impacts associated with the Offshore Export Cable. Note that the all wind farm-related structures that protrude above the surface of the sea, including the offshore substation platforms which form an element of the Offshore Transmission Works (OfTW), are considered in Appendix 19A (Navigational Risk Assessment Development Area) as a result of their location within the Development Area. Therefore this NRA assess the Offshore Export Cable as it is the only element located within the Offshore Export Cable Corridor.

The impact of the Offshore Export Cable has been assessed qualitatively for commercial vessels, fishing vessels and recreational vessels using the data sources described in Section 19B.1.4.

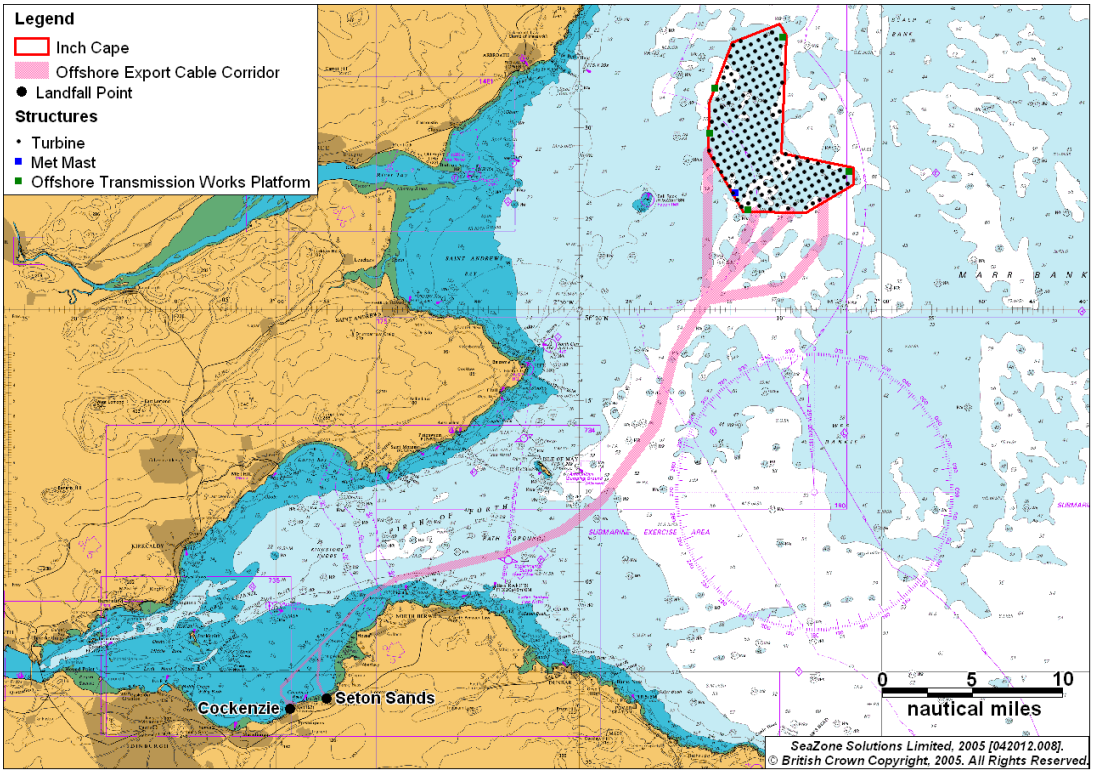
Risks associated with fishing vessel activity, commercial vessel anchoring and vessel foundering have been ranked to identify areas where risks to vessels and the Offshore Export Cable are highest (see Section 19B.10).

19B.3 Development Details

The Wind Farm is located in the outer Firth of Tay region, within STW, approximately 15 to 22 kilometres to the east of the Angus coastline.

A general chart overview of the Development Area including the indicative worst case layout for WTGs, met mast, OSPs and the Offshore Export Cable Corridor is presented in Figure 19B.1. There are two landfall options, located at Cockenzie or Seton Sands.

Figure 19B.1 General Chart Overview of the Offshore Export Cable Corridor and Indicative Worst Case Layout



19B.3.1 Offshore Export Cable – Design Envelope

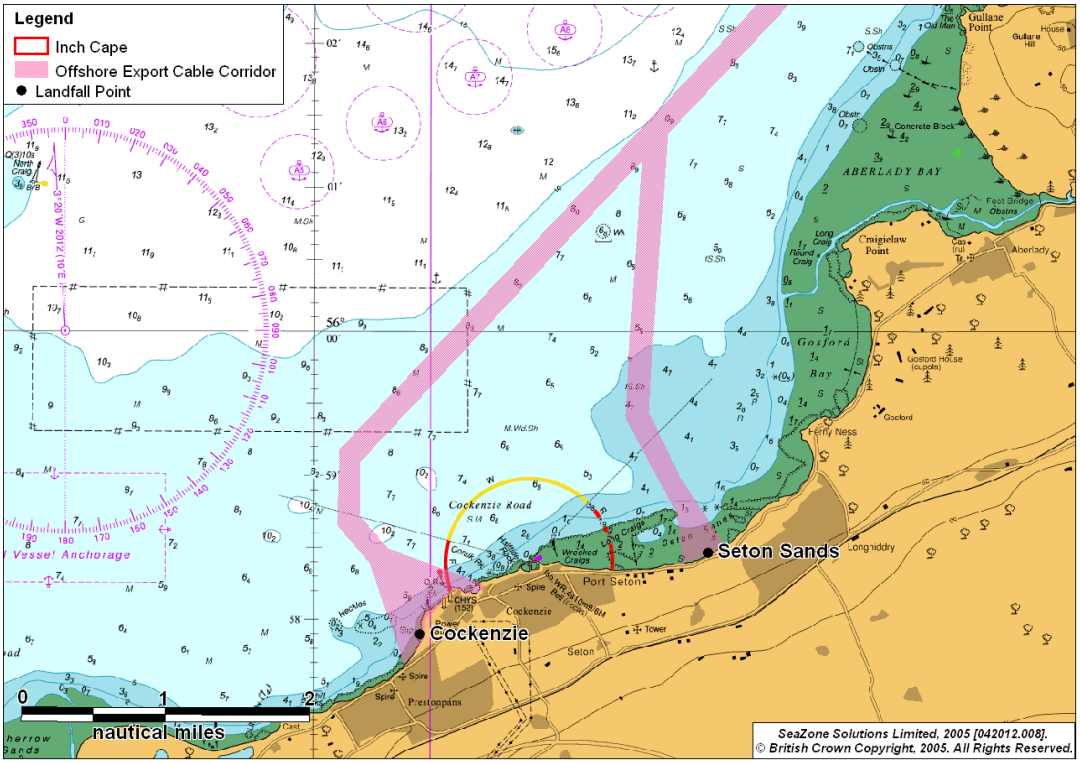
The following table (Table 19B.1) identifies the elements of the Offshore Export Cable considered within the Design Envelope.

Table 19B.1 Offshore Export Cable Design Envelope

Parameter	Value	
	Alternating Current (AC)	**Direct Current (DC)**
Maximum number of cable trenches	Up to 6	Up to 4
Width of offshore cable corridor (m)	300 to 1400	300 to 880
Trench Width (m) per cable	1 (affected width 6)	
Target Trench Depths (m)	1	
Extremes of Trench Depths (m)	0-3 *In some instances it will not be possible to bury the cables. If this is the case then other cable protection measures such as rock placement and concrete mattress will be applied with consideration for navigational safety.*	

A detailed chart of the Offshore Export Cable Corridor towards the landfall options at Cockenzie and Seton Sands is presented in Figure 19B.2.

Figure 19B.2 Detailed Chart Overview of the Offshore Export Cable Corridor



It can be seen on the detailed chart overview of the Offshore Export Cable Corridor that there is a light located between Cockenzie and Seton Sands. This light has an isophase pattern (equal duration of lightness and darkness), is white and red in colour and has an elevation of 10 m above height datum. The period of light is 4 seconds with the range of the lights in clear visibility being 9 sea miles for the white light and 6 nm or the red light.

19B.4 Consultation

The following tables (19B.2 and 19B.3) show both the scoping opinion and consultation feedback for the Offshore Export Cable Corridor.

Table 19B.2 Scoping Opinion

Consultee	Scoping Opinion	Action
MCA	It may also be necessary to mark the landfall site of the export cable routes depending on the location chosen.	Noted – Will be discussed with Northern Lighthouse Board (NLB) once final location of landfall is defined.

Table 19B.3 Consultation Feedback

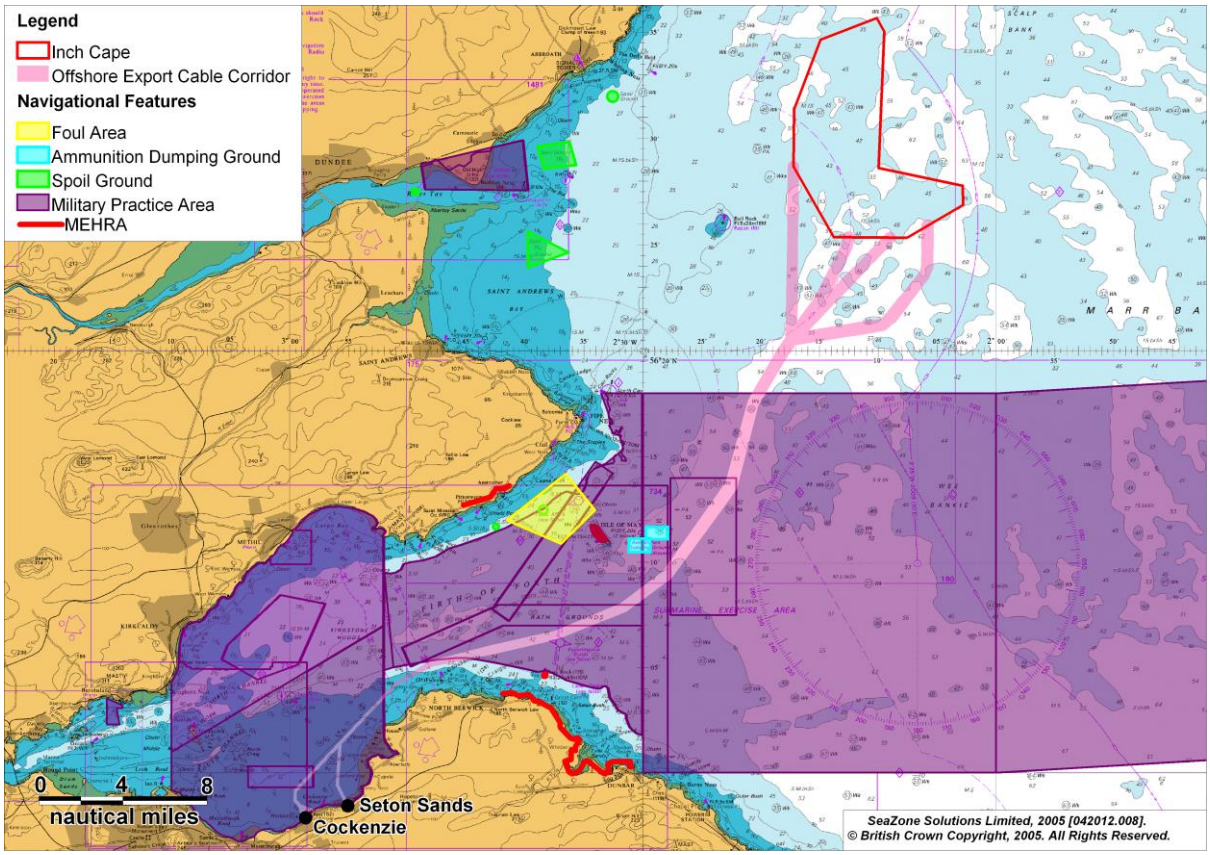
Consultee	Feedback
Forth Ports Ltd (5 June 2012)	• Forth Ports expressed no concerns with the cable passing to the south of the anchorage berths *Note: Following consultation with Forth Ports, ICOL made the decision to remove one cable route option to avoid passing in proximity to the anchoring circles*; • Emergency anchoring should be considered but this is not a concern if the cable is protected or buried; • No concerns were raised over the inshore export cable route option; and • Any disruption to port operations during installation should be discussed with Forth Ports prior to operations being carried out.
NLB (1 October 2012)	• NLB had no comments on the location of the cable route, and were comfortable with the level of data analysis and direct consultation with Forth Ports. • NLB highlighted the issues which occurred within the Thames Estuary where cable protection became a hazard to navigation, ICOL confirmed that navigational safety was a priority when considering protection methods.
MCA (11 October 2012)	• The issue was raised which recently occurred where cable protection used significantly reduced water depths. ICOL confirmed that navigational safety would be considered when considering burial and/or protection methods.

19B.5 Baseline Environment

19B.5.1 Navigational Features

Figure 19B.3 presents a plot of the main navigational features in proximity to the Offshore Export Cable Corridor.

Figure 19B.3 Navigational Features Relative to Offshore Export Cable Corridor



There are two charted ammunition dumping grounds (disused) approximately 0.7 nm west of the Offshore Export Cable Corridor. There is also a foul area located approximately 4.3 nm to the west of the Offshore Export Cable Corridor, on the other side of the Isle of May. Vessels are cautioned from anchoring or fishing within this area due to the existence of foul areas and obstructions on the sea bed.

The Offshore Export Cable Corridor intersects a number of Ministry of Defence (MOD) practice and exercise areas (PEXA) including submarine exercise areas.

19B.5.2 Anchorage Areas

Anchorage areas in the vicinity of the Offshore Export Cable Corridor have been identified from charts and the pilot book for the area (UKHO, 2009) and are presented in Figure 19B.4. Designated anchoring circles in proximity to the Offshore Export Cable landfall area are presented in Figure 19B.5.

Figure 19B.4 Anchorage Areas Relative to Offshore Export Cable Corridor

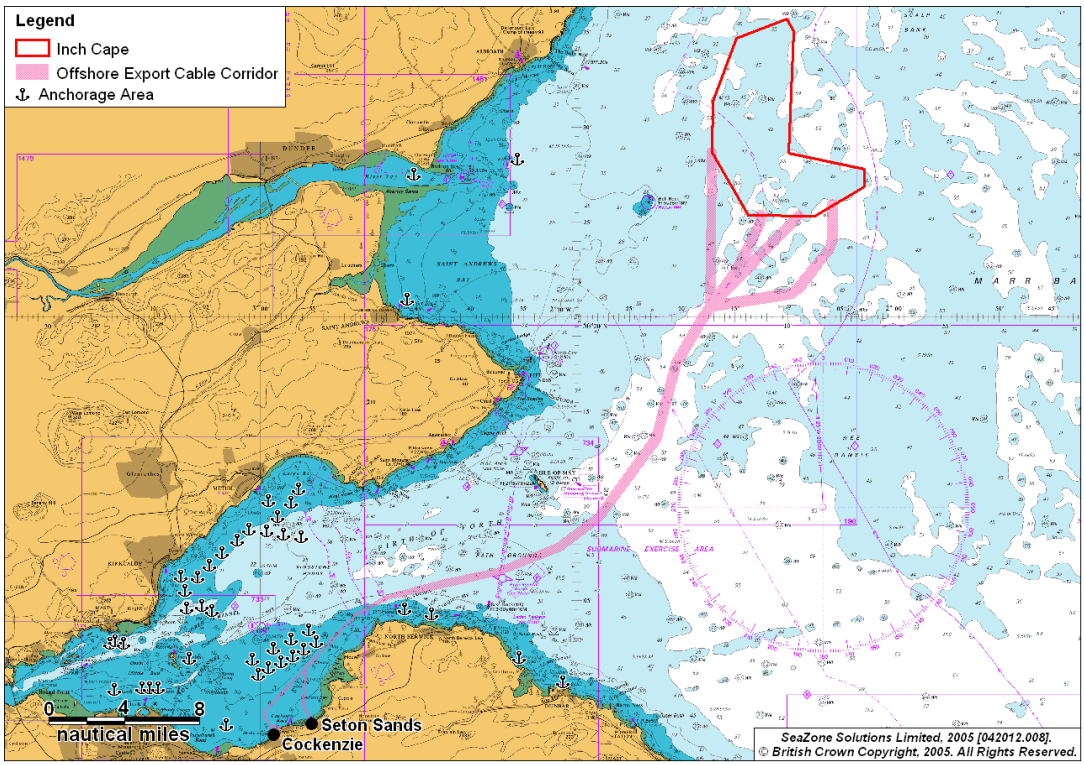
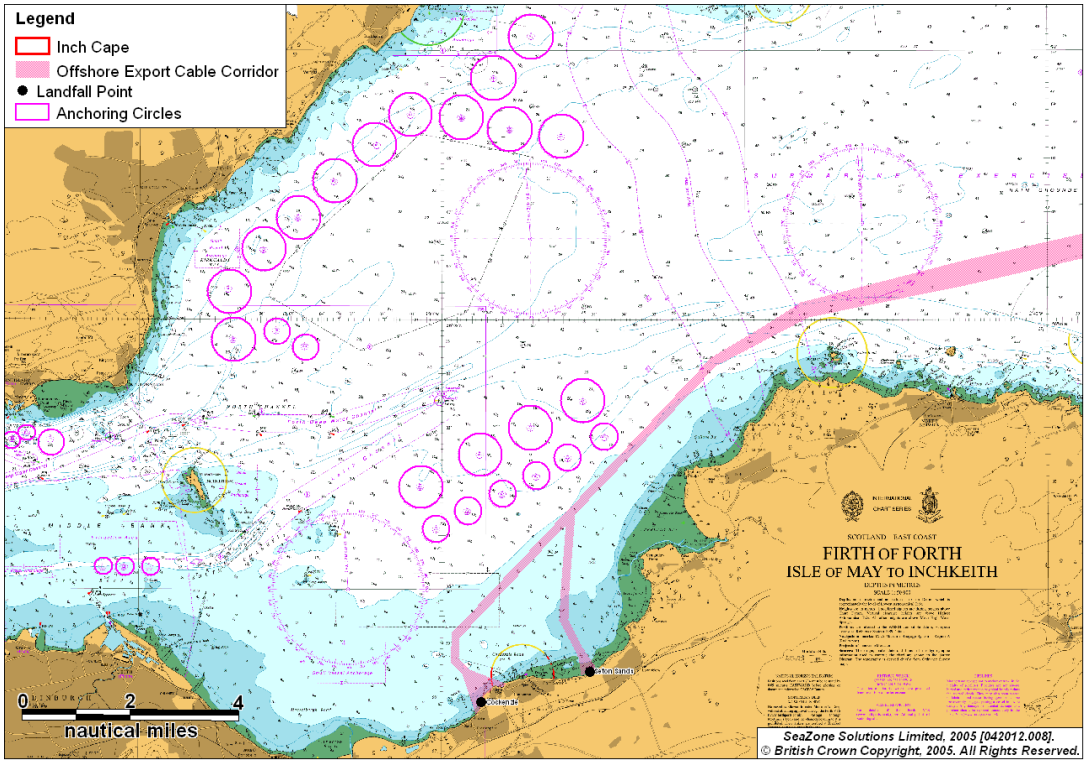


Figure 19B.5 Anchorage Circles Relative to Offshore Export Cable Corridor



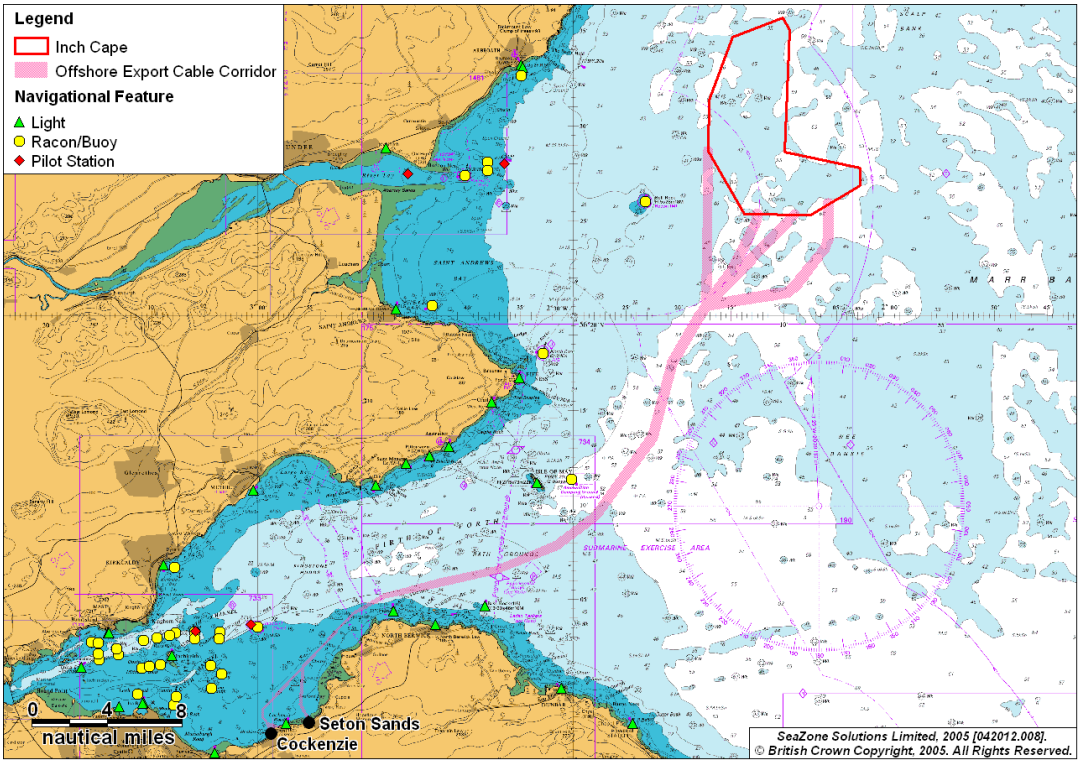
It can be seen that there are a number of designated anchorage areas and anchor berths in the Firth of Forth and along the east coast of Scotland, none of which intersect the Offshore Export Cable Corridor.

Consultation with Forth Ports Harbour Master (see Section 19B.4) indicated no concerns with the proximity of the Offshore Export Cable Corridor to the anchorage circles. However it was noted that once an exact location was defined or during construction works Forth Ports would work with ICOL to ensure navigational safety is maintained.

19B.5.3 Aids to Navigation (AtoN)

A plot of the main navigational aids in the vicinity of the Offshore Export Cable Corridor is presented in Figure 19B.6.

Figure 19B.6 Aids to Navigation Relative to Offshore Export Cable Corridor



There are a number of buoys to the west of the Offshore Export Cable Corridor, which are mainly associated with the marked channels in the Firth of Forth.

There is a Racon on Bell Rock transmitting Morse letter 'M'. The light on Bell Rock is a flashing light every 5 seconds, at a height of 28 m above height datum with a range of 18 m. Bell Rock is located approximately 3 nm west of the Offshore Export Cable Corridor.

19B.5.4 Oil and Gas

There are no oil and gas installations in proximity to the Offshore Export Cable Corridor.

19B.5.5 Aggregate Dredging Areas

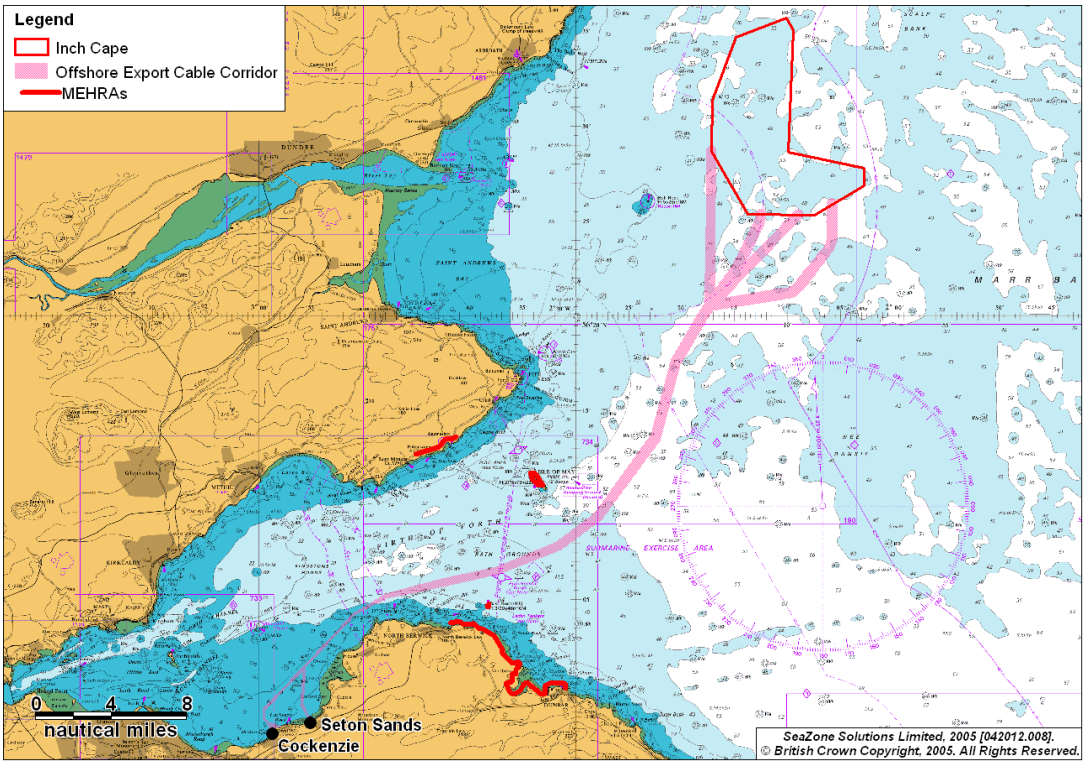
The only aggregate dredging license in Scotland was located within the Firth of Forth (approximately 5 nm west of the Offshore Export Cable Corridor); however the ten year lease between Westminster Gravels Ltd and the Crown Estate ended in January 2011 and has not yet been renewed.

19B.5.6 Marine Environmental High Risk Areas

Marine Environmental High Risk Areas (MEHRAs) are areas that have been identified by the UK Government as areas of environmental sensitivity and at high risk of pollution from ships. The UK Government expects mariners to take note of MEHRAs and either keep well clear or, where this is not practicable, exercise an even higher degree of care than usual when passing nearby.

Figure 19B.7 presents the MEHRAs in the vicinity of the Offshore Export Cable Corridor. It can be seen that there are MEHRAs around the Isle of May (approximately 3 nm east of the Offshore Export Cable Corridor) and at Bass Rock and the adjacent coastline (approximately 1.4 nm south of the Offshore Export Cable Corridor). Both MEHRAs have been designated on wildlife, landscape and geological grounds.

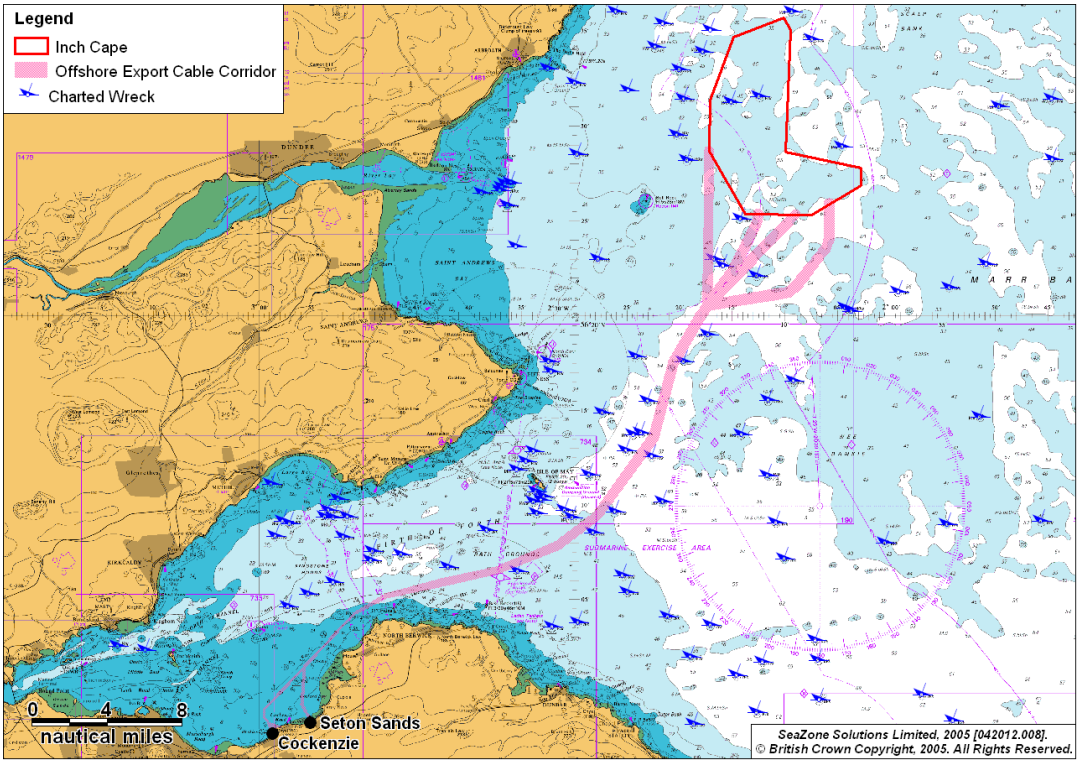
Figure 19B.7 MEHRAs Relative to Offshore Export Cable Corridor



19B.5.7 Wrecks

Based on admiralty charts of the Forth and Tay area, the locations of wrecks in the vicinity of the Offshore Export Cable Corridor are presented in Figure 19B.8.

Figure 19B.8 Wrecks Relative to Offshore Export Cable Corridor



It can be seen that there are a number of wrecks in the vicinity of the Offshore Export Cable Corridor and two located in the Development Area, within which the OSPs are to be situated.

See Chapter 17: Cultural Heritage and Marine Archaeology for more details of wrecks in the vicinity of the Offshore Export Cable Corridor.

19B.5.8 Impacts Associated with Existing Baseline

Following assessment of the Offshore Export Cable Corridor, no impacts associated with navigational safety issues have been identified during operation and maintenance. However it is noted that further assessment of the exact location will be undertaken including consideration for the cable burial and protection index before a final route is defined.

19B.6 Maritime Incidents

19B.6.1 Introduction

This section reviews maritime incidents that have occurred in the vicinity of the Offshore Export Cable Corridor in the ten year period from 2001 to 2010.

A 2 nm buffer was placed around the Offshore Export Cable Corridor to provide a sample area in which to undertake data analysis (Offshore Export Cable Corridor Buffer).

The analysis is intended to provide a general indication as to whether the Offshore Export Cable Corridor is currently low or high risk in terms of the number and type of maritime incidents. If it was found to be a particular high risk area for incidents, this may indicate that the Offshore Export Cable could exacerbate the existing maritime safety risk in the area. Data from the following sources have been analysed:

- MAIB 2001-2010; and
- RNLI 2001-2010.

It is noted that the same incident may be recorded by both sources.

19B.6.2 Marine Accident Investigation Branch

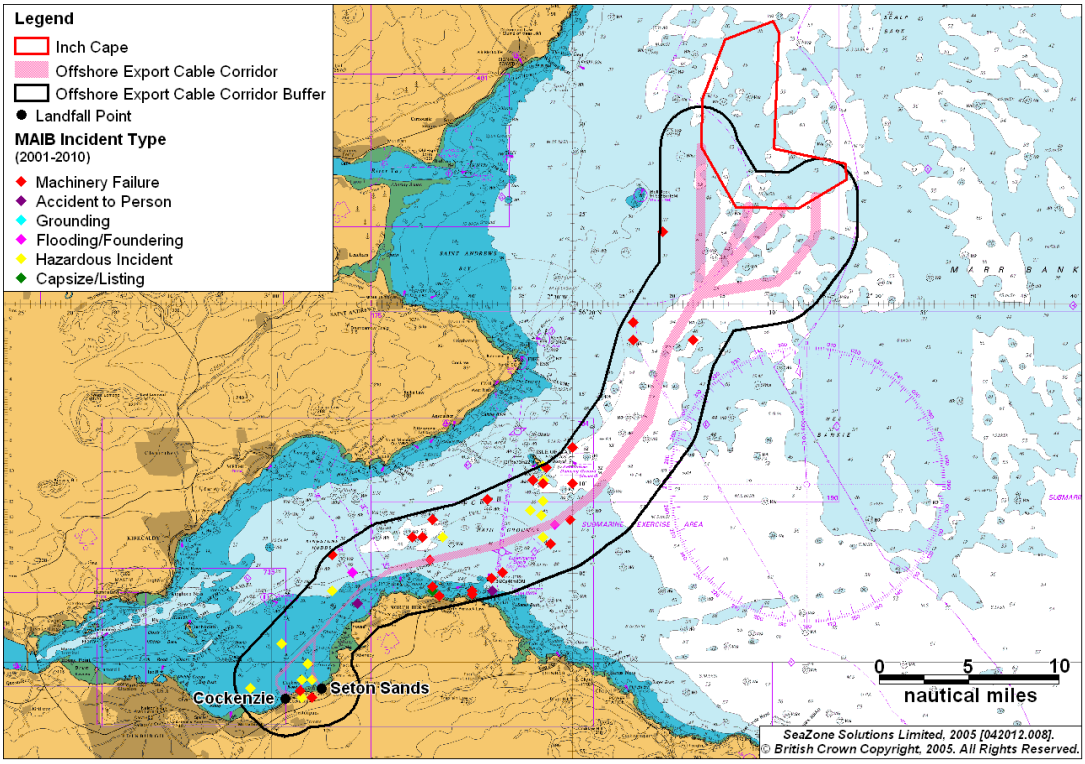
The locations of accidents, injuries and hazardous incidents reported to MAIB in the vicinity of the Offshore Export Cable Corridor between January 2001 and December 2010 are presented in the following subsections. Note that the MAIB aim for 97 per cent accuracy in reporting the locations of incidents.

Hazardous incidents have been defined by the MAIB as *"unspecified events which might have led to an accident, eg, near misses stemming from failure of procedures in shipboard operations, material defects, fatigue and human failures"*.

19B.6.2.1 Offshore Export Cable Corridor MAIB Incidents

MAIB incidents within the Offshore Export Cable Corridor Buffer, between January 2001 and December 2010 are presented in Figure 19B.9, colour-coded by type.

Figure 19B.9 MAIB Incident by Type within Offshore Export Cable Corridor Buffer

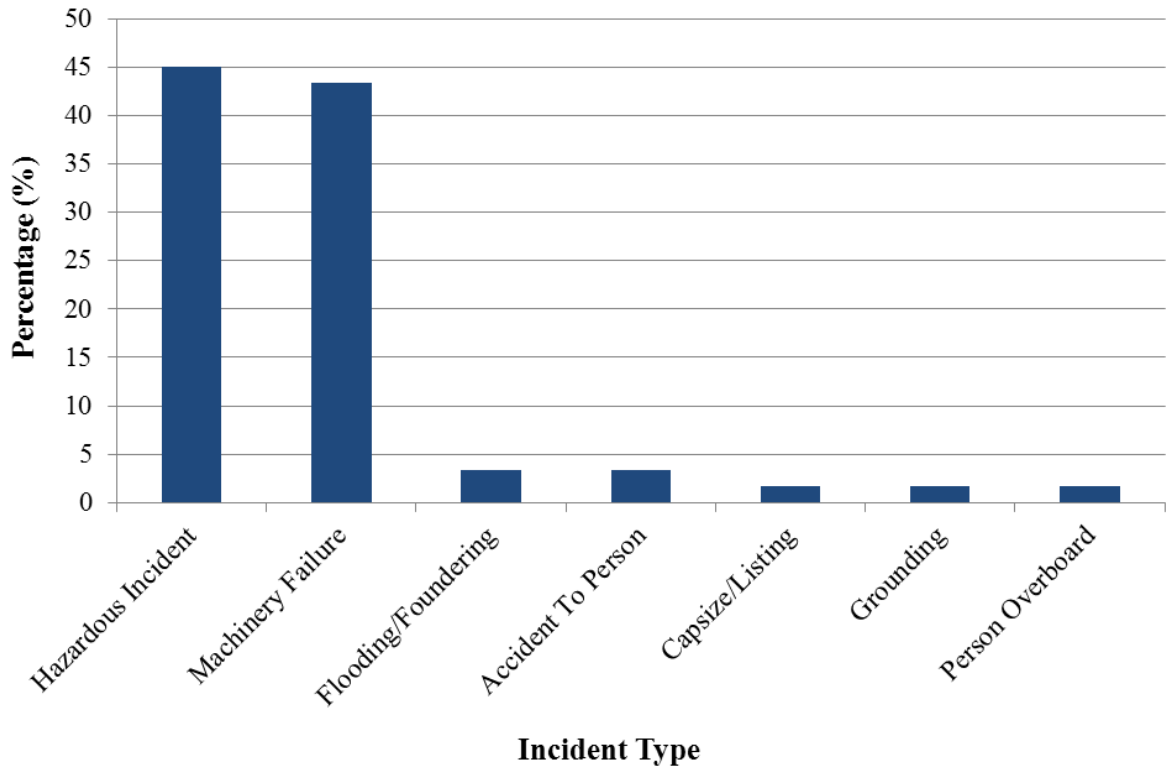


A total of 60 incidents were recorded within the Offshore Export Cable Corridor Buffer over the ten years analysed, involving 51 vessels, corresponding to an average of six incidents per year. Of these, there were two incidents recorded in the Offshore Export Cable Corridor. A summary of these incidents is provided below:

- In October 2008, a trawler on passage (16.61 m in length and 52 Gross Tonnage (GT)) suffered a machinery failure in moderate sea conditions. There was no damage to the vessel.
- In August 2009, a trawler shooting/hauling fishing gear (12.88 m in length and 24.1 GT) flooded/foundered in rough sea conditions with poor visibility. There was minor damage to the vessel.

The distribution by incident type is presented in Figure 19B.10.

Figure 19B.10 MAIB incidents by Type within the Offshore Export Cable Corridor Buffer (2001-2010)



The most common incident types recorded within the Offshore Export Cable Corridor Buffer were hazardous incidents (45 per cent) and machinery failures (43 per cent).

19B.6.3 RNLI

Data on RNLI lifeboat responses within the Offshore Export Cable Corridor Buffer in the ten-year period between 2001 and 2010 have been analysed. There are two types of RNLI lifeboats that can respond to incidents: All-Weather Lifeboats (ALB) and Inshore Lifeboats (ILB). The type of lifeboat is noted when describing incidents.

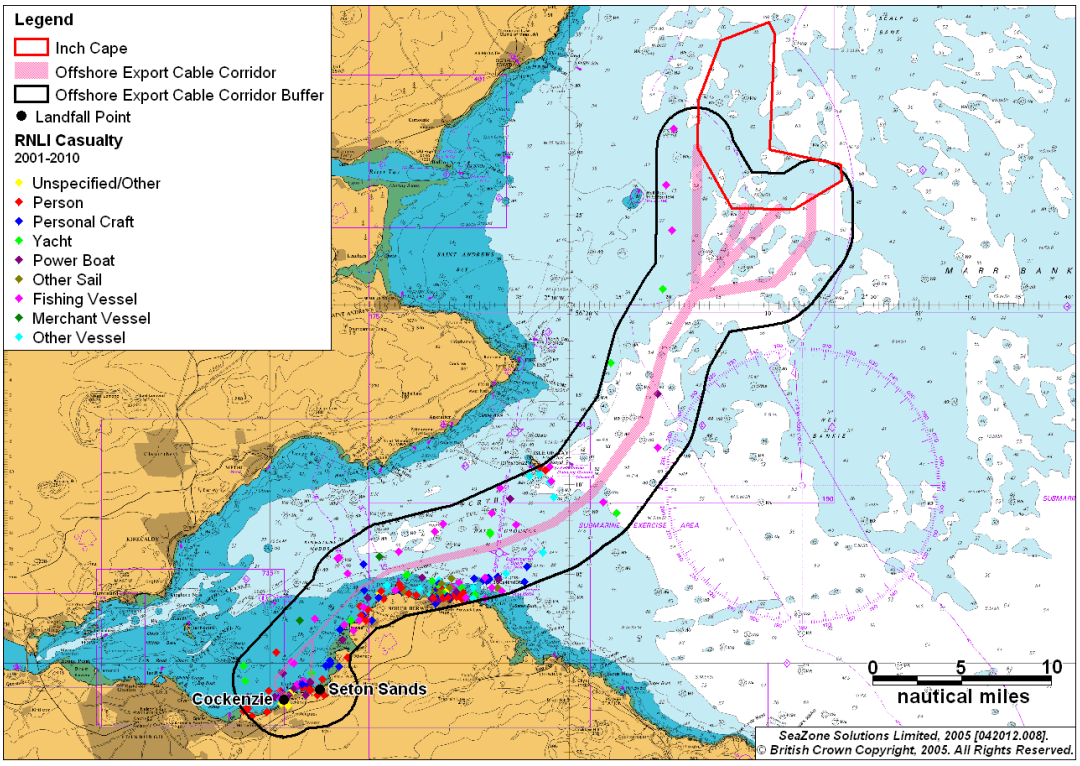
The following subsections analyse the RNLI incidents within the Offshore Export Cable Corridor Buffer.

19B.6.3.1 Offshore Export Cable Corridor RNLI Incidents

A total of 201 unique incidents were recorded within the Offshore Export Cable Corridor Buffer over the ten years analysed, corresponding to an average of 20 incidents per year.

Figure 19B.11 presents the geographical location of incidents colour-coded by casualty type. It can be seen that the vast majority occurred near the coast (i.e. off the East Lothian coast) with relatively few further out to sea.

Figure 19B.11 RNLI Incidents by Casualty Type within Offshore Export Cable Corridor Buffer

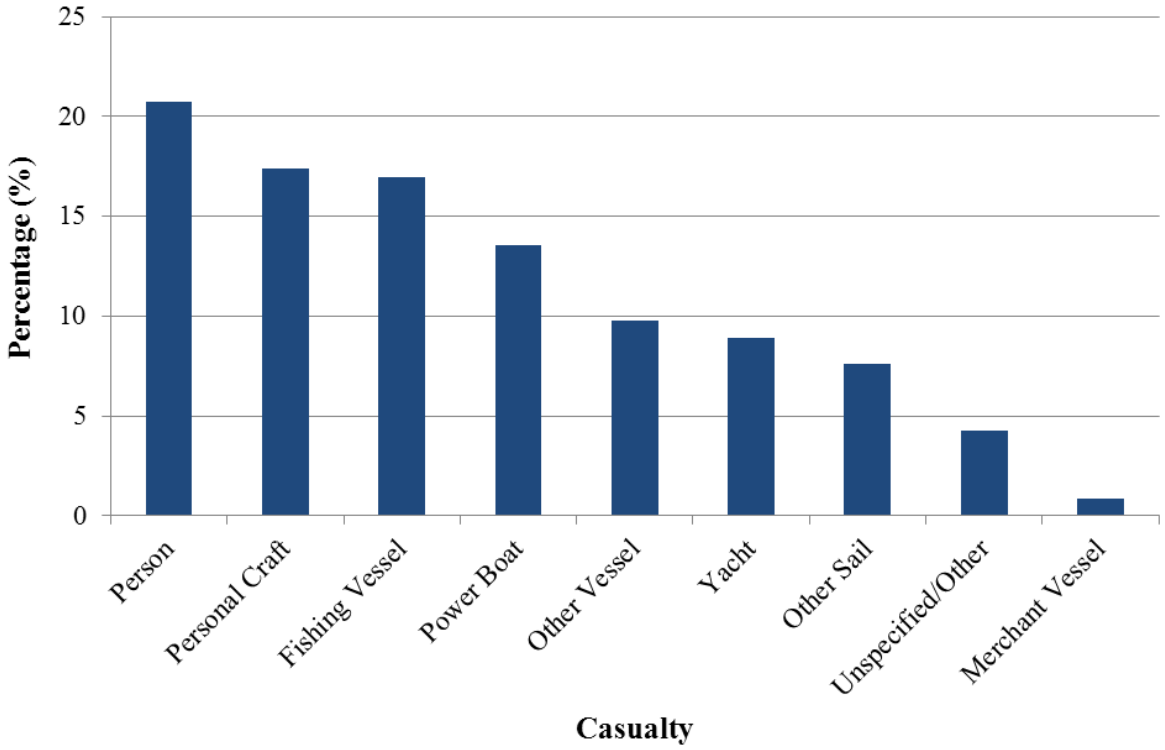


Details of incidents recorded within the Offshore Export Cable Corridor Buffer (excluding those in near shore waters such as person in danger or animal in trouble) are provided below:

- North Berwick ILB and Dunbar ILB responded to an incident in May 2003 when a yacht suffered a steering failure and the casualties were brought inshore;
- In April 2004 Dunbar ALB assisted a large power boat which had suffered a leak and swamping event;
- Kinghorn ILB assisted a small fishing vessel with a machinery failure in June 2007;
- Dunbar ALB responded to a steering failure incident of a fishing vessel in January 2010; and
- Dunbar ALB and Anstruther ALB assisted an ill crewman onboard a sailing yacht in June 2010.

The overall distribution by casualty type is summarised in Figure 19B.12.

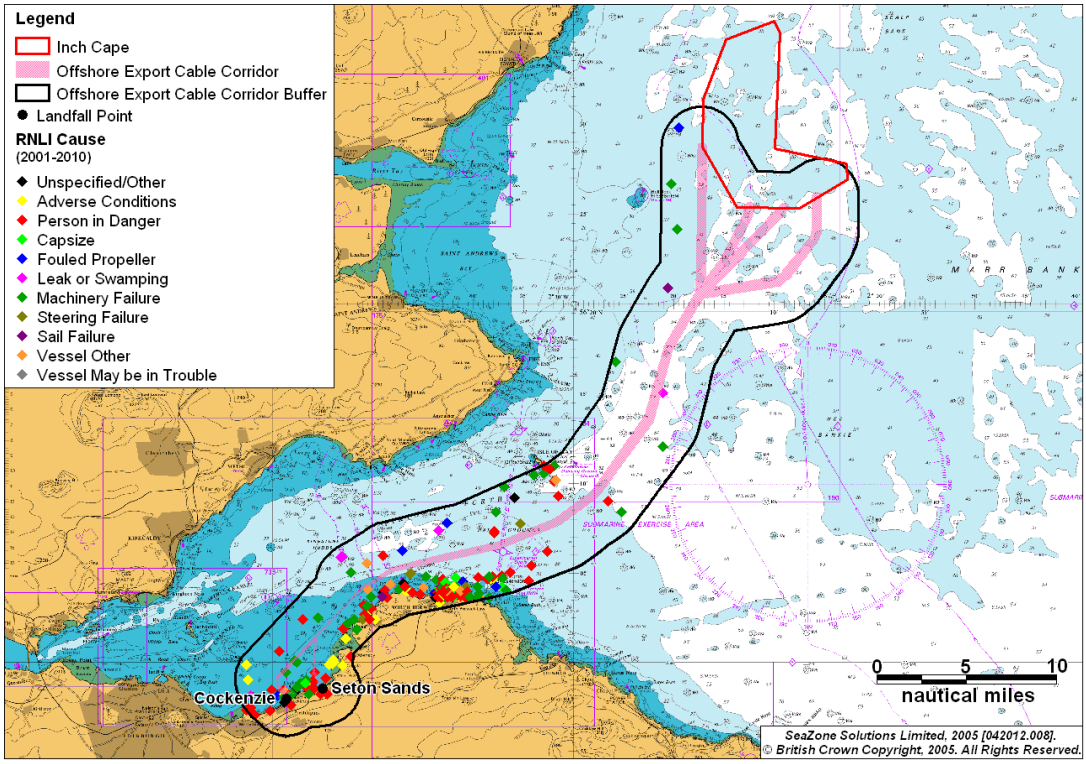
Figure 19B.12 RNLI Incidents by Type within the Offshore Export Cable Corridor Buffer (2001-2010)



Accident to person (21 per cent) was the most common casualty type involved. The remainder of casualties generally consisted of personal craft (17 per cent), fishing vessels (17 per cent) and power boats (14 per cent).

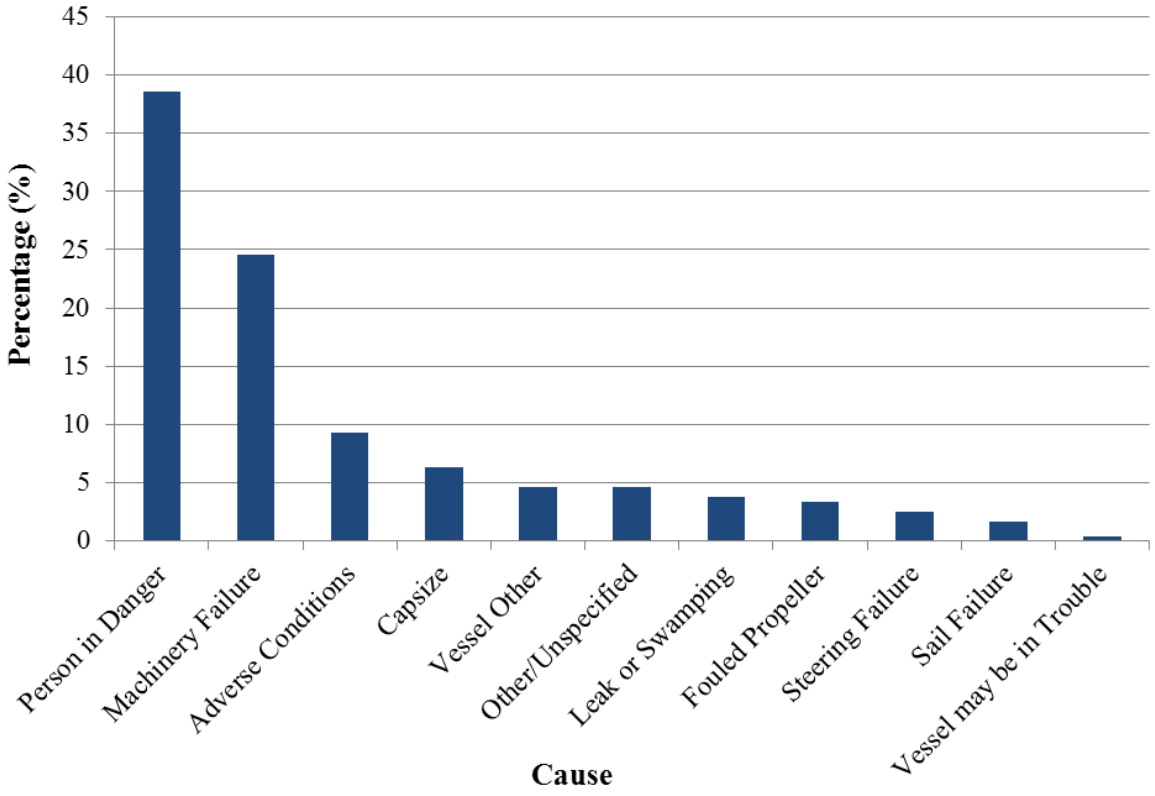
A plot of the incidents by cause is presented in Figure 19B.13.

Figure 19B.13 RNLI Incidents by Cause within the Offshore Export Cable Corridor Buffer



The overall distribution by cause is summarised in Figure 19B.14.

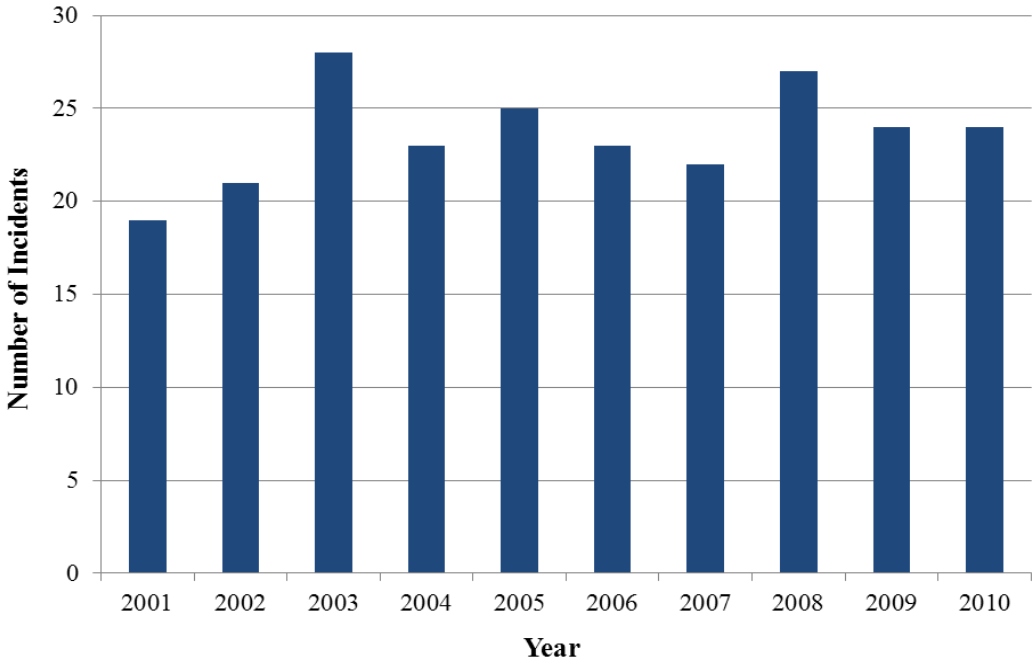
Figure 19B.14 RNLI Incidents by Cause within Offshore Export Cable Corridor Buffer (2001-2010)



The main reported causes were person in danger (39 per cent) and machinery failure (25 per cent).

The annual rate of incidents in the ten years analysed is summarised in Figure 19B.15.

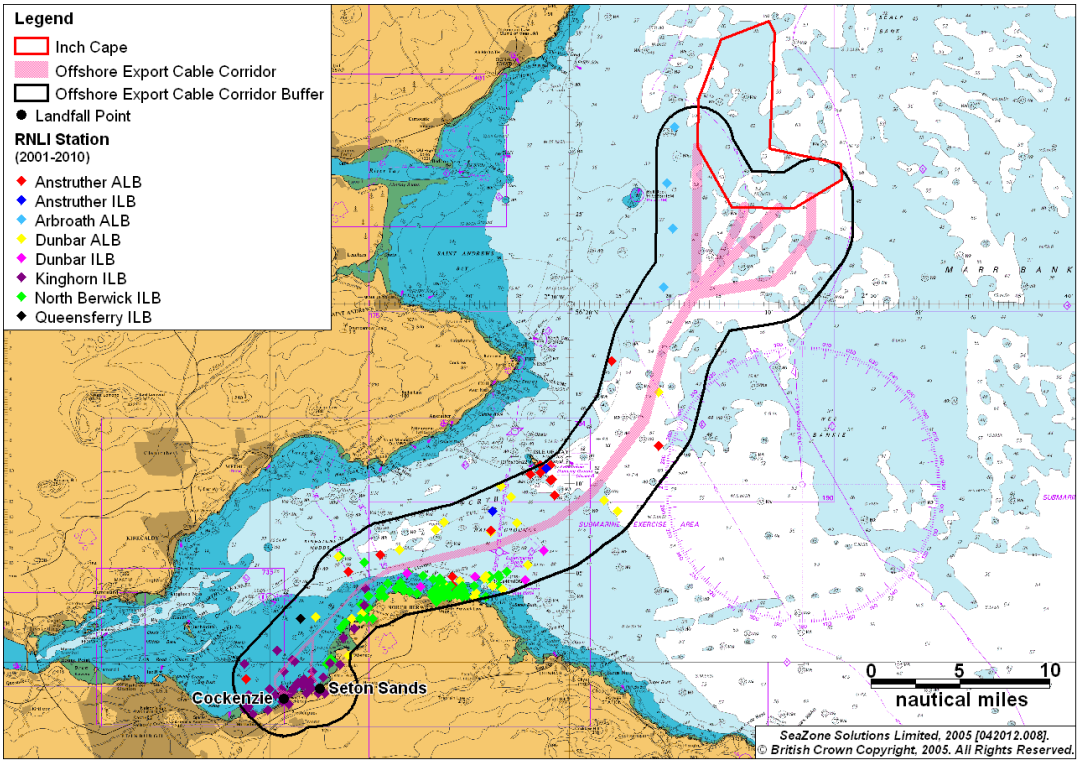
Figure 19B.15 RNLI Incidents by Year within Offshore Export Cable Corridor Buffer



There were an average of 24 RNLI incidents per year recorded within the Offshore Export Cable Corridor buffer and the year with the most incidents was 2003 when 28 were recorded.

A plot of the RNLI stations responding to the incidents is presented in Figure 19B.16.

Figure 19B.16 RNLI Stations Responding to Incidents



From the ten year period of RNLI data analysed (2001-2010), North Berwick ILB responded to 46 per cent of incidents and Kinghorn ILB to 23 per cent of incidents.

19B.6.4 Conclusions

Based on the review of incidents, it can be seen that there have been a relatively low rate of accidents in recent years within the Offshore Export Cable Corridor buffer.

Most incidents in the area have occurred off the coast of East Lothian within 1-2 nm of the coastline.

19B.7 Maritime Traffic Surveys

19B.7.1 Introduction

The data presented in this section comprises coastal-based AIS collected from shore based stations in Stonehaven, Dundee, Inner Forth and Dunbar as part of the FTOWDG work (28 days in January/February 2011) and AIS data collected from shore based stations located in proximity to the Offshore Export Cable Corridor (28 days in May 2012).

Data have been analysed within the Offshore Export Cable Corridor Buffer to provide context.

19B.7.2 Vessel Types

Plots of the vessel tracks recorded on AIS within the Offshore Export Cable Corridor Buffer in January/February 2011 and May 2012, colour-coded by vessel type are presented in Figure 19B.17 and Figure 19B.18 respectively. Non-routine and temporary vessels including survey ships were removed from the data sets and will not be included in the subsequent analysis.

Figure 19B.17 Overview of AIS Tracks Recorded (28 Days January/February 2011)

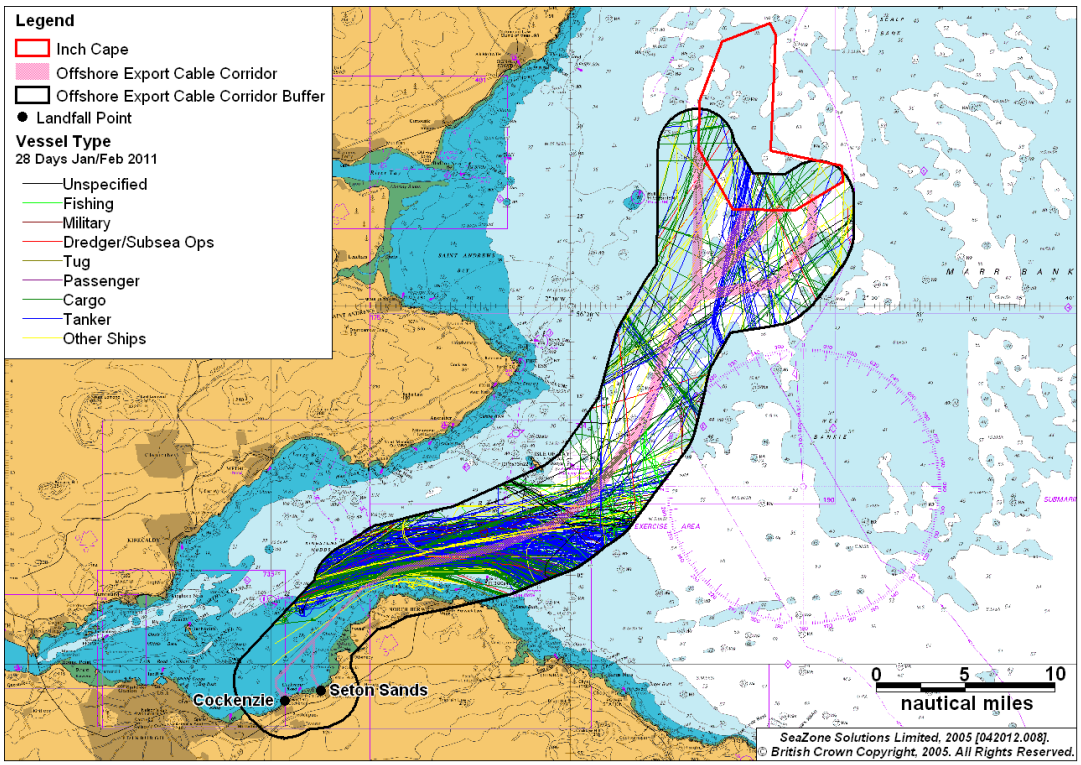
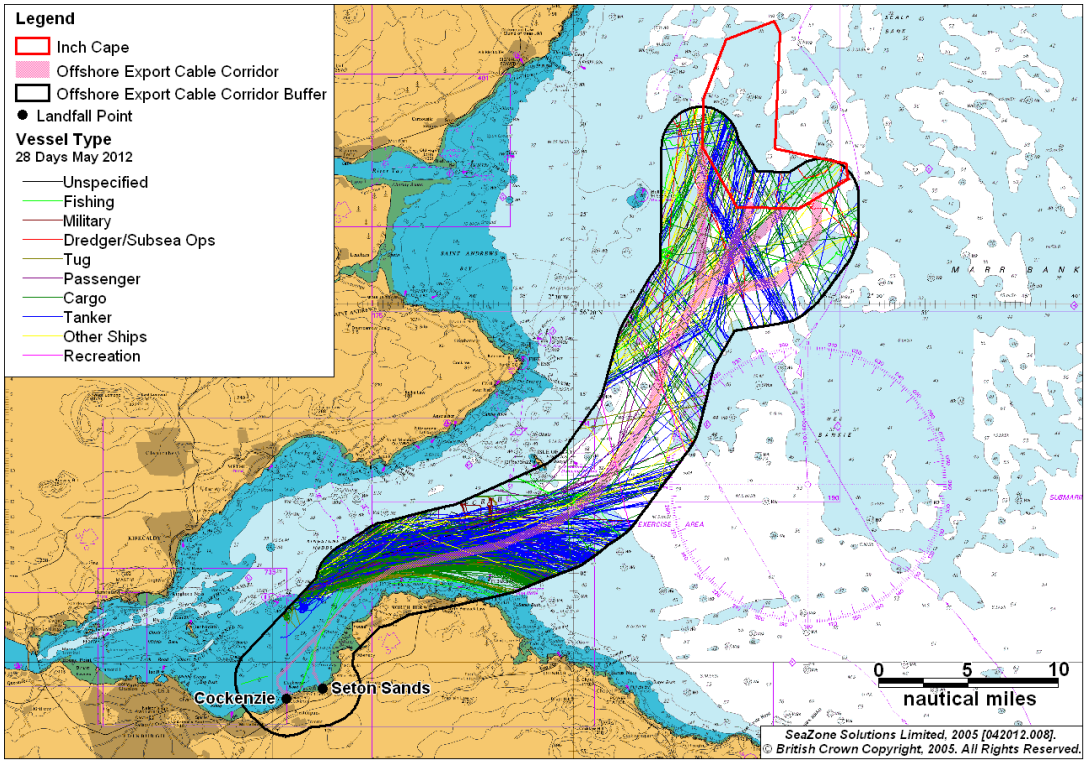


Figure 19B.18 Overview of AIS Tracks Recorded (28 Days May 2012)



The breakdown of vessel types for each of these periods is presented in Figure 19B.19 and Figure 19B.20.

Figure 19B.19 Vessel Type (28 days January/February 2011)

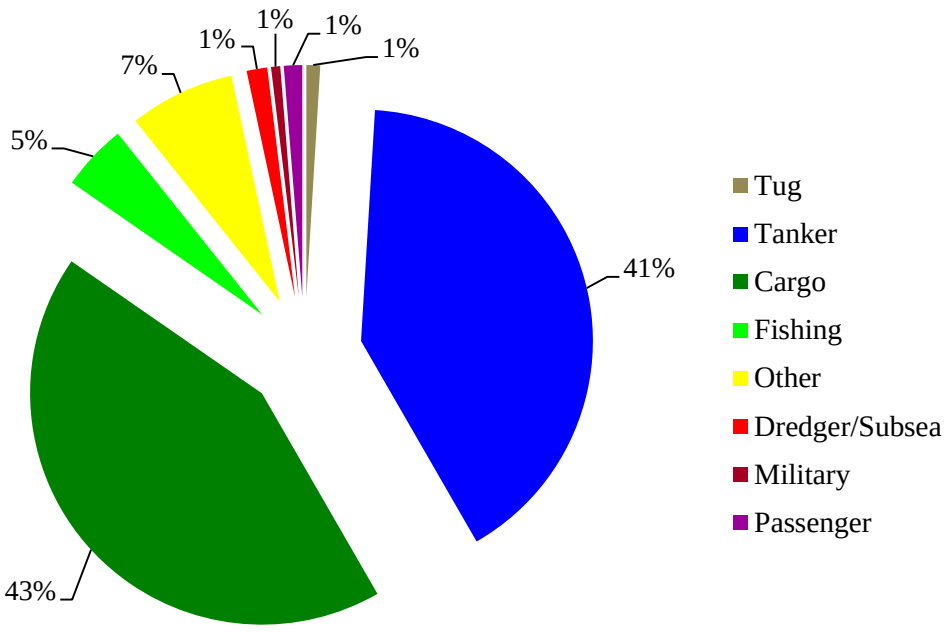
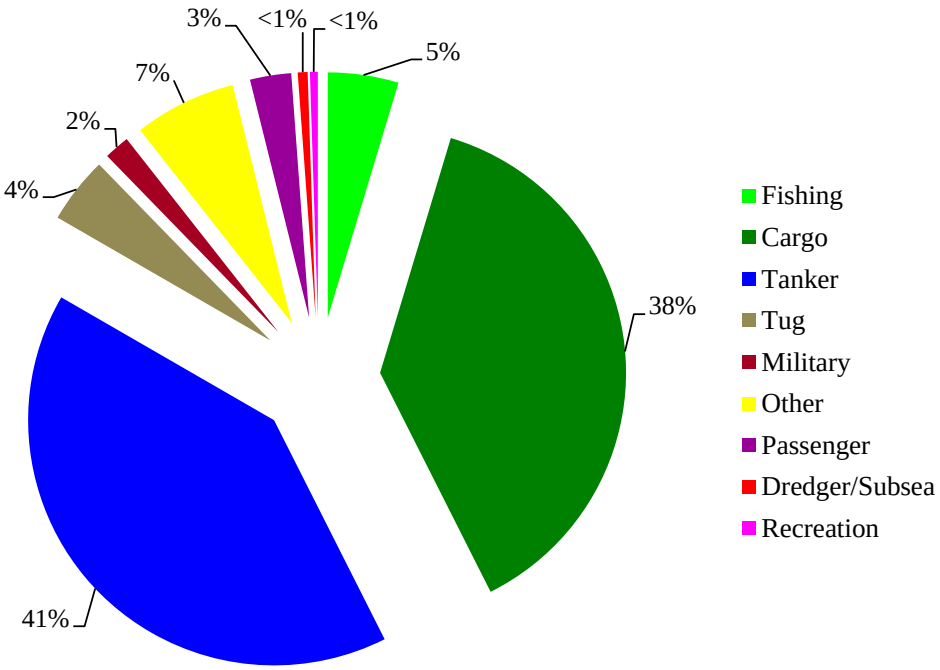


Figure 19B.20 Vessel Type (28 days May 2012)



In January/February 2011, the most common types of vessel recorded within the Offshore Export Cable Corridor Buffer were cargo vessels (43 per cent) and tankers (41 per cent) with 'other' vessels making up seven per cent of traffic with the remaining nine per cent made up by military, tugs, dredgers and fishing vessels. In May 2012, tankers and cargo vessels made up 41 per cent and 38 per cent of traffic respectively with 'other' vessels comprising 7 per cent with the remaining 14% made up by fishing, tug, military, passenger, dredgers and recreation.

Plots of cargo vessels, tankers and passenger vessels for the two periods are presented in Figure 19B.21 to Figure 19B.26.

Figure 19B.21 Cargo Vessels (28 Days January/February 2011)

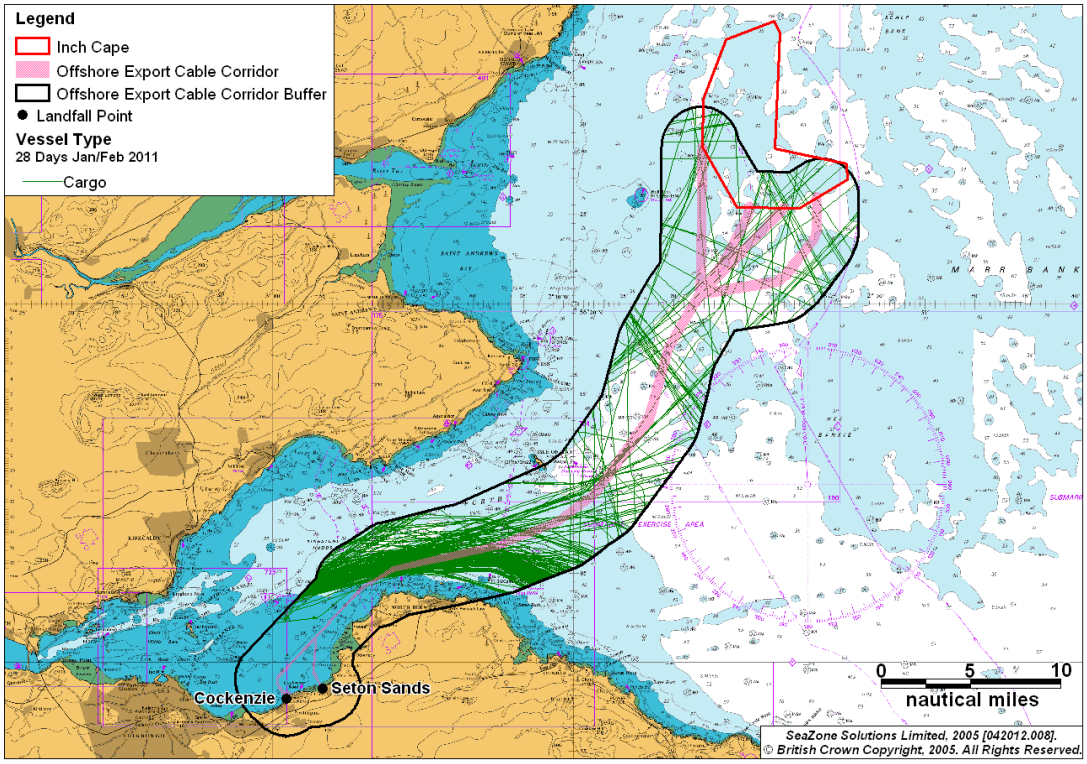


Figure 19B.22 Cargo Vessels (28 Days May 2012)

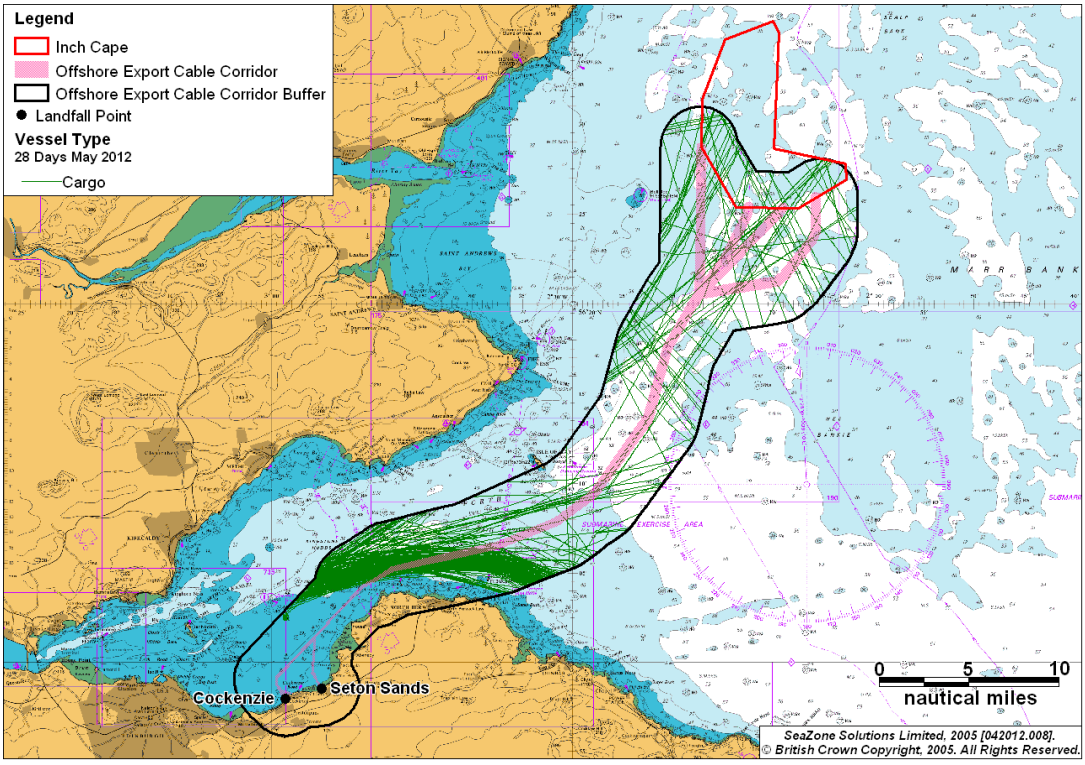


Figure 19B.23 Tankers (28 Days January/February 2011)

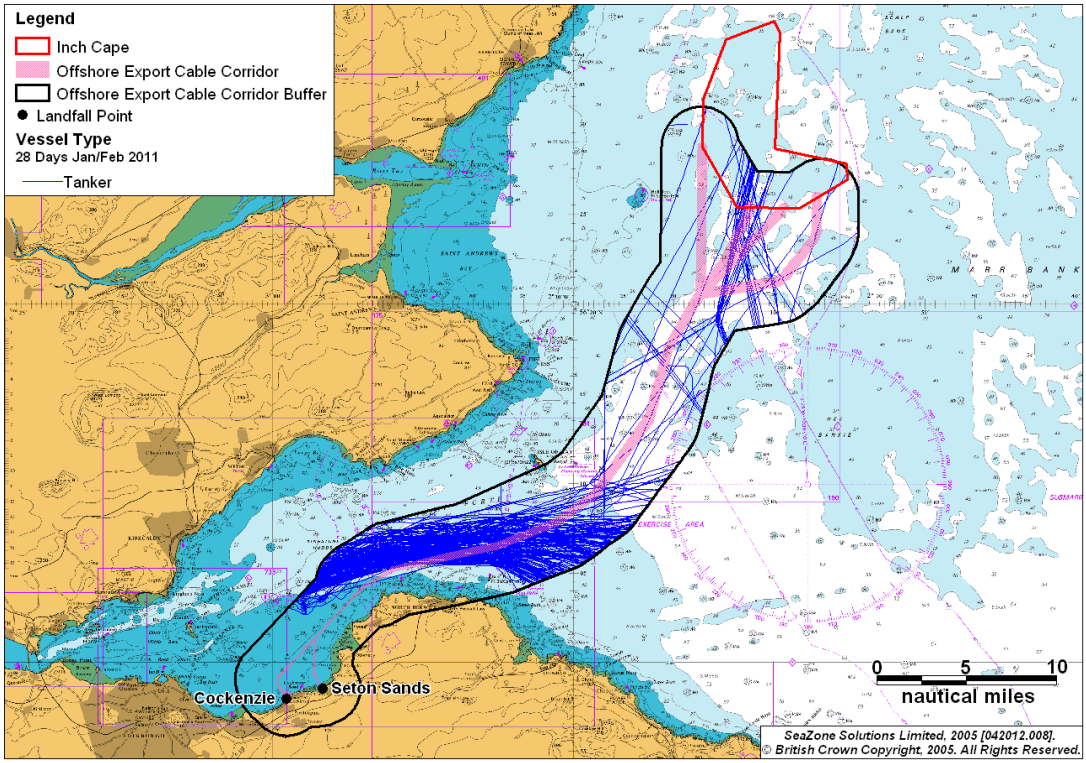


Figure 19B.24 Tankers (28 Days May 2012)

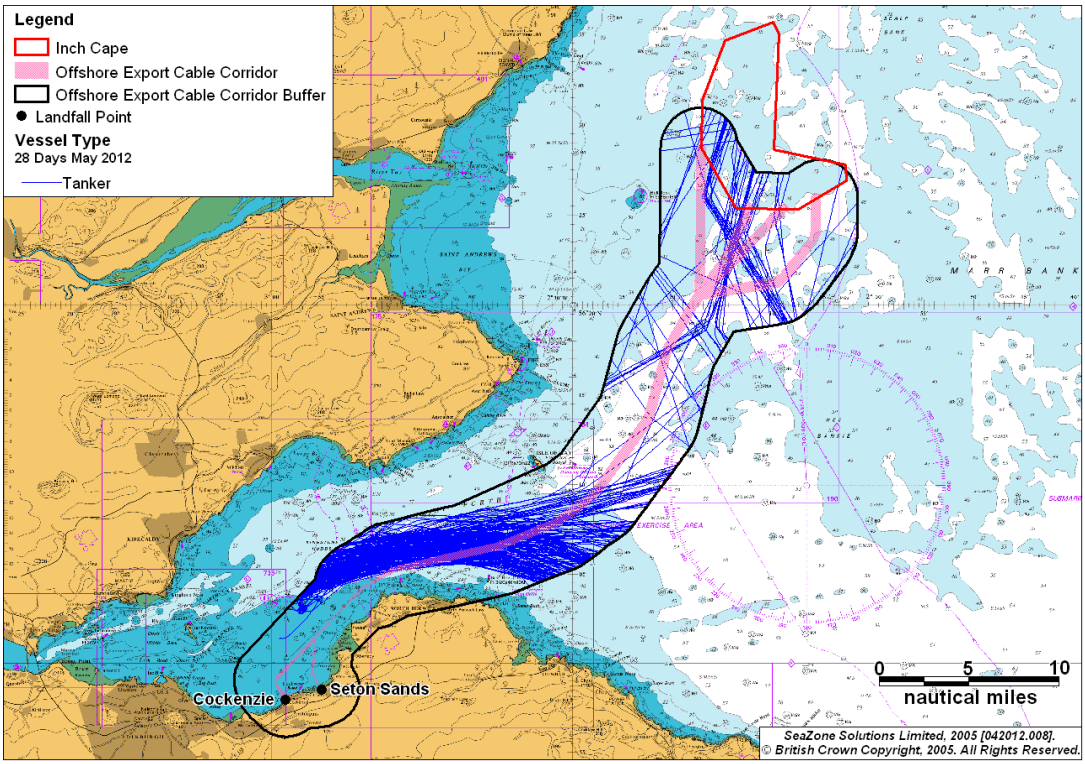


Figure 19B.25 Passenger Vessels (28 Days January/February 2011)

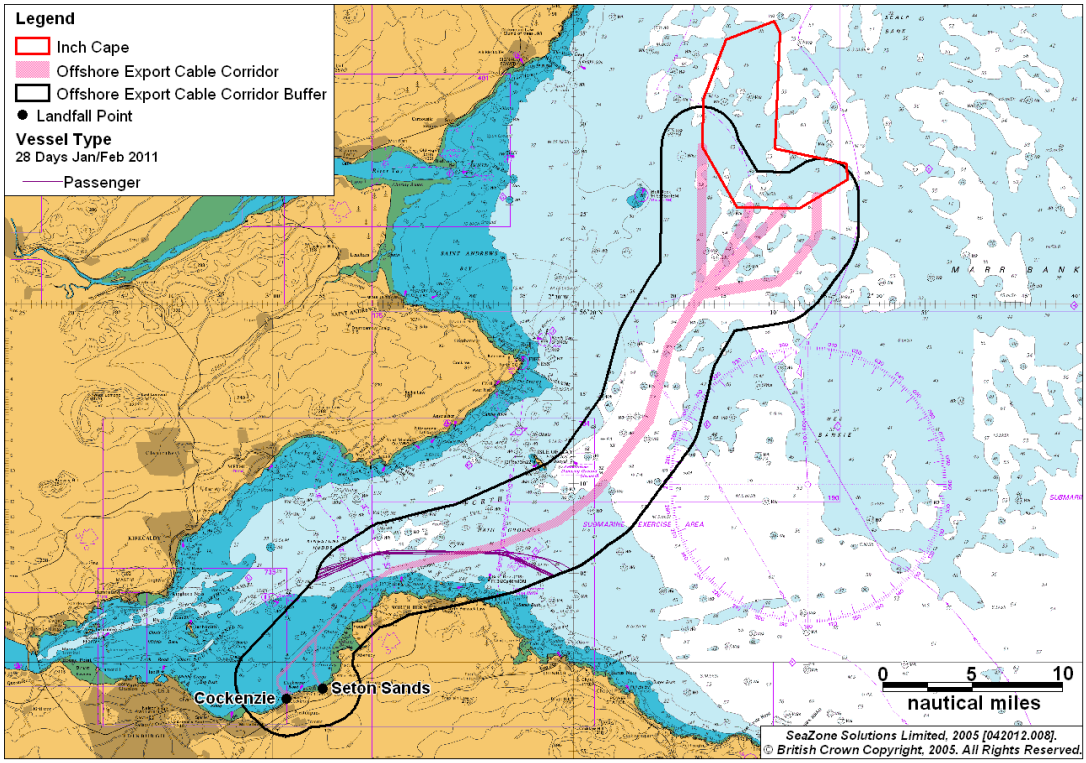
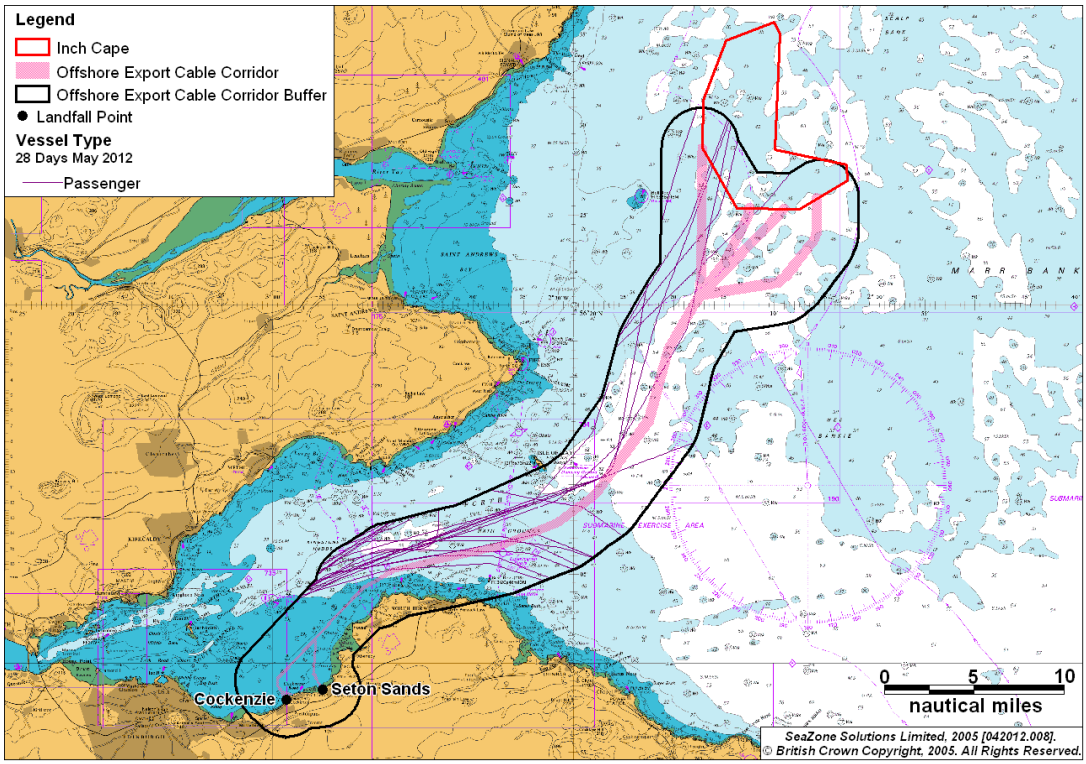


Figure 19B.26 Passenger Vessels (28 Days May 2012)

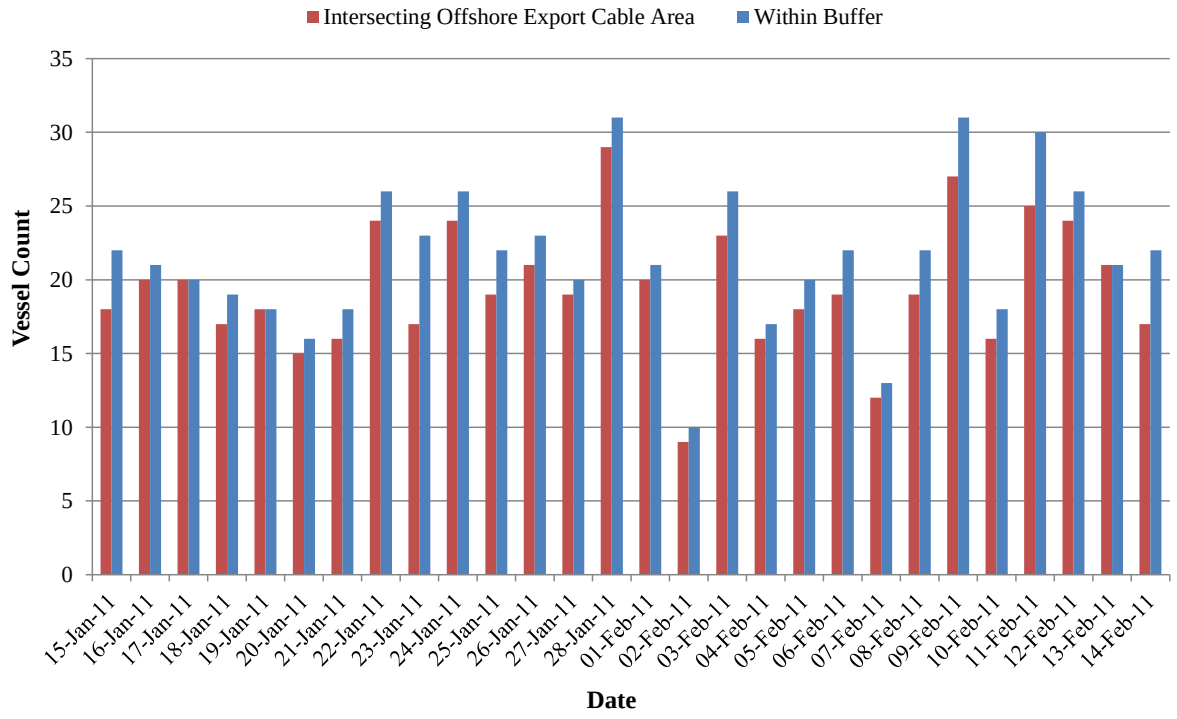


In terms of passenger vessel movements, the vessel recorded crossing the Offshore Export Cable Corridor in an east-west direction in January/February 2011 was the Roll On Roll Off (RoRo) *Dublin Seaways* (now renamed *Stena Feronia*), transiting between Rosyth and Zeebrugge. In May 2012, a large number of the passenger vessels recorded were cruise vessels headed for Leith and Rosyth.

19B.7.3 Vessel Count

Figure 19B.27 presents the daily number of unique vessels intersecting the Offshore Export Cable Corridor and passing within the Offshore Export Cable Corridor Buffer for 28 days in January/February 2011.

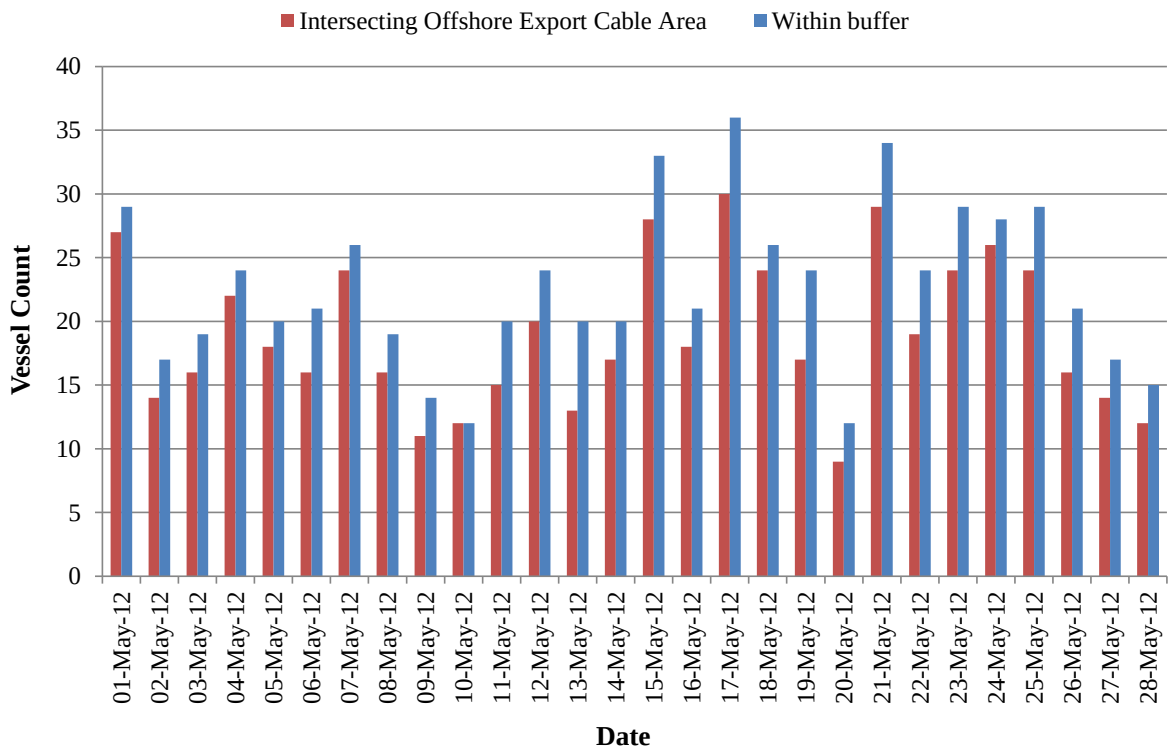
Figure 19B.27 Daily Count January/February 2011



In January and February 2011, there were an average of 19 unique vessels intersecting the Offshore Export Cable Corridor per day and an average of 22 unique vessels within the Buffer per day. The busiest days were 28 January 2011 and 9 February 2011 with 31 vessels being recorded within the Buffer. The quietest day was 2 February 2011 when 10 vessels were tracked.

Figure 19B.28 presents the daily number of unique vessels intersecting the Offshore Export Cable Corridor and passing within the Offshore Export Cable Corridor Buffer for 28 days in May 2012.

Figure 19B.28 Daily Count May 2012



In May 2012, there were an average of 19 unique vessels intersecting the Offshore Export Cable Corridor per day and an average of 23 unique vessels within the buffer per day. The busiest day during the 28 day period was 17 May 2012 with 36 vessels being recorded within the Buffer. 10 and 20 May 2012 were the quietest days with 12 vessels being recorded within the Buffer on these days.

19B.7.4 Vessel Length and Draught

Figure 19B.29 and Figure 19B.30 present the vessel tracks colour coded by length.

Figure 19B.29 Vessel Length (28 Days January/February 2011)

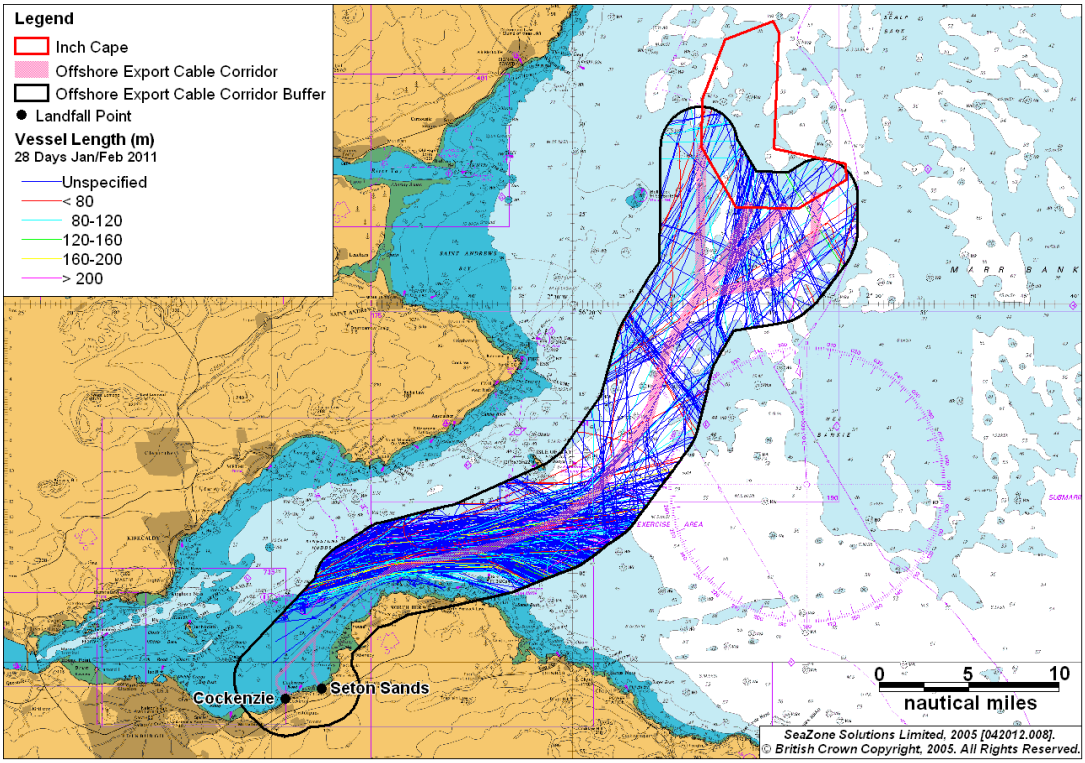
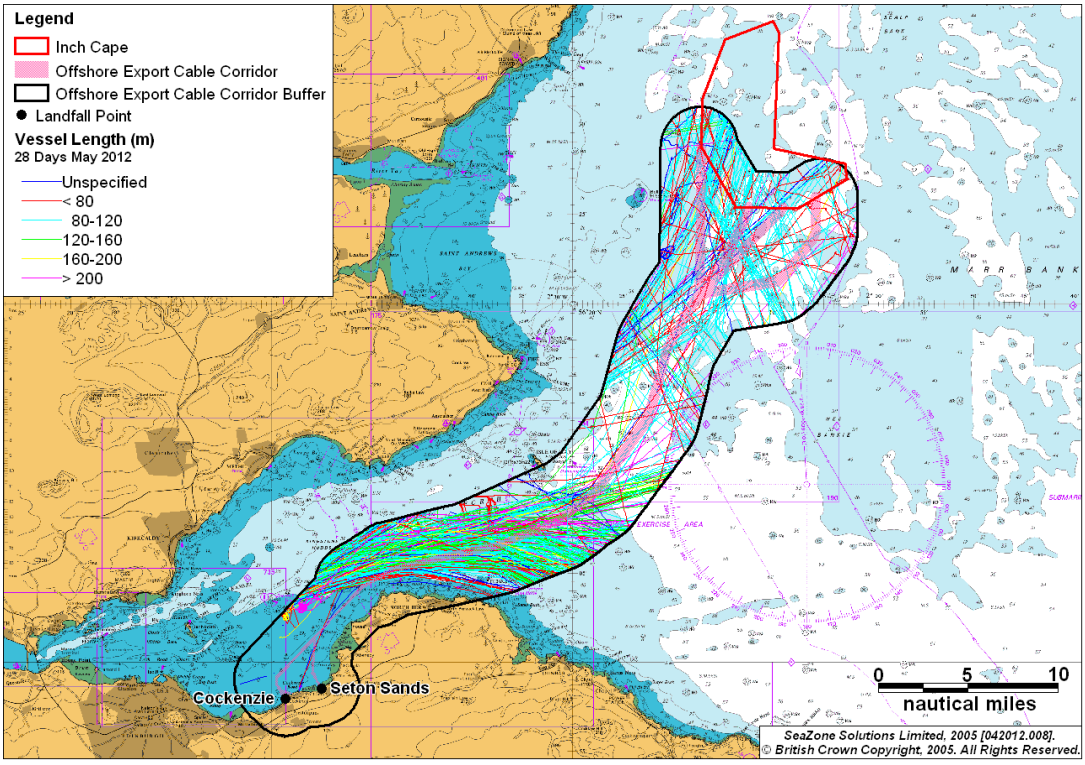


Figure 19B.30 Vessel Length (28 Days May 2012)



In January/February 2011 the average length of vessels within the Offshore Export Cable Corridor Buffer was 104 m (excluding those which did not specify a length). The longest vessel was the tanker *British Gannet* at 252 m in length.

In May 2012 the average length of vessels within the Offshore Export Cable Corridor Buffer was 104 m (excluding those which did not specify a length). The longest vessels were the crude oil tankers *Front Tina* and *Atlantas* at 333 m in length.

Figure 19B.31 and Figure 19B.32 present the vessel tracks crossing the Offshore Export Cable Corridor, colour coded by draught.

Figure 19B.31 Vessel Draught (28 Days January/February 2011)

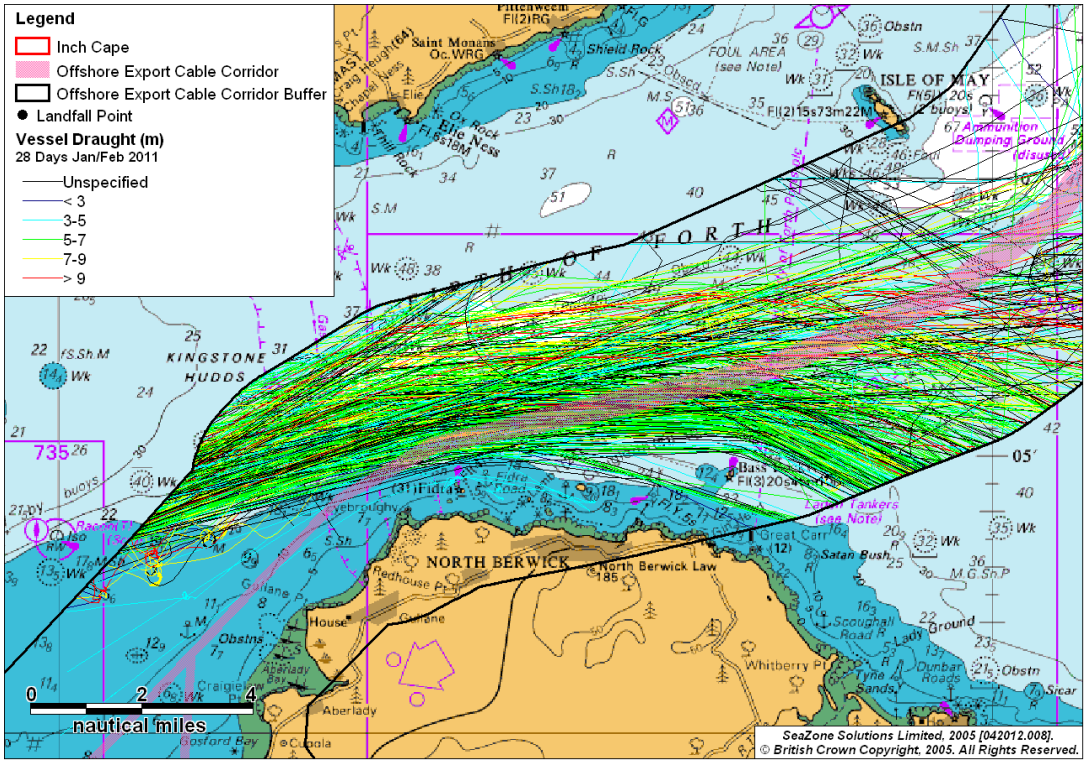
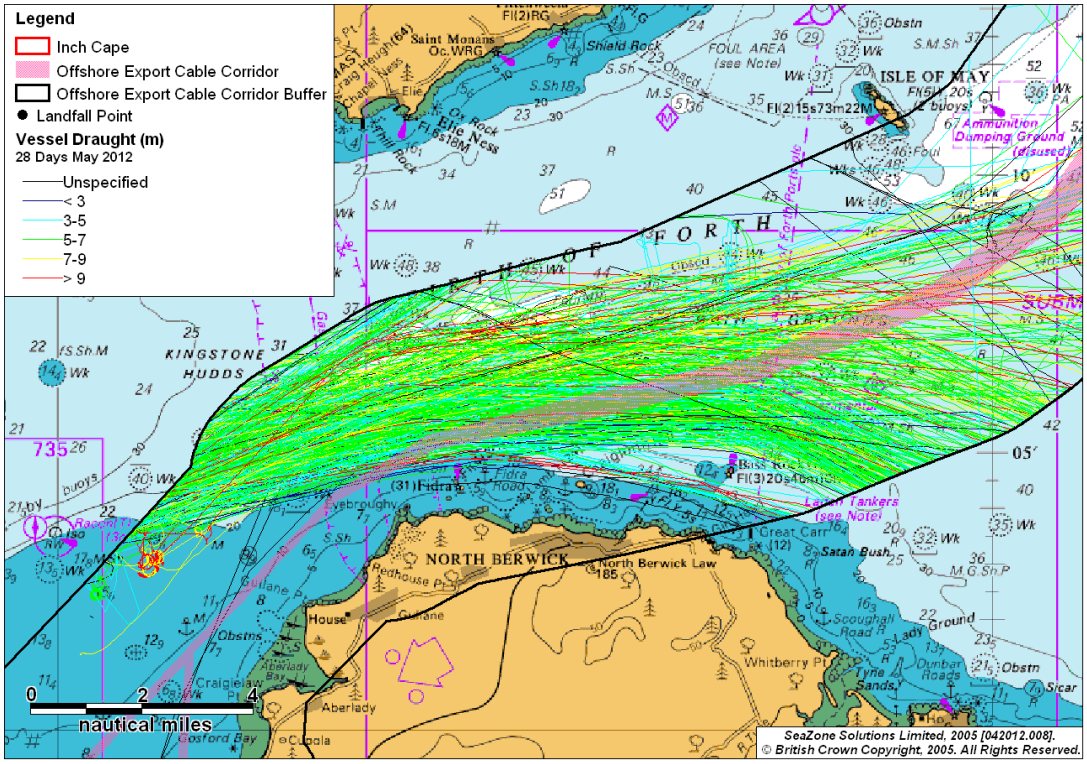


Figure 19B.32 Vessel Draught (28 Days May 2012)



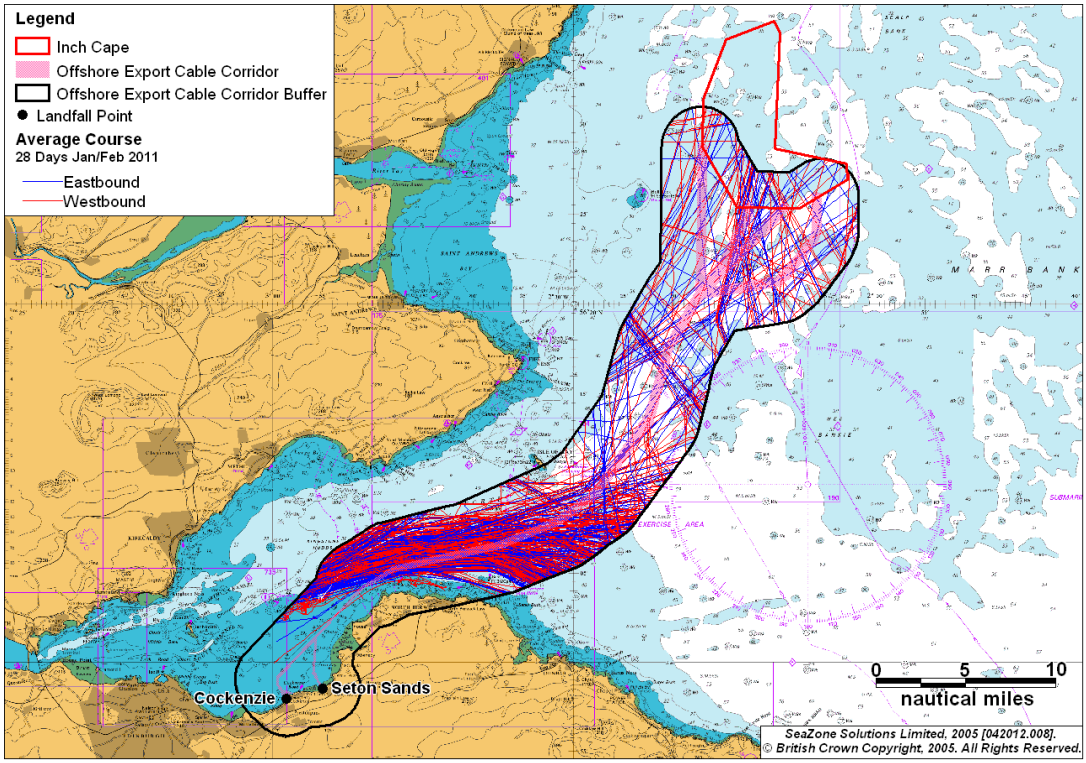
In January/February 2011 the average draught of vessels within the Offshore Export Cable Corridor Buffer was 5.5 m (excluding those which did not specify a draught). The vessel with the deepest draught was the tanker *British Gannet* at 11 m.

In May 2012 the average draught of vessels within the Offshore Export Cable Corridor Buffer was 5.6 m (excluding those which did not specify a length). The vessel with the deepest draught was the utility vessel *Forth Jouster* at 25 m.

19B.7.5 Vessel Course

The average course of vessels in January/February 2011 is presented in Figure 19B.33.

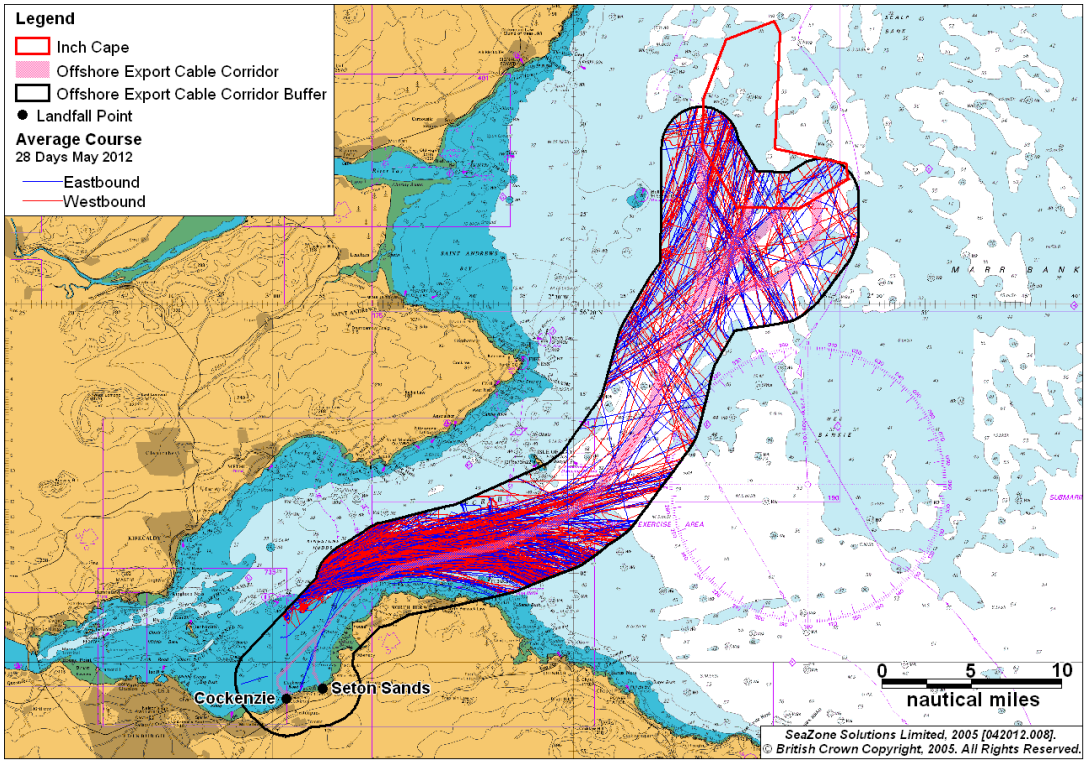
Figure 19B.33 Vessel Course (28 Days January/February 2011)



In January/February 2011, 47 per cent vessels were headed eastbound and 53 per cent westbound.

The average course of vessels in May 2012 is presented in Figure 19B.34.

Figure 19B.34 Vessel Course (28 Days May 2012)



In May 2012, 49 per cent of vessels were headed eastbound and 51 per cent westbound.

19B.7.6 Vessel Speed

The breakdown of vessel tracks by average speed (knots) for 28 days in January/February 2011 is presented in Figure 19B.35 and the speed distribution is summarised in Figure 19B.36.

Figure 19B.35 Vessel Speed (28 Days January/February 2011)

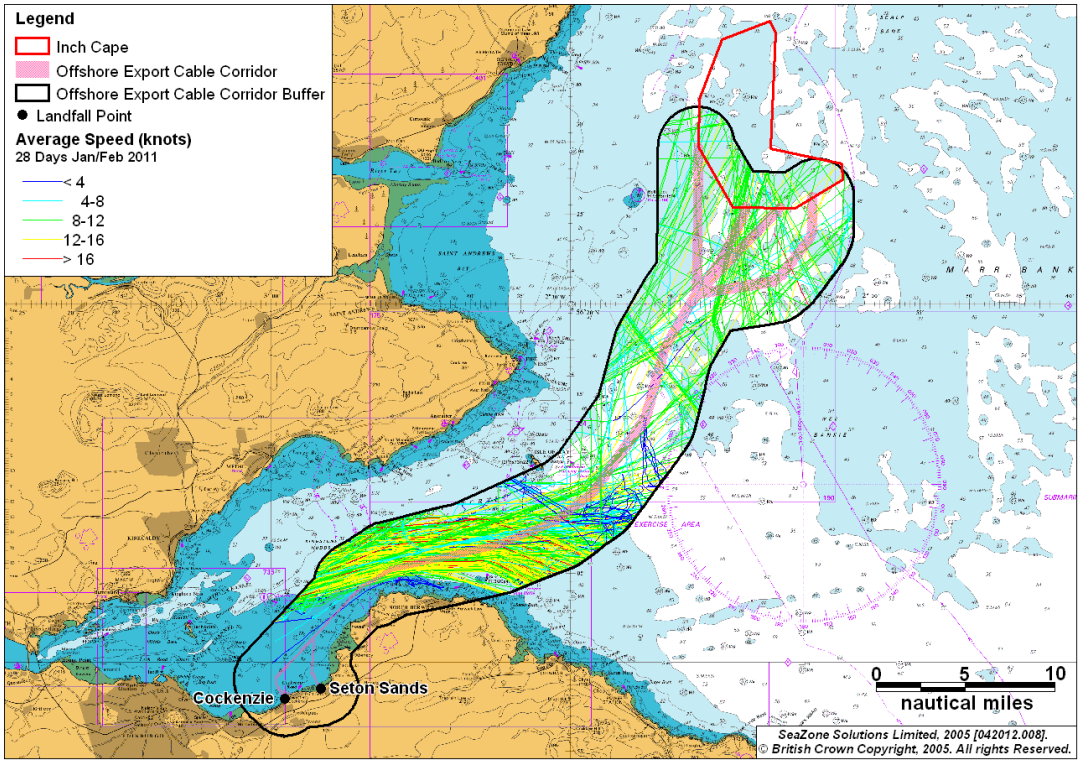
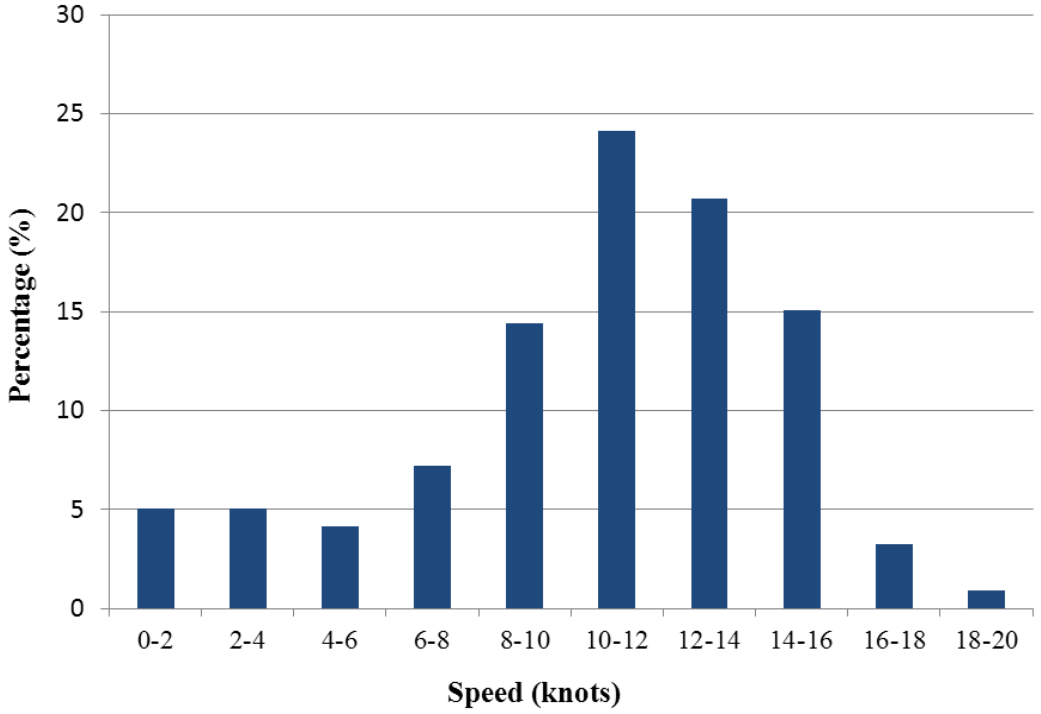


Figure 19B.36 Speed Distribution (28 Days January/February 2011)



The average speed of vessels within the Offshore Export Cable Corridor Buffer in January/February 2011 was 10.5 knots. The fastest vessel recorded was the pilot vessel *Forth Leopard* at speeds of up to 20 knots.

The breakdown of vessel tracks by average speed (knots) for 28 days in May 2012 is presented in Figure 19B.37 and the speed distribution is summarised in Figure 19B.38.

Figure 19B.37 Vessel Speed (28 Days May 2012)

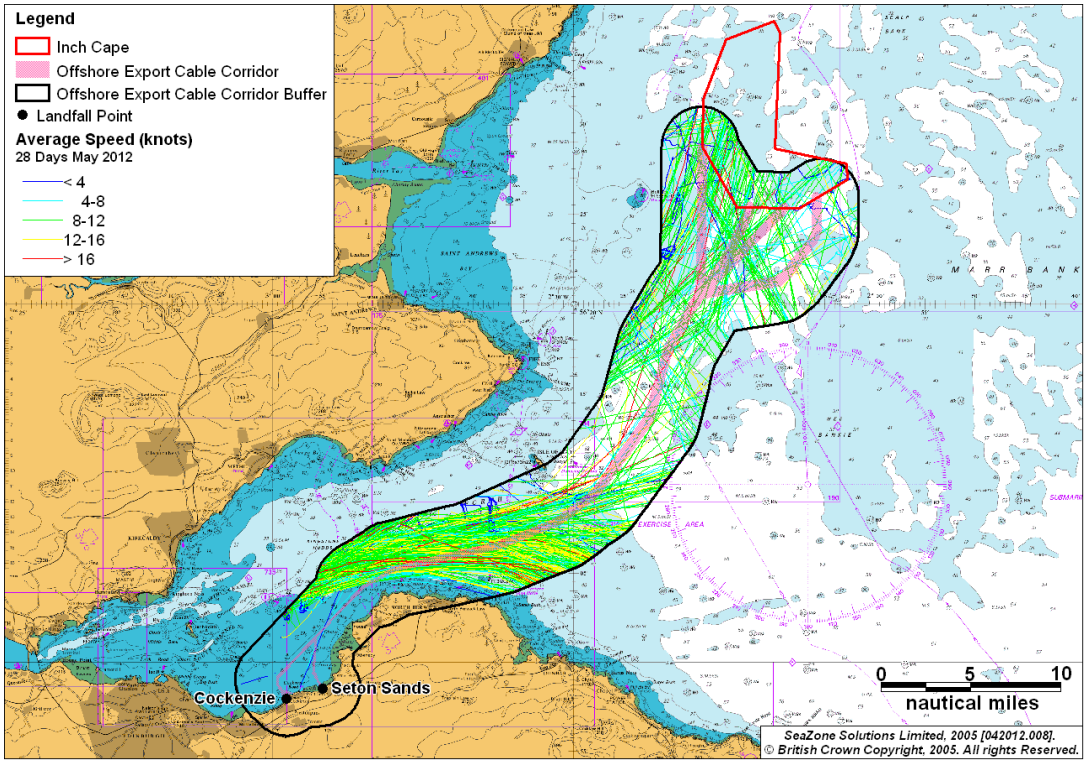
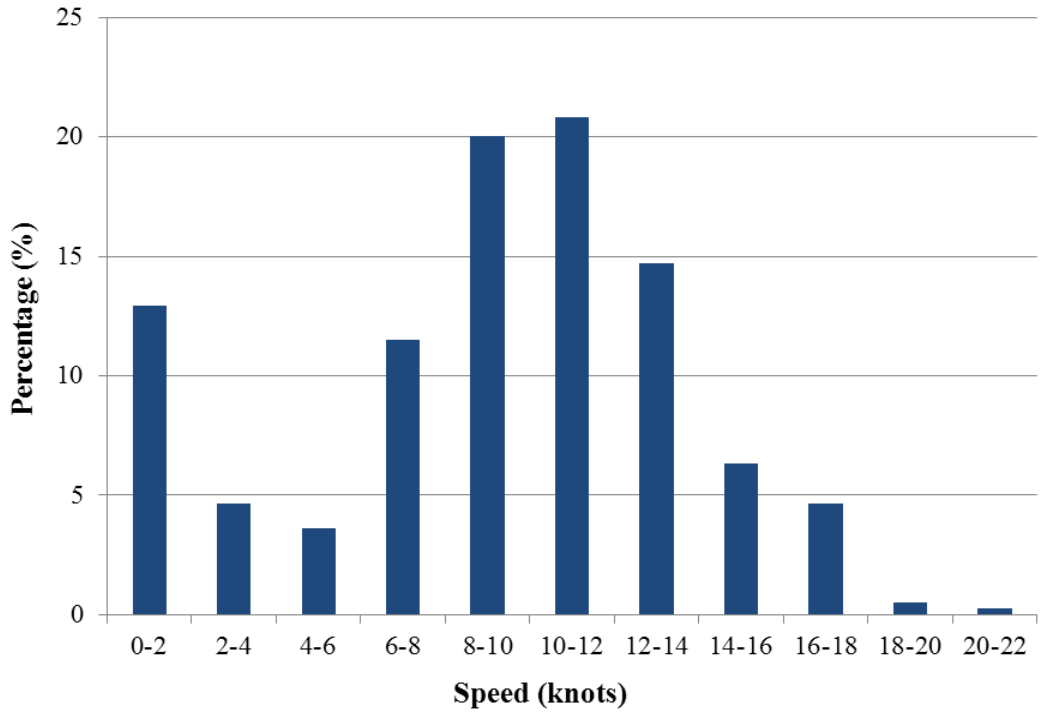


Figure 19B.38 Speed Distribution (28 Days May 2012)



The average speed of vessels within the Offshore Export Cable Corridor Buffer in May 2012 was 9.1 knots. The fastest vessel recorded was the pilot vessel *Forth Leopard* at speeds of up to 20.7 knots.

19B.7.7 Destination

The main destinations for vessels tracked passing within the Offshore Export Cable Corridor Buffer in January/February 2011 and May 2012 are summarised in Figure 19B.39 and Figure 19B.40.

Figure 19B.39 Vessel Destinations (January/February 2011)

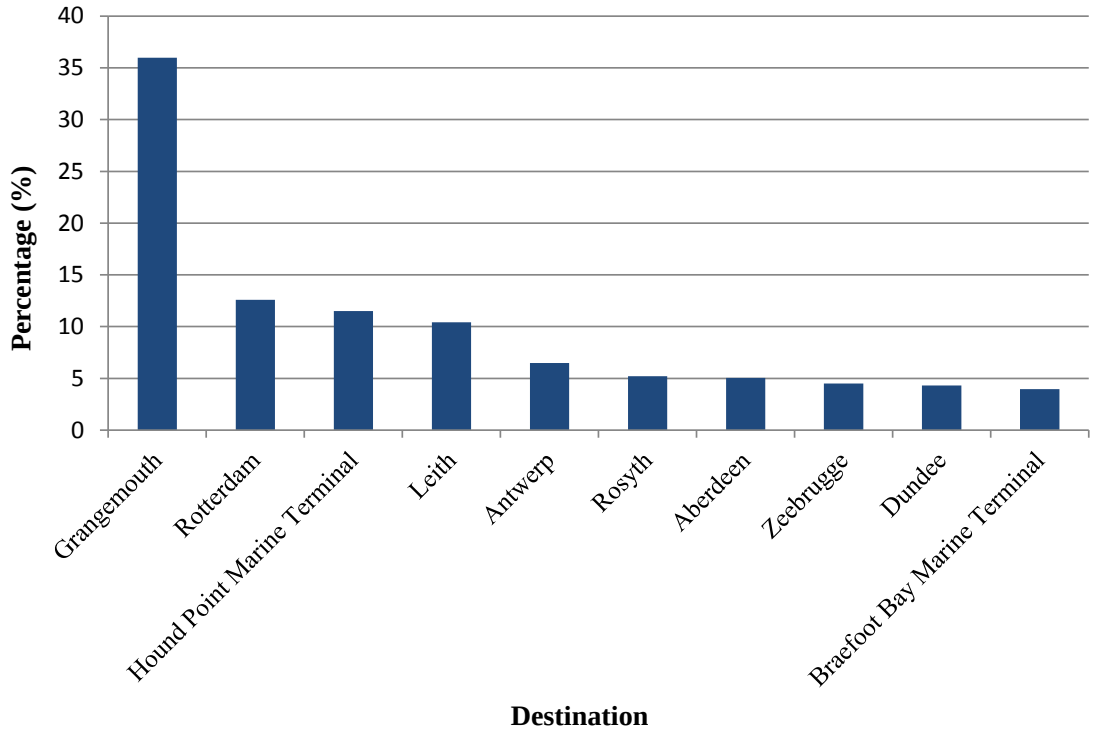
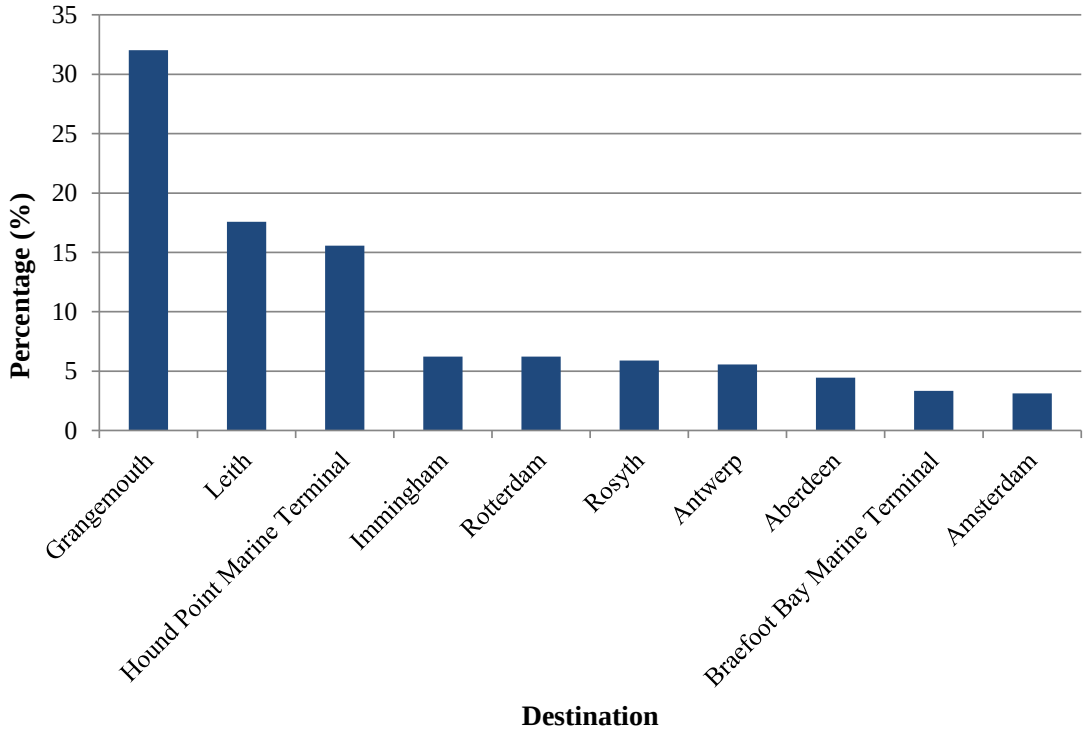


Figure 19B.40 Vessel Destinations (May 2012)



It can be seen that, in both periods analysed, the majority of vessels were headed to Grangemouth. Other frequent destinations for vessels include UK ports such as Hound Point and Leith and European ports such as Rotterdam and Antwerp.

19B.7.8 Anchored Vessels

Anchored vessels can be identified based on the AIS navigational status which is set on the AIS transmitter on board a vessel. Information is manually entered into the AIS; therefore it is common for vessels not to update the navigational status if they are anchored for only a short period of time. For this reason, those vessels which travelled at a speed of less than 1 knot for more than 30 minutes were assumed to also be at anchor and were included in this report. Manual observations of the data were also carried out to identify vessels at anchor.

Overview plots of vessels anchored within the Offshore Export Cable Corridor Buffer in January/February 2011 and May 2012 are presented in Figure 19B.41 and Figure 19B.42 respectively. Zoomed in plots of anchored vessels around the landfall area for the two periods are presented in Figure 19B.43 and Figure 19B.44.

Figure 19B.41 Anchored Vessels (28 Days January/February 2011)

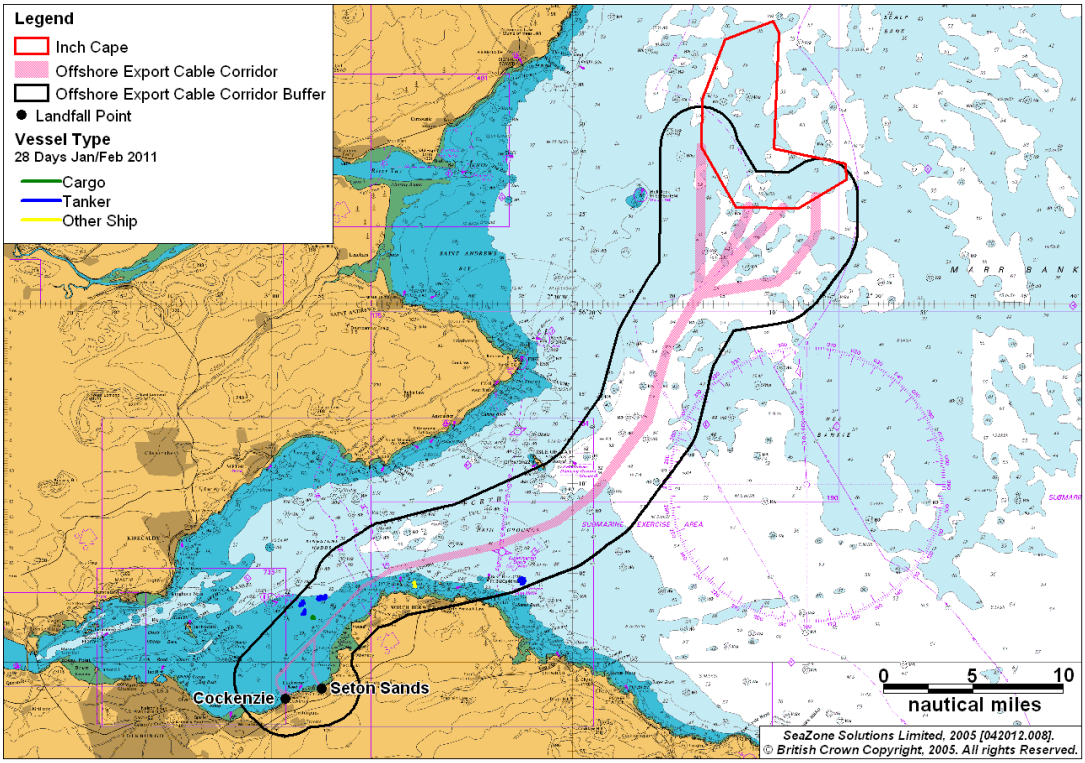


Figure 19B.42 Anchored Vessels (28 Days May 2012)

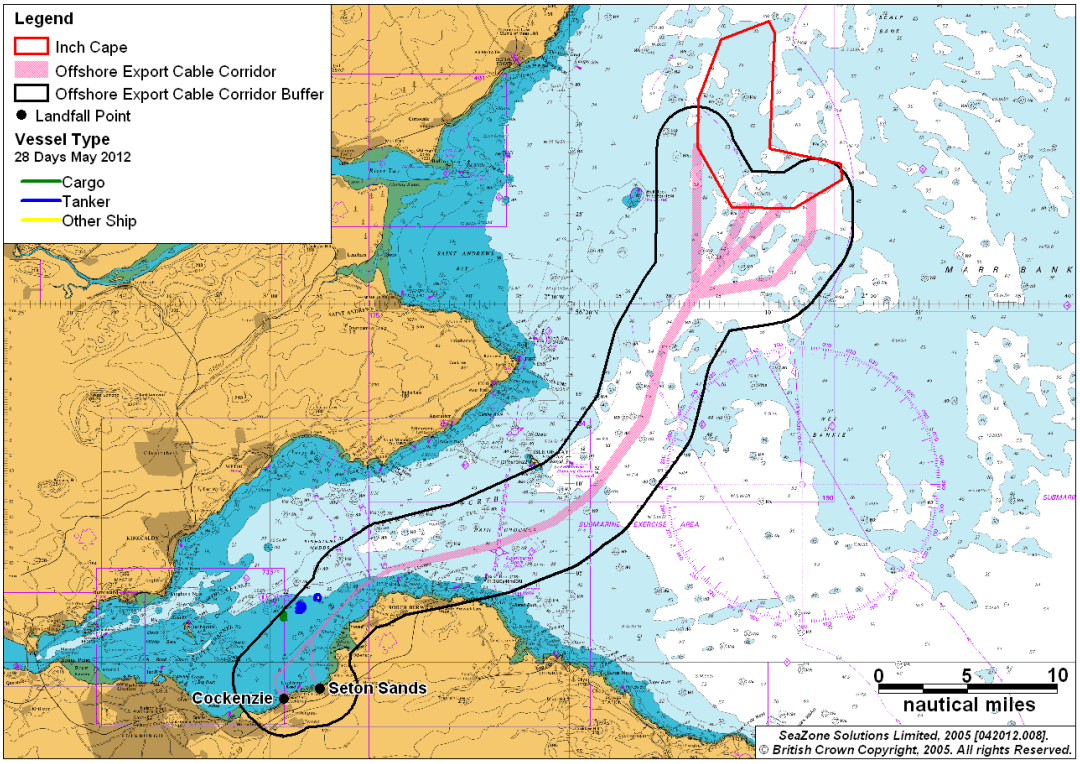


Figure 19B.43 Zoomed in Plot of Anchored Vessels (28 Days January/February 2011)

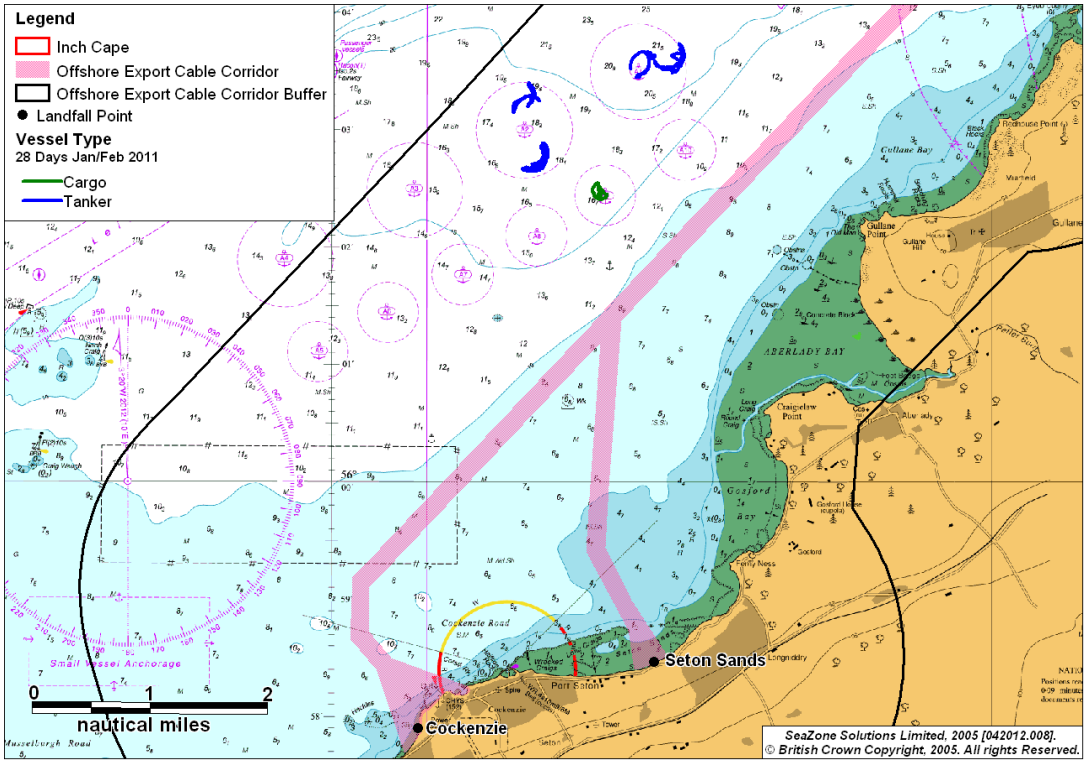
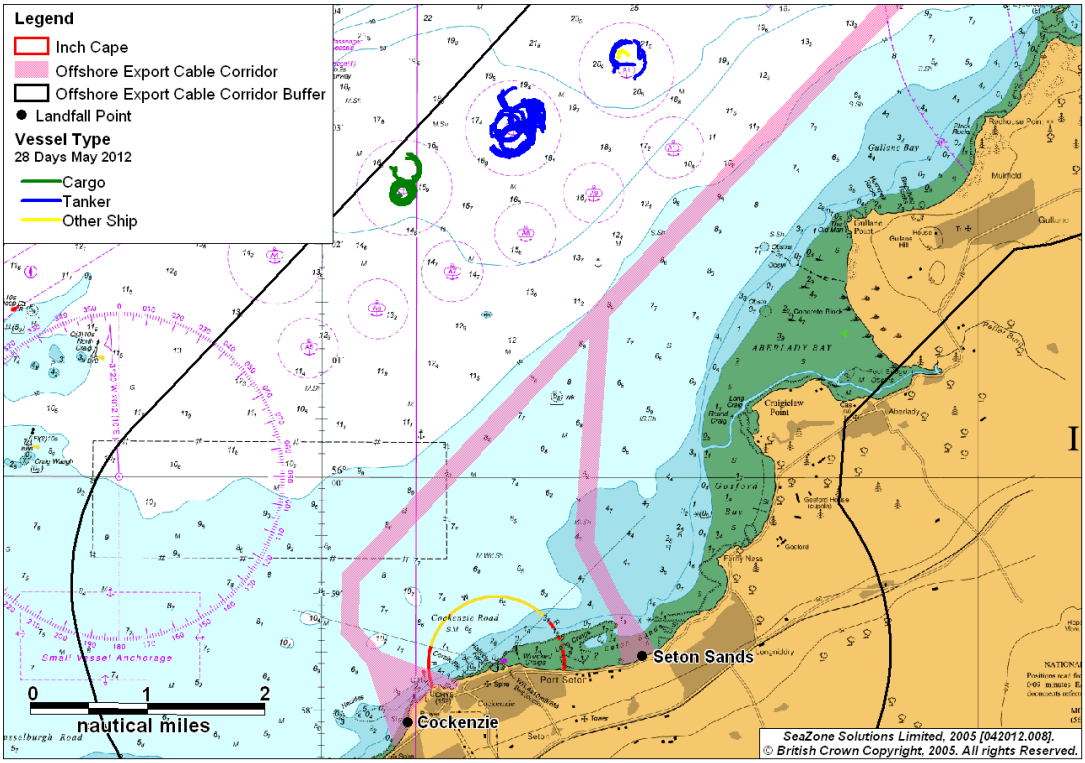


Figure 19B.44 Zoomed in Plot of Anchored Vessels (28 Days May 2012)



It can be seen that a number of vessels anchored in the designated anchorages north of the landfall sites and on the North Berwick coastline. No vessels were recorded at anchor within the Offshore Export Cable Corridor. Details of the vessels recorded at anchor within the Offshore Export Cable Corridor Buffer are presented in Table 19B.4.

Table 19B.4 Details of Anchored Vessels

Period	Vessel Name	Type	Consecutive Hours Duration at Anchor (hrs. mins.)	Vessel Length (m)	Vessel Draught (m)	Destination
28 Days January and February 2011	Benita	Cargo	33 hrs. 29	107	Not Available	Ghent
	Maria Princess	Tanker	95 hrs. 03	229	Not Available	Hound Point
	Astro Polaris	Tanker	05 hrs. 53	274	Not Available	Hound Point
	Front Opalia	Tanker	28 hrs. 39	333	Not Available	Hound Point
	Pacific Sky	Tanker	15 hrs. 39	250	Not Available	Hound Point
	Mare Oriens	Tanker	18 hrs. 00	246	Not Available	Hound Point

Period	Vessel Name	Type	Consecutive Hours Duration at Anchor (hrs. mins.)	Vessel Length (m)	Vessel Draught (m)	Destination
	Hildegaard	Tanker	52 hrs. 09	248	Not Available	Hound Point
	Pharos	Other	(i) 42 hrs. 59 (ii) 37 hrs. 45	84	Not Available	Fidra
	British Gannet	Tanker	77 hrs. 21	252	Not Available	Hound Point
May 2012	Aleksandr Suvorov	Cargo	230 hrs. 33	181	6.7	For Orders
	Ocala	Cargo	120 hrs. 43	186	6	Leith
	Atlantas	Tanker	80 hrs. 18	333	11.2	Hound Point
	Kornati	Tanker	43 hrs. 28	244	8.3	Hound Point
	SKS Doyles	Tanker	18 hrs. 50	250	9.7	Hound Point
	Nordic Mistral	Tanker	21 hrs. 04	274	9.3	Hound Point
	Alfa Britannia	Tanker	61 hrs. 05	248	8.7	Hound Point
	Katja	Tanker	57 hrs. 05	232	8.5	Hound Point
	Gulmar Da Vinci	Other	08 hrs. 20	116	6.1	Leith
	Sea Heritage	Tanker	57 hrs. 47	243	8	Hound Point
	Front Tina	Tanker	4 hrs. 25	333	11.4	Hound Point

19B.8 Recreational Vessel Activity

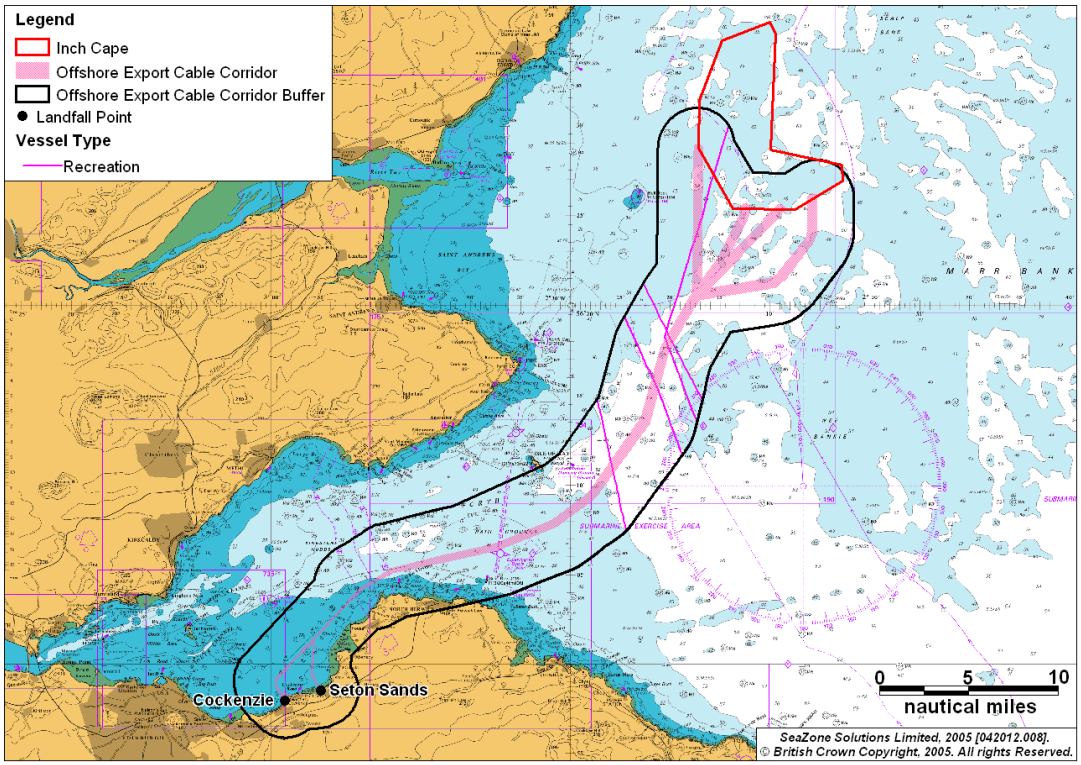
19B.8.1 Introduction

This section reviews recreational vessel activity relative to the Offshore Export Cable Corridor based on information published by the RYA (RYA, 2009).

19B.8.2 Survey Data

No recreational vessels were recorded in the area during the 28 day period in January/February 2011. A plot of the recreational vessels recorded within the Offshore Export Cable Corridor Buffer during 28 days in May 2012 is presented in Figure 19B.45.

Figure 19B.45 Recreational Vessels (28 Days May 2012)



Three unique recreational vessels were recorded crossing the Offshore Export Cable Corridor Buffer during 28 days in May 2012. Examples of recreational vessels recorded in the area are presented in Figure 19B.46 and Figure 19B.47.

Figure 19B.46 Recreational Vessel Momo

Figure 19B.47 Recreational Vessel Zeebeest

19B.8.3 RYA Data

19B.8.3.1 Introduction

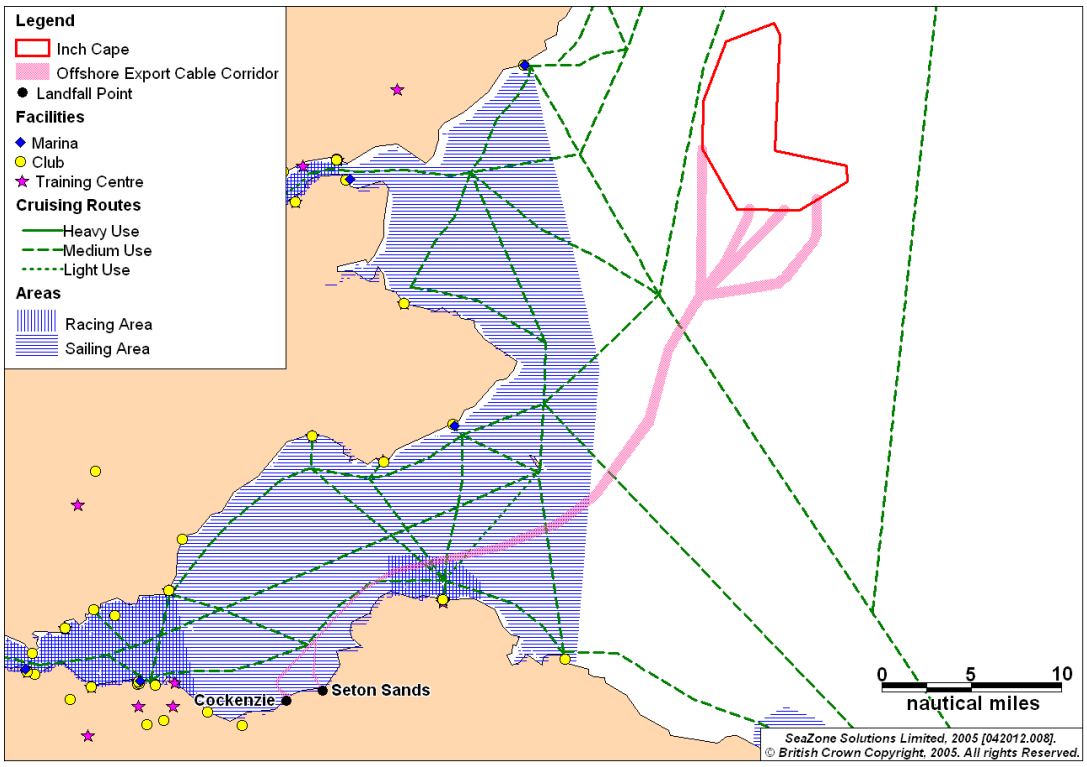
The Cruising Atlas (RYA, 2009) notes that recreational boating, both under sail and power is highly seasonal and highly diurnal. The division of recreational craft routes into Heavy, Medium and Light Use is therefore based on the following classification:

- *Heavy Recreational Routes*: - Very popular routes on which a minimum of six or more recreational vessels will probably be seen at all times during summer daylight hours. These also include the entrances to harbours, anchorages and places of refuge.
- *Medium Recreational Routes*: - Popular routes on which some recreational craft will be seen at most times during summer daylight hours.

- *Light Recreational Routes*: - Routes known to be in common use but which do not qualify for medium or heavy classification.

A chart of the recreational sailing activity and facilities relative to the Offshore Export Cable Corridor and the Development Area is presented in Figure 19B.48.

Figure 19B.48 Recreational Overview for Offshore Export Cable Corridor



Based on the RYA published data, the Offshore Export Cable Corridor is intersected by a number of medium use cruising routes and one light use cruising route. There is a yacht club at North Berwick which holds a number of events and races during the year.

The Offshore Export Cable Corridor intersects a 'general sailing' area along approximately 21 nm of its length and a 'general racing' area at North Berwick.

General sailing areas are defined by the RYA as "areas in extensive use for general day-sailing by all types of recreational craft but particularly smaller craft such as small cruisers, day-boats, dinghies, sailboards and personal watercraft. Such craft will not normally be undertaking point-to-point passages but will be on out and return activities and may appear to be sailing in random directions as they take advantage of wind and tide to make progress".

General racing areas are defined by the RYA as "areas in frequent use, particularly at week-ends and holiday periods, by large numbers of racing craft normally under sail but also power. Such areas are generally under the control of nearby Sailing Clubs and may contain

temporary or permanent race course marking buoys. Detailed routes will normally only be determined on the day of the race although certain longer-distance races may have routes published in advance. In addition some racing may take place outside the areas indicated. Racing craft will obey the specialised racing rules between themselves but will follow the conventional Collision Regulations when other vessels are in conflict."

19B.9 Fishing Vessel Activity

19B.9.1 Introduction

This section reviews the fishing vessel activity relative to the Offshore Export Cable Corridor based on AIS, sightings and satellite data.

19B.9.2 Survey Data

Figure 19B.49 and Figure 19B.50 present the AIS fishing vessel tracks relative to the Offshore Export Cable Corridor Buffer.

Figure 19B.49 Fishing Vessels (28 Days January/February 2011)

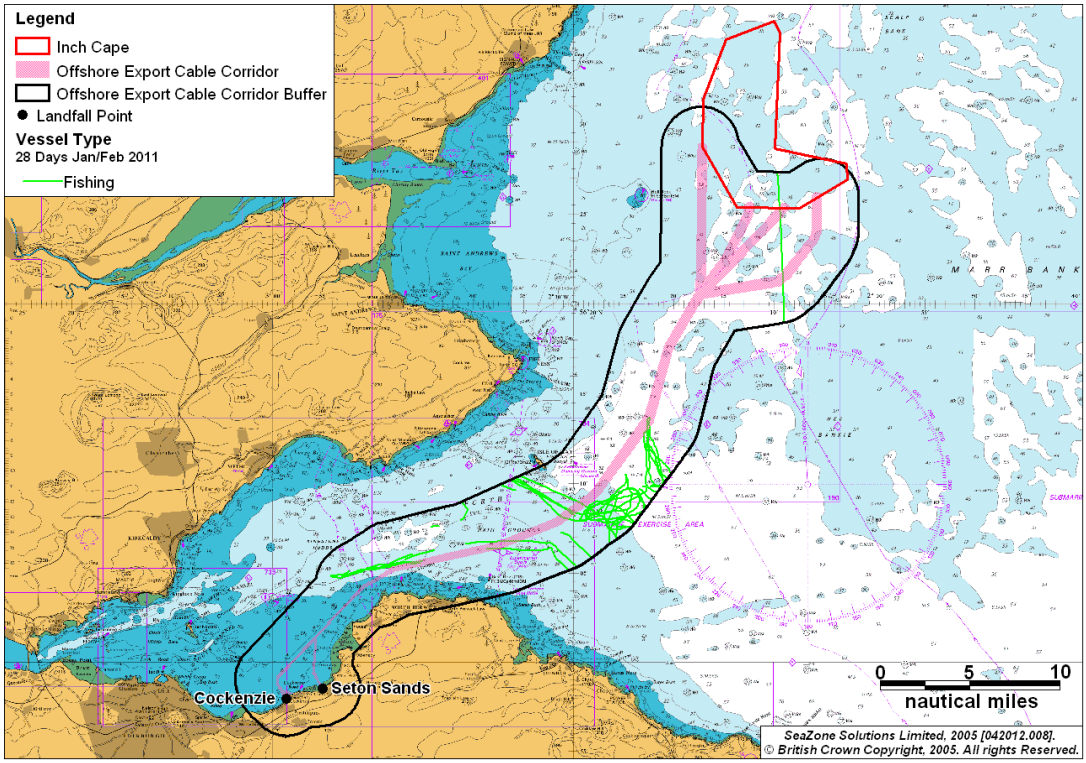
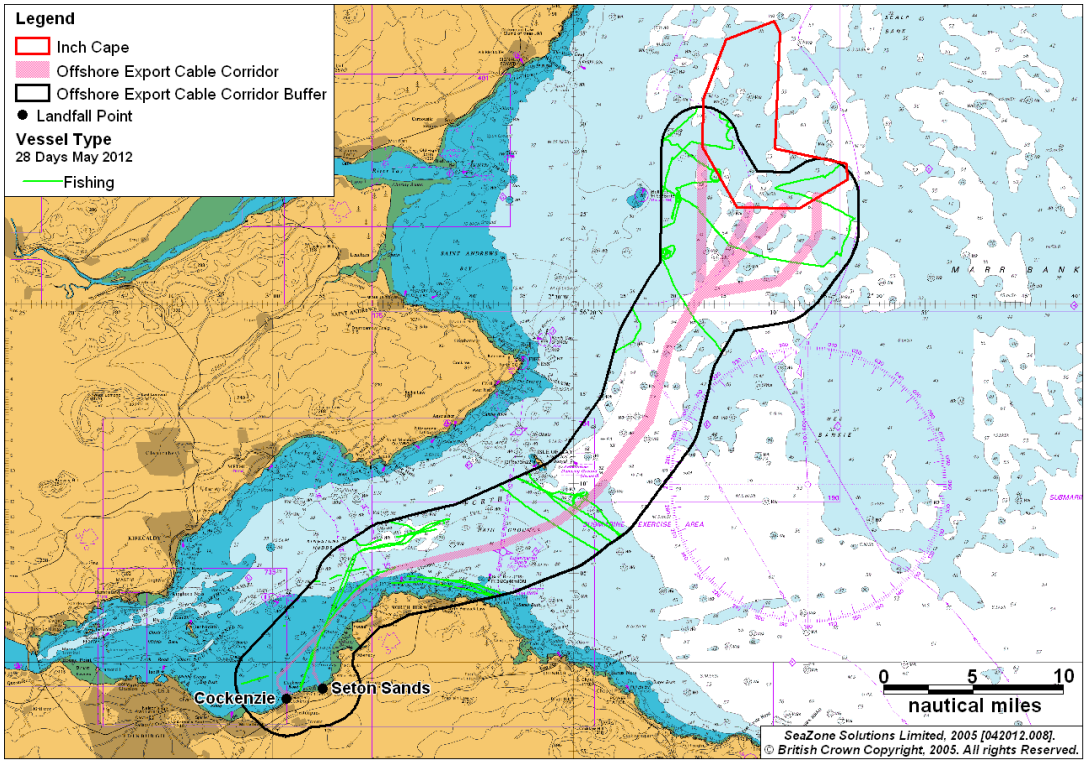


Figure 19B.50 Fishing Vessels (28 Days May 2012)



It can be observed that a low number of fishing vessels were recorded within the Offshore Export Cable Corridor Buffer. Six unique vessels were recorded in the area during the 28 days in January/February 2011 and four during the 28 days in May 2012. Examples of fishing vessels recorded in the area are presented in Figure 19B.51 and Figure 19B.52.

Figure 19B.51 Fishing Vessel White Heather LH1

Figure 19B.52 Fishing Vessel Crystal Tide

19B.9.3 Sightings and Satellite Data Overview

19B.9.3.1 Sightings Data

The Sea Fisheries Inspectorate (SFI) monitor the fishing industry's compliance with UK, EU and international fisheries laws through the deployment of patrol vessels, surveillance aircraft and the sea fisheries inspectorate.

Each patrol logs the positions and details of all fishing vessels (UK and non-UK) within the area being patrolled. All vessels are logged, irrespective of size, provided they can be identified by their Port Letter Number (PLN).

Data was obtained for the five-year period from 2005 to 2009. Section 19B.9.4 presents the vessel density grid and sightings data analysis.

19B.9.3.2 Satellite Data

The MMO, formerly the Marine and Fisheries Agency, operates a satellite vessel monitoring system from its Fisheries Monitoring Centre in London. The vessel monitoring system is used, as part of the sea fisheries enforcement programme, to track the positions of fishing vessels in UK waters. It is also used to track all UK registered fishing vessels globally.

Vessel position reports are received approximately every two hours unless a vessel has a terminal on board which cannot be polled and then it must report once per hour. The data covers all European Commission (EC) countries within British Fisheries Limits and certain Third Countries, e.g., Norway and Faeroes. Vessels used exclusively for aquaculture and operating exclusively within baselines are exempt.

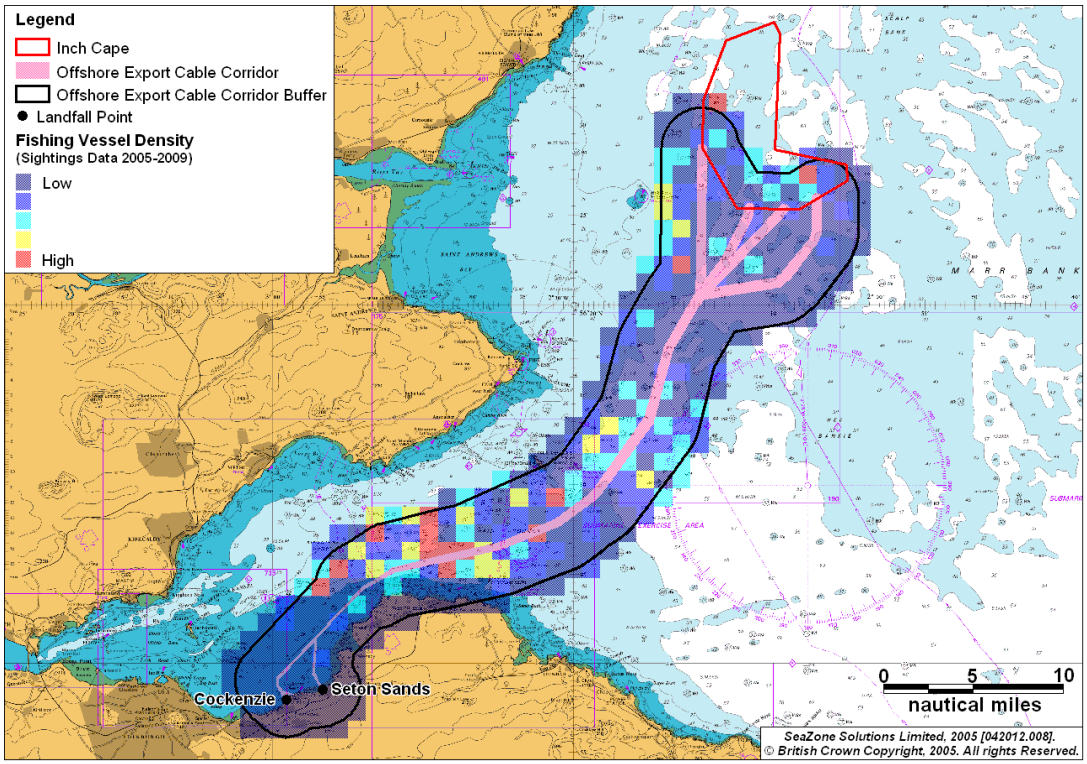
Satellite monitoring data from 2009 was analysed (including UK and non-UK fishing vessels). Section 19B.9.5 presents the vessel density grid satellite data analysis.

19B.9.4 Sightings Data Analysis

19B.9.4.1 Sightings Density Grid

Figure 19B.53 presents a density grid based on the 2005-2009 sightings data to highlight the hot spots of fishing vessel activity within the Offshore Export Cable Corridor Buffer.

Figure 19B.53 Fishing Vessel Sightings Data (2005-2009)



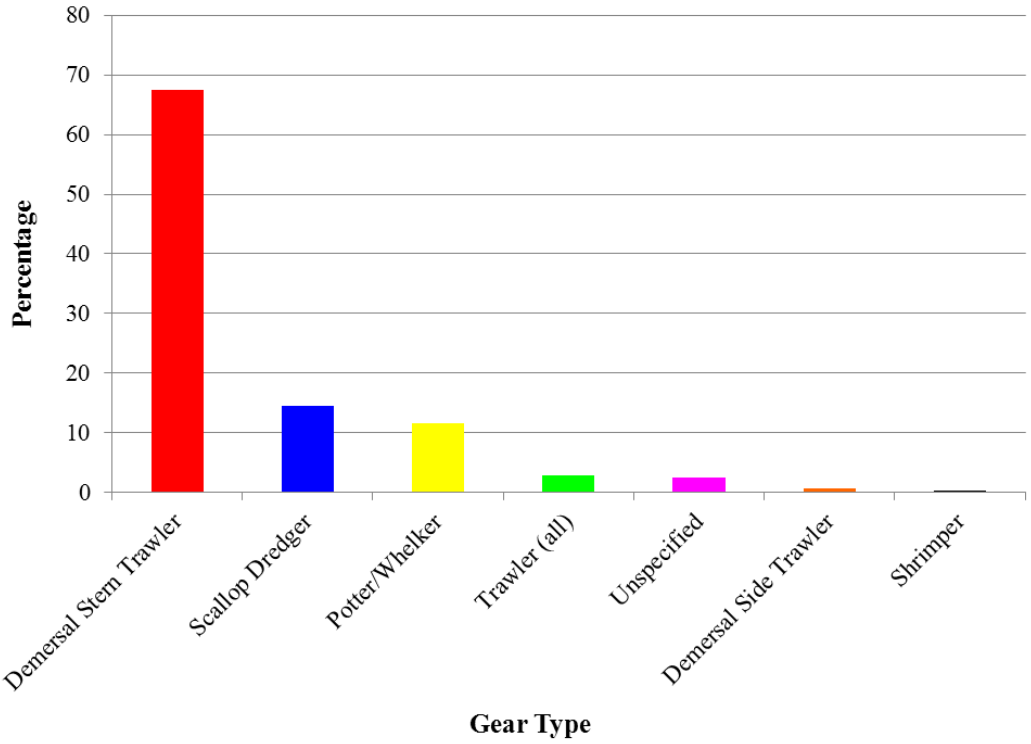
19B.9.4.2 Sightings Nationality Analysis

100 per cent of fishing vessel sightings within the Offshore Export Cable Corridor Buffer were UK-registered vessels.

19B.9.4.3 Sightings Gear Analysis

Using the fishing vessel sightings data, Figure 19B.54 presents an analysis of the gear types used by vessels within the Offshore Export Cable Corridor Buffer. It can be seen that the main fishing vessel types were demersal stern trawlers (67 per cent), scallop dredgers (14 per cent) and potters/whelkers (12 per cent). Fishing gear types are described in Section 19B.10.

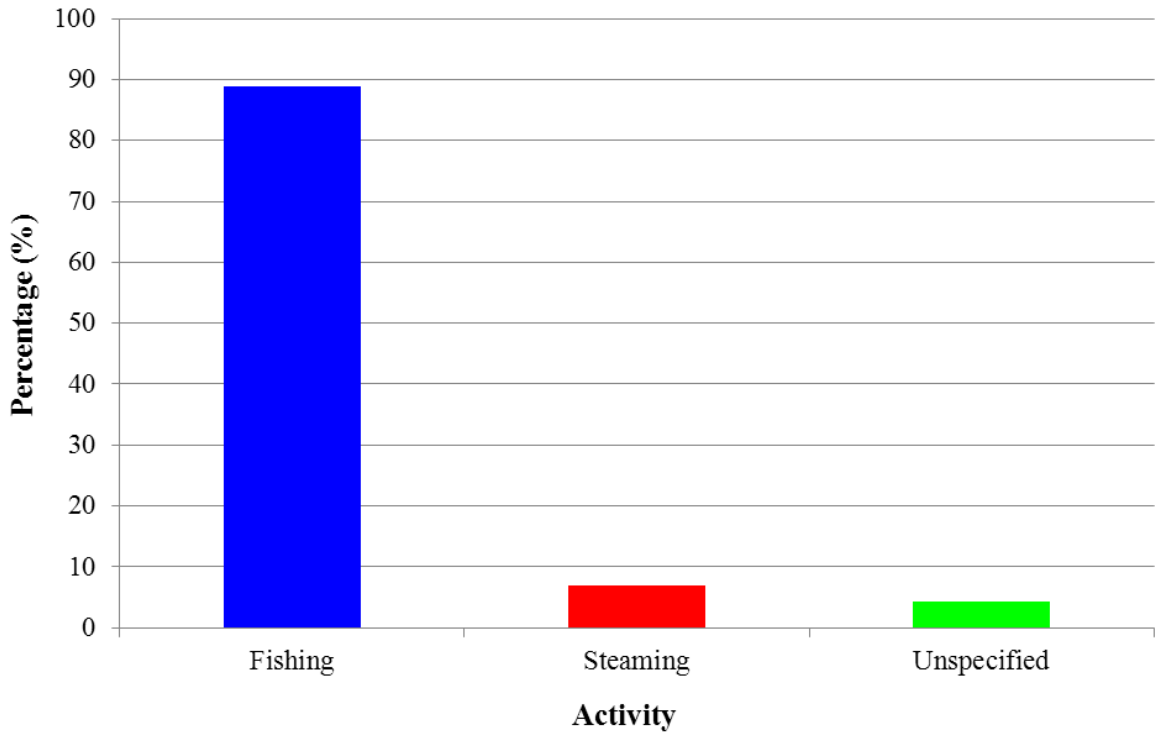
Figure 19B.54 Fishing Vessels by Gear Type (2005-2009)



19B.9.4.4 Sightings Activity Analysis

From Figure 19B.55, it can be seen that 89 per cent of fishing vessels within the Offshore Export Cable Corridor Buffer were engaged in fishing, 7 per cent were steaming (transiting to/from fishing grounds) and 4 per cent did not specify their activity.

Figure 19B.55 Fishing Vessels by Activity (2005-2009)

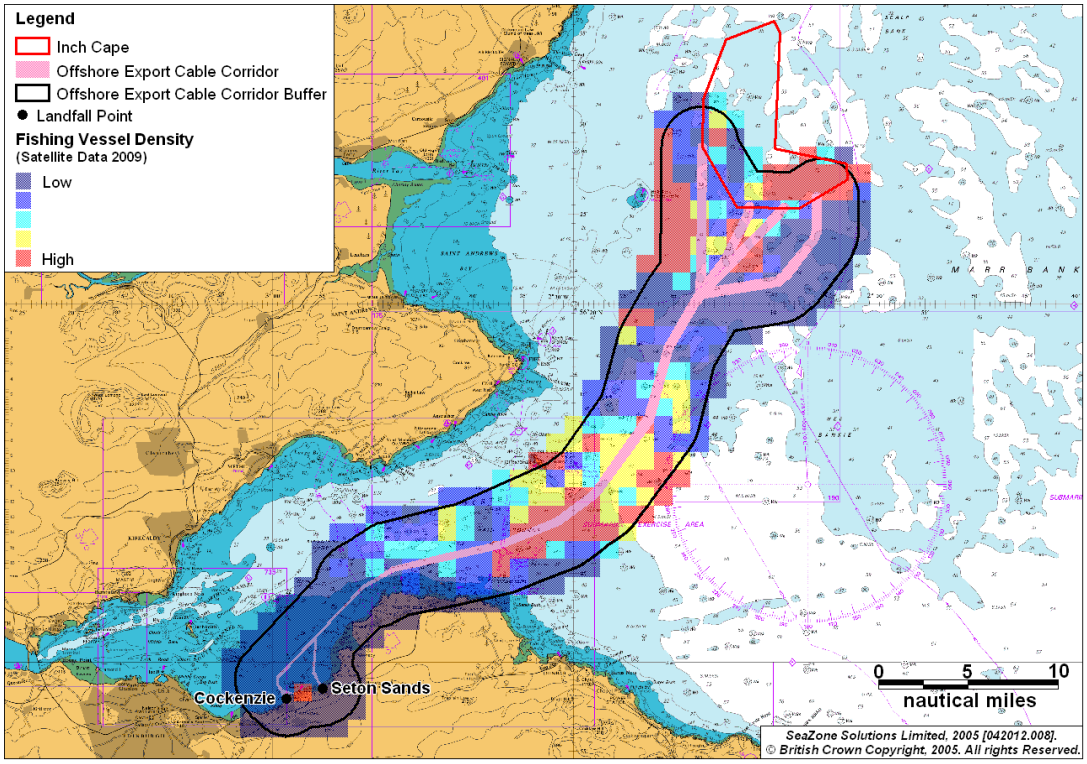


19B.9.5 Satellite Data Analysis

19B.9.5.1 Satellite Density Grid

Figure 19B.56 presents a density grid based on the 2009 satellite data to highlight the hot spots of fishing vessel activity.

Figure 19B.56 Fishing Vessel Satellite Data (2009)



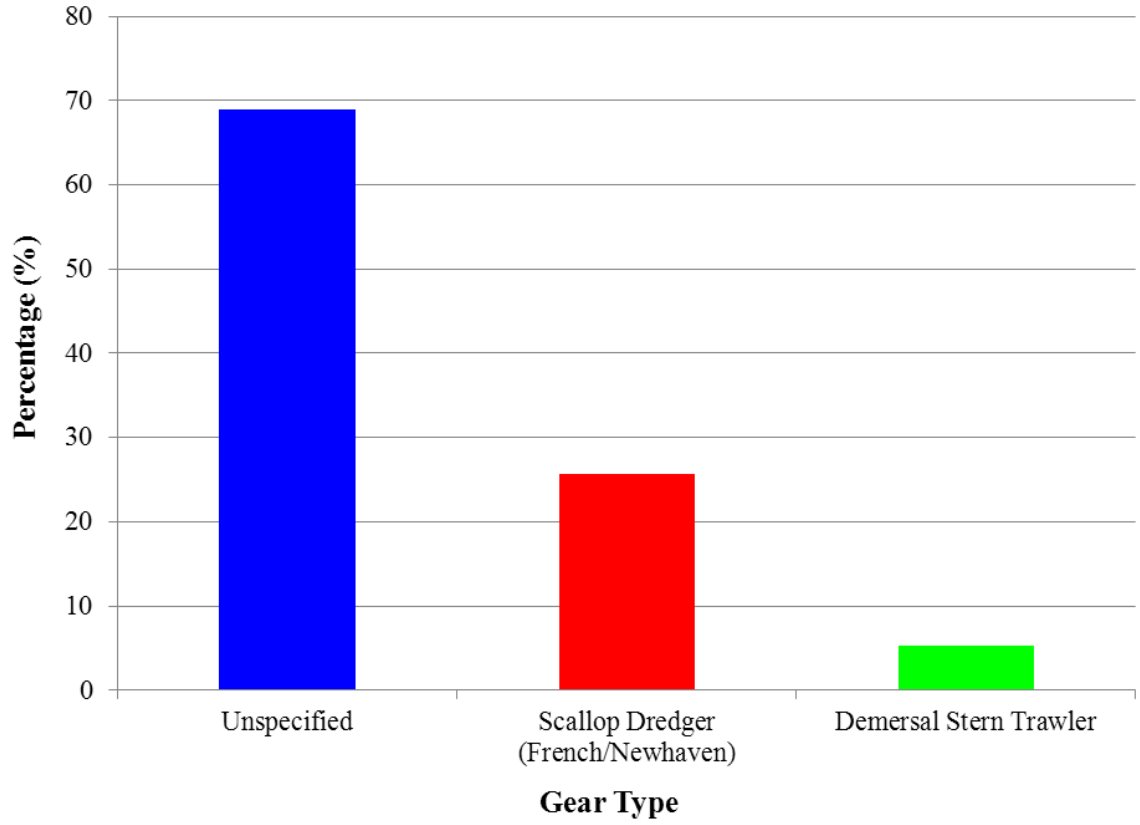
19B.9.5.2 Satellite Nationality Analysis

The vast majority of vessels were UK-registered in the 2009 satellite data, with a small proportion of vessels not specifying their nationality.

19B.9.5.3 Satellite Gear Analysis

Figure 19B.57 presents the vessel types (where available) for fishing vessel satellite positions recorded in 2009 within the Offshore Export Cable Corridor Buffer. 69 per cent of vessels could not be specified in the satellite data. The majority of vessels which could be specified were either scallop dredgers (26 per cent) or demersal stern trawlers (5 per cent).

Figure 19B.57 Fishing Vessels by Gear Type (2009)



19B.10 Export Cable Risk Assessment

19B.10.1 Introduction

This section describes the main hazards which could pose a risk to the Offshore Export Cable. The following hazards are described in detail:

- Fishing Gear Interaction.
- Vessel Foundering.
- Anchoring.

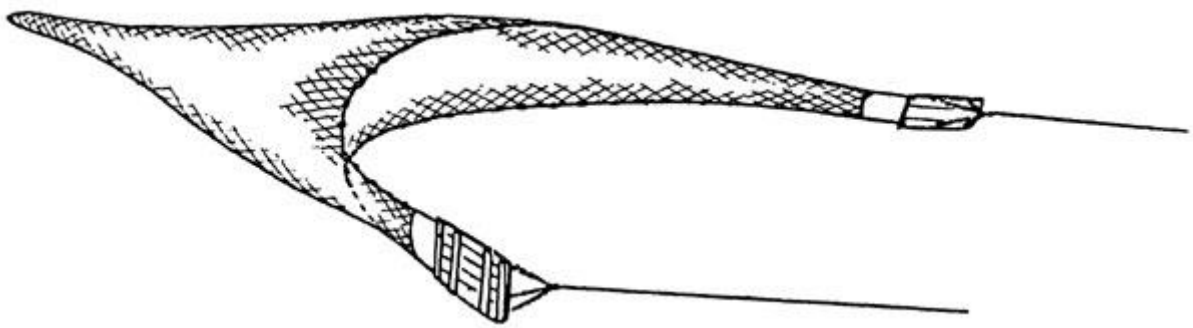
19B.10.2 Fishing Gear Interaction

The fishing types considered to pose the most risk to a subsea cable are bottom trawling and scallop dredging, both of which are carried out in the vicinity of the Offshore Export Cable Corridor. These fishing methods differ from mid water trawling (pelagic) where the net is towed higher in the water column and poses minimal risk of interaction with a subsea cable. A description of bottom trawling methods (demersal stern trawling) and scallop dredging are provided in Sections 19B.10.2.2 to 19B.10.2.4.

19B.10.2.1 Otter Trawl

This is the most commonly used towed gear in UK fisheries. Both finfish and shellfish found on or near the bottom are taken by this method. The gear consists of a cone shaped net attached to the vessel by wire ropes or ‘warps’. The length of the warp is normally about three and a half to four times the depth of the water and can be used in depths of 100-450 m from the stern of the vessel. As the net is towed over the sea floor the mouth is kept open by large rectangular otter boards composed of timber or steel. The tail end of the net where the fish are trapped is the ‘cod end’. The otter boards scrape the seabed as they are towed behind the vessel, thus creating a cloud of seabed material and creating the potential for interactions with subsea cables and pipelines. The main components of an otter trawl that have the potential to hook a subsea cable are the trawl doors and the clump weight. Figure 19B.58 presents a schematic of a typical bottom otter trawler.

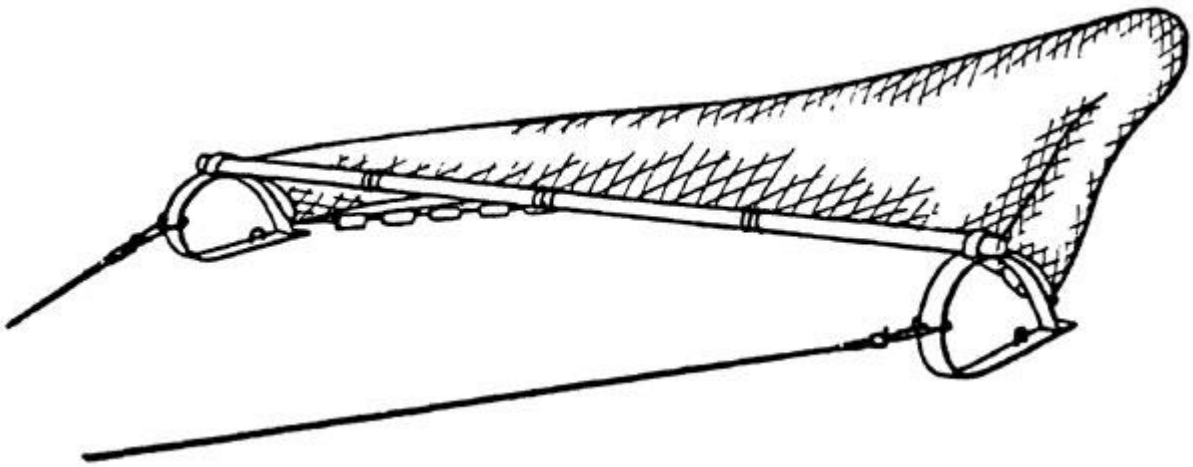
Figure 19B.58 Example of Bottom (Otter) Trawl Gear (FAO, 2012)



19B.10.2.2 Beam Trawl

The beam trawl is a bottom fishing trawl net, used mainly by small vessels for catching demersal flatfish relatively close to the shore. In beam trawling, the net is held open by a rigid beam which is attached to the netting. The net is heavily weighted with a chain on the underside and has tickler chains running in front. As was described with otter trawling, the seabed is disturbed by this fishing activity which creates the potential for cable and pipeline interactions. The main components of a beam trawl that have the potential to hook a pipeline are the beam and runners/shoes. A schematic of typical beam trawler gear is presented in Figure 19B.59 below.

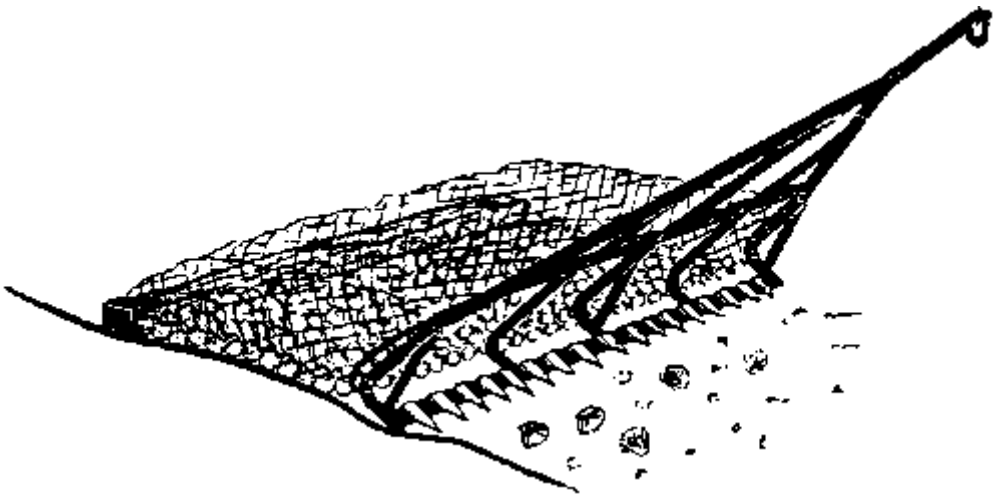
Figure 19B.59 Beam Trawl Gear (FAO, 2012)



19B.10.2.3 Scallop Dredger

Most scallop dredgers have a chain bag which drags along the bottom collecting the catch. Some also use steel teeth which penetrate the seabed by a few centimeters. Like other gear types, greater seabed penetration can occur under unusual conditions, such as when a dredge pushes a rock ahead of it. A dredge 4.5 m wide with tickler chains can weigh in excess of 2,200 kg when empty. With towing speeds ranging up to five knots, this type of gear can easily damage a submarine cable. In some fisheries, deflecting bars and wheels have been added to help the gear pass over seabed obstacles. Such devices may also help prevent entanglement with cables. An example of typical scallop dredger gear is presented in Figure 19B.60.

Figure 19B.60 Scallop Dredger Gear (FAO, 2012)



19B.10.2.4 Gear Interaction with Cables

When trawl gear is towed over or along a cable, the interaction can be considered in three phases as described below.

- Impact:
  - The initial phase when the trawl board, beam shoe or clump weight hits the cable. This impact occurs over a short time frame and mainly results in localised damage to the shell and protective coating of the cable. This stage has the potential to damage the cables but rarely damages the trawl gear and there is negligible risk to the fishermen on board the vessel.

- Pull over:
  - This occurs when a trawl board, beam trawl or clump weight is pulled over the cable. The duration of this phase is longer than that of the initial impact and forces can be significantly greater. Again the risks to fishermen during this phase of the interaction are limited.

- Hooking:
  - Hooking occurs when the trawl equipment becomes "stuck" under the cable. This tends to be a low probability event but it represents the greatest risk to fishermen.

19B.10.3 Vessel Foundering

A foundering is considered to be when a vessel suffers structural failure and sinks. This type of incident has the potential to damage a subsea cable if the vessel sinks over the cable. It is noted that this type of incident is considered to have a very low frequency based on historical incident data for the UK (from 1994-2008 approximately 4 per cent of all MAIB incident types were listed as flooding/foundering).

19B.10.4 Anchoring

Anchoring has the potential to damage a subsea cable if a vessel drops anchor on the cable or drags anchor over the cable. The damage caused depends on the penetration depth of the anchor (which depends on vessel size and type of anchor), the type of seabed and the cable burial depth. It is considered that anchor interaction with a subsea cable will be similar to that of fishing gear interaction, based on impact, pull over and potential snagging phases.

Anchoring can take place for a number of reasons. The following scenarios could lead to a vessel anchoring:

- Adverse weather anchoring (e.g. seeking refuge in a safe haven);
- Machinery failure (e.g. to slow drift speed/stop and/or to carry out repairs);
- Waiting on orders (e.g. commercial vessels and/or drilling rigs);
- Waiting on approach to a port (e.g. port berth or pilotage); and
- Subsea operations/survey vessel and semi-submersible drilling rig anchoring.

It is noted that when the cable is installed and charted, the probability of planned anchoring in close proximity to the cable route is reduced.

19B.10.5 Offshore Export Cable Risk Assessment

A 1 km x 1 km grid consisting of 1,135 cells was created for the buffer around the Offshore Export Cable Corridor. This method is the standard method within NRAs for displaying the Offshore Export Cable Risk Assessments.

Sections 19B.10.5.1 to 19B.10.5.3 present the methodology for ranking the abovementioned identified hazards (fishing gear interaction, vessel foundering and anchoring) with a value between 0 and 5 for each of the grid cells. The values for each of the three hazards were summed (maximum 15) and distributed into five sensitivity ranges.

19B.10.5.1 Risk Ranking for Fishing Gear Interaction

Fishing vessel density per grid cell in the Buffer around the Offshore Export Cable Corridor was categorised based on the satellite data (see Section 19B.9.5) which provided more comprehensive coverage of fishing vessel activity in the vicinity of the Offshore Export Cable Corridor compared to the sightings data and the survey data collected. It covers larger fishing vessels (15 m+) which have the most potential to interact with subsea equipment.

Satellite tracking positions with speeds equal to or less than five knots were selected (it is assumed a vessel travelling over five knots will not be fishing) and grid cells were ranked from 0 (no activity) to 5 (highest activity).

19B.10.5.2 Risk Ranking for Vessel Foundering

28 days AIS data were used to identify cells with a higher density of shipping (which would therefore have a higher risk of foundering). Any cells where there number of vessel intersects was greater than one per day were given a ranking of 1.

In addition to this, the last ten years of RNLI and MAIB incident data (2001-2010) were analysed to extract incidents where a vessel foundered or was lost. For the areas where one of these incidents was recorded, a 500 m radius was created around each incident (to take into account vessel break-up or drifting once submerged). Cells that were intersected by a foundering incident area were given the highest risk ranking (5).

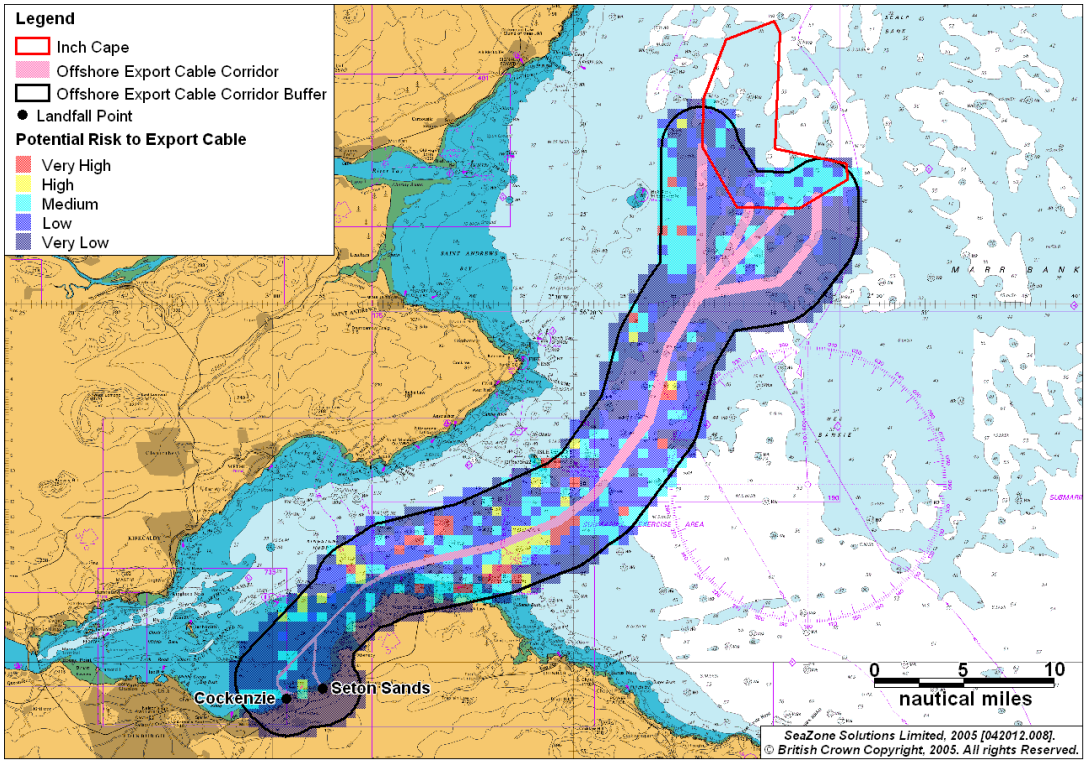
19B.10.5.3 Risk Ranking for Anchoring

Vessel anchoring was identified from the 56 AIS data analysed in this report (28 days January/February 2011 and 28 days May 2012). Cells intersected by one anchored vessel were given a rank of 3 and cells intersected by two or more vessels and/or multiple days of anchoring were given a rank of 5.

Vessels that were involved in machinery or mechanical failure incidents can drop anchor to arrest or slow down their drift (when they are not under command). For this reason, incidents which recorded a machinery or mechanical failure were extracted from the RNLI and MAIB incident databases and given a ranking of 5.

Figure 19B.61 below presents an overview of the cable risk ranking for the buffer around the Offshore Export Cable Corridor, based on the three rankings described above.

Figure 19B.61Overview of Cable Risk Ranking for Offshore Export Cable Corridor Buffer



A number of high and very high risk areas were located within the buffer around the Offshore Export Cable Corridor. In terms of the Offshore Export Cable, there were locations within the

Corridor where a very high risk was recorded. This can be attributed to the presence of fishing vessels in these areas and the history of incidents recorded by the RNLI and MAIB which could have led to a vessel foundering on the Offshore Export Cable.

The large and medium risk areas to the north of the Offshore Export Cable Corridor can be attributed to the number of vessels recorded as fishing in this area in the satellite data, therefore creating snagging and gear interaction risks.

19B.11 Effect of the Offshore Export Cable on Shipping and Navigation

19B.11.1 Introduction

Following the above assessment of the shipping and navigation baseline and high level hazard review, the effects of the Offshore Export Cable are described below.

19B.11.2 Commercial Shipping

The effects on commercial vessels from the Offshore Export Cable are assessed in the following subsections.

19B.11.2.1 Effect on Commercial Vessel Routeing

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.

Traffic headed in and out of the Firth of Forth crosses the cable route approximately 1.5-2 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 and tankers with tugs, 'other' vessels and passenger vessels also being recorded. Traffic is mainly headed between ports in the Firth of Forth (Grangemouth, Leith and Rosyth) to European Ports (Rotterdam, Amsterdam and Antwerp).

Other lower use main routes also intersect the Offshore Export Cable Corridor. There is a tanker route between Immingham and northern Scotland to the north of the Offshore Export Cable Corridor, towards the Development Area. This route is used by approximately one vessel every 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 Forth and ports in northern Europe.

In terms of the effect on commercial shipping routes from the Offshore Export Cable Corridor, vessels on the main routes described above will be displaced during cable installation and maintenance activities. The presence of cable installation vessels creates a collision risk for vessels and deviations from main routes will be required during such work to maintain a safe distance from vessels working in the Offshore Export Cable Corridor. Vessels will also be required to deviate to avoid rolling safety zones which may be in place during cable installation (these are localised to the area around the cable installation activities and will 'roll on' to the next specific location where the cable installation activity is taking place). These deviations will be temporary due to the nature of the work.

19B.11.2.2 Effect on Anchoring Vessels

There are a number of designated anchorage areas and anchor berths in proximity to the Offshore Export Cable Corridor (see Figure 19B.4). From analysis of the AIS data, no vessels anchored within the Offshore Export Cable Corridor. Within the buffer, vessels were

recorded at anchor in the designated anchorages. Nine vessels were recorded at anchor during the 28 days analysed for January and February 2011, seven of which were tankers with their destination set to Hound Point (marine terminal in the Firth of Forth comprising two jetties where vessels are loaded with crude oil). In May 2012, 11 tankers were recorded at anchor, eight of which were tankers headed to for Hound Point.

It is not expected that vessels will anchor over the Offshore Export Cable following installation due to the presence of designated anchorages nearby and the fact that the Offshore Export Cable will be marked on Admiralty Charts to deter anchoring. Vessels may however be required to anchor in an emergency situation such as machinery failure. The risk to vessels anchoring over the Export Cable will be present for the entire duration of the Offshore Wind Farm operation whilst Export Cables are in place and may continue post-decommissioning if Export Cables are not removed.

19B.11.3 Effect on Fishing Vessels

From analysis of the sightings and satellite data, the main fishing vessel types within the Offshore Export Cable Corridor Buffer were demersal stern trawlers and scallop dredgers. As described in Section 19B.10.2.1 to 19B.10.2.3, these fishing methods have the potential to interact with cables when being towed over or along them. When fishing gear interacts with a cable, there is a risk of entanglement which could lead to damage to the cable, the gear and/or the fishing vessel.

This risk will be decreased by reducing the exposure of the Offshore Export Cable through cable burial and protection methods. The Offshore Export Cable will be buried to an target depth of 1 m where seabed conditions allow. Where burial is not possible the cable will be protected by other means such as rock placement and concrete mattresses. To ensure that cable protection does not adversely affect fishing vessels, rocks of between 3 and 5 inches are preferred when rock placement is used. Inspections and maintenance regimes will be implemented throughout the lifetime of the Offshore Export Cable to ensure it remains buried and does not become exposed over time.

19B.11.4 Effect on Recreational Vessels

Overall, a low level of recreational activity was observed in proximity to the Offshore Export Cable Corridor with three unique recreational vessels being recorded crossing the Offshore Export Cable Corridor Buffer during 28 days in May 2012. From analysis of the RYA routes, the Cable Corridor is intersected by a number of medium use cruising routes and one light use cruising route.

The main risk to recreational vessels from the Offshore Export Cable will be during cable installation and maintenance activities due to the increased number of vessels working in the area that a recreational vessel could potential encounter and therefore collide with. This risk can be mitigated through the promulgation of information through Notices to Mariners (NtM) and clubs/marinas to inform recreational users of the works being undertaken and allow them to plan their routes accordingly.

19B.11.5 Electromagnetic Interference on Vessel Navigation Equipment

An additional navigational impact was identified based on electromagnetic interference on small vessels' (mainly recreational craft and small fishing boats) magnetic compasses.

Both AC and DC options are being considered for the Offshore Export Cable. DC export cables have the potential to cause localised compass deviations when vessels are in close proximity to them due to the electromagnetic fields generated by the cable. The amount by which the compass is offset depends on the angle the cable makes with the magnetic meridian and the water depth.

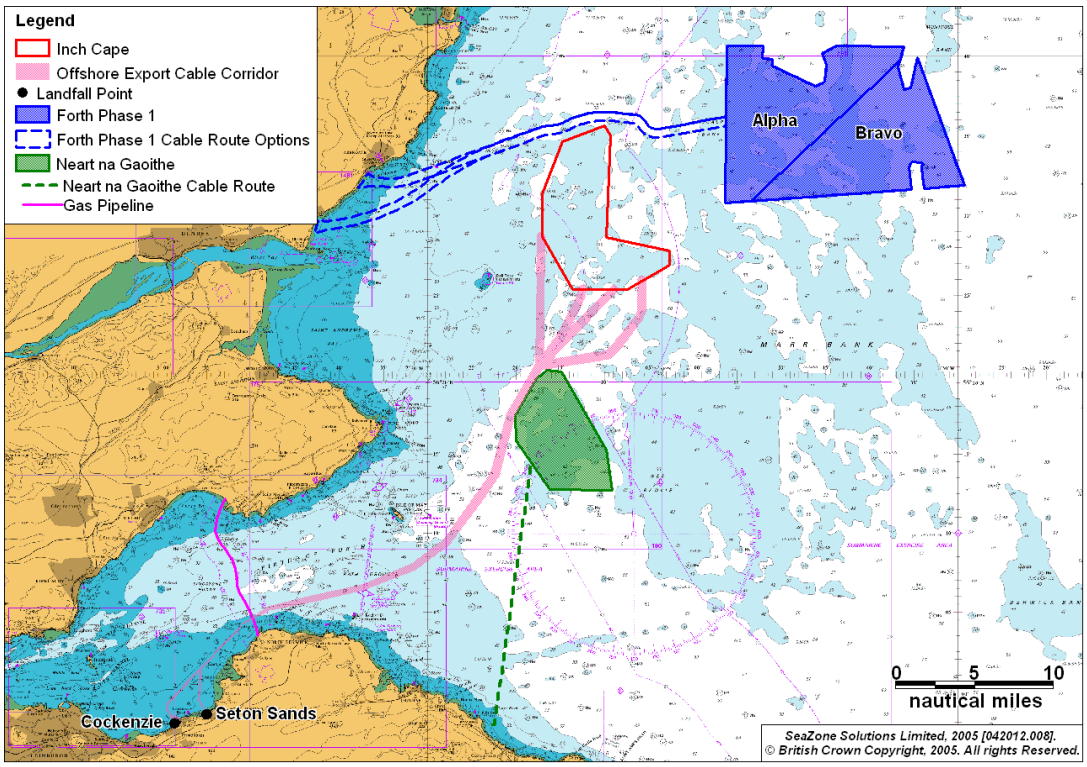
Compass deviations are greatest in water depths less than 5 m and where the cable is not buried. For the Offshore Export Cable Landfall option at Cockenzie, the water depth does not fall below 5 m until approximately 0.2 nm away from the shore. For the Offshore Export Cable Landfall option at Seton Sands, the water depth becomes less than 5 m approximately 0.7 nm from the Landfall. However it assumed as these points the Export Cable will be trenched and buried, further mitigating the impacts of EMF on magnetic compasses.

Given the low numbers of vessel movements recorded in the areas of the Offshore Export Cable Corridor where the water depth is below 5 m, and the fact that cables will be buried or otherwise protected thus decreasing the deviations further, the effect is not expected to majorly impact shipping and navigation in the area. Cables will be specified to reduce EMF emissions as per industry standards and best practice such as IEC specifications.

19B.12 Cumulative Considerations

An assessment has been undertaken to identify existing and cables and pipelines in proximity to the Development Area and Offshore Export Cable Corridor, as presented in Figure 19B.62. There are not expected to be any cumulative effects for shipping and navigation from the combined presence of these cables and pipelines. The cumulative effect of the offshore wind farm is discussed in Section 19A.22 of Appendix 19A: Navigational Risk Assessment Development Area.

Figure 19B.62 Other Cables and Pipelines in Vicinity of the Development Area



19B.13 Risk Mitigation and Monitoring

Mitigation and safety measures will be applied to the Offshore Cable appropriate to the level and type of risk determined during the EIA. The specific measures to be employed will be selected in consultation with the MCA Navigation Safety Branch and other relevant statutory stakeholders where required.

19B.14 Conclusions

Following a baseline review of shipping and navigation within the Offshore Export Cable Corridor Buffer, the hazards to vessels have been assessed.

56 days AIS data have been analysed in total and it has been identified that tankers and cargo vessels are the most common vessel types recorded within the Offshore Export Cable Corridor Buffer. In January and February 2011, there were an average of 22 unique vessels per day within the buffer. In May 2012, the average number of unique vessels within the buffer was 23.

Commercial vessel routes intersecting the Offshore Export Cable Corridor have been identified. Vessels on these routes will be impacted by the presence of cable installation and maintenance vessels and will be required to make route deviations to maintain a safe distance from the work activities.

A number of designated anchorage areas and anchor berths have been identified in the Firth of Forth and analysis of the AIS data identified vessels at anchor in these areas, the majority of which were tankers headed for the Hound Point marine terminal in the Firth of Forth. No vessels anchored within the Offshore Export Cable Corridor.

There is a risk to fishing vessels and to the Offshore Export Cable due to gear snagging and entanglement with unprotected cables, as demersal trawling and scallop dredging were both recorded in the vicinity of the Offshore Export Cable Corridor as common fishing methods. Suitable mitigation would include cable burial/protection, monitoring of cable burial depths, liaison with the fishing industry and marking the cable on admiralty charts.

Given the potential for fishing gear interactions with the Offshore Export Cable and the risk of vessels being required to anchor in an emergency situation over the Offshore Export Cable, a monitoring plan will be determined for the Offshore Export Cable which considers higher risk areas such as anchorage locations. Appropriate remedial action will be taken if risks are determined to be unacceptable. This will help ensure the effects on fishing vessels and anchoring vessels are minimised.

The main risk to recreational vessels will be during cable laying and maintenance activities due to the increased number of vessels working in the corridor. However, with suitable mitigations in place and promulgation of information through clubs and marinas, the effect is considered to be small.

Given the water depths and the fact that cables will be buried/ protected, compass deviations from the electromagnetic fields generated by the DC Export Cable are unlikely to majorly impact shipping and navigation (note that AC cables are also being considered but they do not create an EMF field that is substantial enough to affect marine navigation). Cables will be specified to reduce EMF emissions as per industry standards and best practice such as IEC specifications.

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