Chapter 19: Navigation and Shipping

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19.1 Introduction

This chapter assesses the potential impacts related to shipping and navigation associated with the installation and operational phases of the proposed NorthConnect HVDC marine cabling between Long Haven Bay (south of Peterhead), UK and the UK-Norway median line. A baseline assessment (Appendix G.1) was used to identify the impacts, the significance of which were determined using the Formal Safety Assessment Process (IMO, 2002).

19.2 Sources of Information

The key sources of information used to inform this chapter are listed below:

- One year of Automatic Identification System (AIS) data (January-December 2017);
- Four years of Vessel Monitoring System (VMS) data (2014-2017);
- Ten years of Royal National Lifeboat Institution (RNLI) incident data (2005-2014);
- Ten years of Marine Accident Investigation Branch (MAIB) data (2005-2014);
- UK Admiralty Charts;
- Admiralty Sailing Directions, North Sea (West) Pilot, 2016; and
- Marine Scotland Data.

The primary data source on vessel activity used in this assessment was the AIS data. IMO regulation requires AIS to be fitted aboard all ships of 300 gross tonnage (GT) and upward engaged on international voyages, cargo ships of 500 GT and upwards not engaged on international voyages and passenger ships irrespective of size. Ships fitted with AIS shall maintain AIS in operation at all times except where international agreements, rules or standards provide for the protection of navigational information.

As of 31 May 2014, all EU fishing vessels of length 15m and above are required to carry AIS equipment. A proportion of smaller fishing vessels carry AIS voluntarily but may not broadcast continuously. The VMS data covers fishing vessels of 12m length and above.

Recreational craft are not required to carry AIS, but a minority do, estimated at around one-fifth for this area by RYA Scotland in their Scoping Opinion response. Similarly, military vessels may not broadcast on AIS.

19.2.1 Planning Framework

The United Nations Convention on the Law of the Sea (UNCLOS, 1982) provides principles relating to all submarine cables and pipelines. In line with UNCLOS and UK legislation, the consenting process will involve relevant navigation stakeholders via the Department for Business, Energy and Industrial Strategy (BEIS) and Crown Estate Scotland (CES).

19.2.2 Legislative Framework

In the UK, developers are required to comply with the following:

- International Regulations for Preventing Collisions at Sea (COLREGS 1972/78), as implemented in the UK through Marine Shipping Notices (IMO, 1972/78); and
- International Association for Lighthouse Authorities Guidance on Aids to Navigation and Buoyage (IALA, 2001).

19.2.3 Relevant Guidance

The following guidance has been used in preparation of this assessment:

- International Maritime Organisation (IMO) Guidelines for Formal Safety Assessment (FSA) – MSC/Circ. 1023 (IMO, 2002). The impact assessment methodology used in this chapter is in line with the FSA method; and
- MCA MGN 543 (MCA, 2016) Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response Issues. Although this guidance is focused on offshore renewables, it highlights issues to be taken into consideration when assessing the effects of offshore developments on navigational safety and includes guidance on cable protection and burial within UK waters.

19.2.4 Other Sources

19.2.4.1 Consultation

Meetings specific to navigation and shipping were held with the following organisations:

- Maritime and Coastguard Agency (MCA);
- Northern Lighthouse Board (NLB); and
- Peterhead Harbour.

As part of the wider project stakeholder engagement, consultation was also carried out with recreational vessel representatives (RYA Scotland, Peterhead Sailing Club, Misty Angling Trips), fisheries representatives (as part of the commercial fisheries assessment as well as in planning survey work) and the Ministry of Defence. Correspondence about the project was also sent to the Marine Safety Forum but no technical feedback was received.

19.2.4.2 Cable Protection Analysis Report

Cathie Associates has undertaken a Cable Protection Analysis Report (CPAR) for the subsea cable survey corridor of the NorthConnect project. This has drawn upon many of the findings from the separate CBRA (Cable Burial Risk Assessment) report which included an assessment of hazards from ship anchors and fishing gear. The CPAR and CBRA are provided as Appendixes to the Construction Method Statement (NorthConnect 2018). It also incorporates information gathered from the final geophysical and geotechnical reports.

The main body of the CPAR summarises the seabed conditions and installation risks identified along the cable route. A Risk Register, analysing the main cable installation and protection risks and mitigation measures to reduce these risks is presented as Appendix A. Other appendices provide a comprehensive assessment of the route, encompassing a preliminary burial tool assessment, Alignment Charts, information on cable burial techniques and tools and examples of specific equipment and rock placement volume estimates to account for possible sections of reduced burial, trench backfill and crossing designs.

Implementation of the CPAR findings provides key mitigation against navigation and shipping hazards.

19.3 Assessment Methodology

An overview of the NRA methodology used in this study is presented in this section.

19.3.1 Overview

The IMO Formal Safety Assessment process (IMO, 2002) approved by the IMO in 2002 under SC/Circ.1023/MEPC/Circ392 has been applied within this study. This is a structured and systematic methodology based on risk analysis and cost benefit analysis (if applicable). There are five basic steps within this process:

- Identification of hazards (a list of all relevant accident scenarios with potential causes and outcomes);
- Assessment of risks (evaluation of risk factors);
- Risk control options (devising regulatory measures to control and reduce the identified risks);
- Cost benefit analysis (determining cost effectiveness of risk control measures); and
- Recommendations for decision making (information about the hazards, their associated risks and the cost effectiveness of alternative risk control measures).

Figure 19.1 is a flow diagram of the FSA methodology applied. The focus of this assessment has been on Steps 1-3.

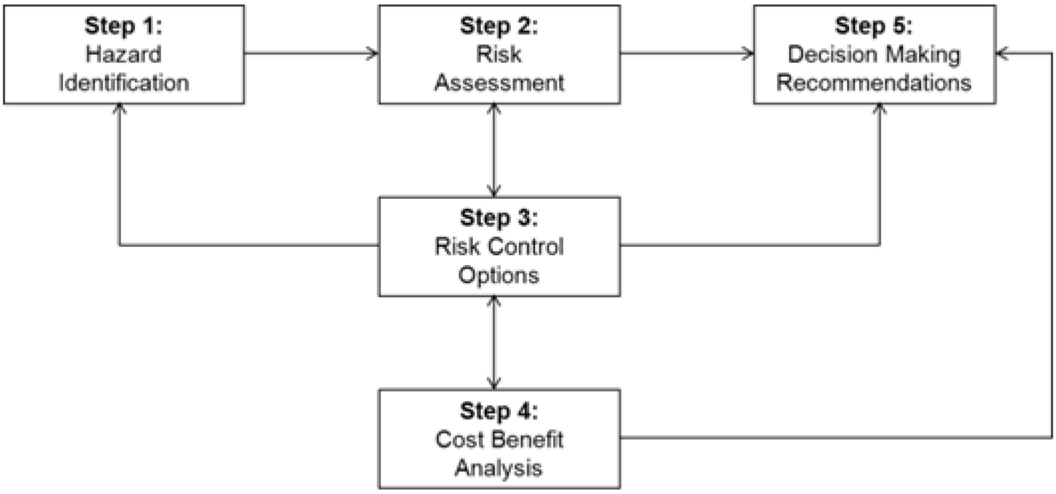

Figure 19.1. Formal Safety Assessment Process.

19.3.2 Desk Study

A detailed assessment of the vessel activity in the vicinity of the NorthConnect HVDC consenting cable corridor was undertaken using a variety of data sources including twelve months of AIS data. A 5NM buffer of the HVDC offshore cable corridor was used to encapsulate all relevant shipping and fishing activity, and this was therefore chosen as the study area in which to perform the detailed shipping assessment. To ensure the anchoring activity analysis was comprehensive, the study area was extended to 10NM around the cable corridor for the section within UK territorial limits.

As fishing activity can vary by season, long term Vessel Monitoring System (VMS) was used in addition to the AIS data in the fishing assessment. The long-term data covered the four-year period from 1st January 2014 to 31st December 2017 (inclusive). Other fisheries data sets covering smaller vessels are presented in Chapter 20: Commercial Fisheries.

Admiralty Navigational Charts and Sailing Directions (UKHO, 2016) covering the North Sea were used to identify the navigational features relevant to the consenting cable corridor. This high-level assessment carried out by Anatec, was undertaken over a wider area than that used in the shipping and anchoring assessment as significant features existed outside the 5 and 10NM study areas.

The shipping and navigation baseline assessment was then used to identify potential impacts that have been considered within the impact assessment.

19.3.3 Consultation

Consultations were carried out with a number of organisations to gain information to inform the baseline and impact assessment of shipping and navigation (see Section 19.2.4). A summary of the key points raised during face-to-face meetings is provided in Table 19.1.

Table 19.1. Stakeholder Consultation Meetings on Navigation and Shipping.

Organisation	Summary of Key Points
Maritime and Coastguard Agency	• Overview presented of NorthConnect project and baseline shipping and navigation assessment. • MCA are interested to review the Cable Burial Risk Assessment and evidence of navigational stakeholder consultation. • Where protection measures other than trenching / burial are being proposed, the MCA will require details. Any reduction in the existing chart datum should not exceed 5%. • MCA do not want to see compass deviation greater than 5 degrees. Actual deviation should be confirmed post-installation. • Other issues discussed included military activity, UXO, wrecks, guard vessels and Marine Conservation Zone.
Northern Lighthouse Board	• Overview presented of NorthConnect project and baseline shipping and navigation assessment. • Restriction on AIS range of coverage as well as vessel carriage requirements were discussed. Recreational vessels and fishing vessels below 15m length are known to be under-represented. • Cumulative projects were reviewed, the nearest being redevelopment of Peterhead Port and Hywind Scotland floating wind farm. No significant adverse cumulative effects were considered likely. • Potential impacts and planned mitigation measures were reviewed and considered appropriate. • A shore-based marker would not be required given the impracticality of establishing a mark in the area above the HDD route. The cable will be suitably protected against anchor and fishing gear impact from the exit point onwards, informed by a Cable Burial Risk Assessment.

Organisation	Summary of Key Points
Peterhead Port Authoirty	• Review of vessels involved in installation work and timescales. • Review of vessel activity – shipping, fishing anfd recreation • Review of anchoring activity outside Peterhead Harbour Limits and methodology used to separate anchored vessels from vessels holding posiiton using DP. • Port VTS control movements inside Harbour Lmits but does not offer advice to vessels on where to anchor. • There is good holding ground outside the port to north and south. Rare for vessels to drag anchor. • Discussion of Pilot station which overlaps consenting corridor. Harbour Master stated this can be temporarily relocated to the west to avoid the cable laying when in this vicinity. • Cumulative issues including Peterhead Port Redevelopment were discussed. No significant changes to baseline traffic (from 2017) are expected. • Further meetings planned as the offshore installation work approaches.

Scoping Opinion responses were also considered as part of the assessment. Each of the scoping opinions have been considered and are summarised in Chapter 4: Consultations.

19.3.4 Impact Assessment Methodology

The impact assessment process has been evaluated using the IMO Formal Safety Assessment Methodology (IMO, 2002). The FSA assigns each impact a “severity of consequence” and a “frequency of occurrence” to evaluate the significance of each impact. The definitions used in the FSA to evaluate the consequence and frequency of impacts are presented in Table 19.2 and Table 19.3, respectively.

Table 19.2. Severity of Consequence.

Severity	Definition
Catastrophic	• Total loss of a vessel or crew • Extensive environmental damage
Serious	• Loss of a crew member, or multiple serious injuries • Major environmental damage • Major damage to infrastructure or vessel • Major national business, operation or reputation impacts
Moderate	• Serious injury to person • Notable damage to infrastructure or vessel • Significant environmental damage • Considerable business, operation, or reputation impact
Minor	• Slight injury(s) to person • Minor damage to infrastructure of vessel • Minor environmental damage • Minor business, operation, or reputation impact
Negligible	• No injury to persons • No significant damage to infrastructure of vessel • No environmental damage • No significant operational impacts

Table 19.3. Frequency of Occurrence.

Frequency	Definition
Frequent	Will occur on a regular basis during the project
Reasonably Probable	Extremely likely to happen during the project span
Remote	Likely to happen during the project span
Extremely Unlikely	Unlikely to happen but not exceptional
Negligible	Only likely to happen in exceptional cicrumstances

Once impacts have been assigned significance based on their severity of consequence and frequency of occurrence, their significance has been assessed as "Unacceptable", "Tolerable", or "Broadly Acceptable". The definitions of these are given in Table 19.5. The risk matrix used to assign significance is presented below.

Table 19.4. Risk Matrix.

Frequency	Frequent	Tolerable	Tolerable	Unacceptable	Unacceptable	Unacceptable
	Reasonably Probable	Broadly Acceptable	Tolerable	Tolerable	Unacceptable	Unacceptable
	Remote	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable	Unacceptable
	Extremely Unlikely	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable
	Negligible	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable
		Negligible	Minor	Moderate	Serious	Catastrophic
		Severity				

Table 19.5. Significance Definitions.

Significance	Definition
Unacceptable (High Risk)	Generally regarded as unacceptable whatever the level of benefit associated with the activity. Significant risk mitigation or design modification required to reduce to tolerable (ALARP).
Tolerable (Moderate Risk)	Typical of the risks from activities which people are prepared to tolerate to secure benefits. There is however an expectation that such risks are properly assessed, appropriate control measures are in place, residual risks are as low as reasonably practicable (ALARP) and that risks are periodically reviewed to monitor if further controls are appropriate.
Broadly Acceptable (Low Risk)	Generally regarded as acceptable and adequately controlled. At these risk levels the opportunity for further reduction is limited.

19.4 Baseline Information

19.4.1 Introduction

This section summarises baseline vessel activity and navigational features in the vicinity of the proposed NorthConnect offshore consenting cable corridor. The full analysis is provided in Appendix G.1.

19.4.2 Navigational Features

The closest major port to the consenting corridor is Peterhead Port, located approximately 3NM north of the corridor landfall. This port provides deep-water berthing facilities at depths of up to 14m to a broad range of industries including oil & gas, renewables and fishing. Peterhead Port is the UK's largest white and pelagic fish port; it also accommodates tankers, general cargo ships, cruise ships as well as recreational craft in Peterhead Bay Marina. Further south (approximately 21NM south of the landfall) is Aberdeen Harbour. This port is of commercial significance and the most important base for the offshore oil and gas industry in NW Europe. There are various small harbours located within 10NM of the landfall including Buchanhaven, Boddam, Port Errol, Collieston and Newburgh. Boddam is closest to the landfall (approx. 1.3NM) and is the base for inshore creel boats as well as the Misty Angling sea angling/boat trips in the summer.

Two general anchorages area were identified in literature: Peterhead Bay; and Cruden Bay. The Pilot Book states that Peterhead Bay offers anchorages in depths exceeding 11m with the best holding ground found SE of the South Breakwater. It also notes that vessels have been known to drag anchor in bad weather. Cruden Bay also offers anchorage, primarily for small vessels.

There are no military practice areas (PEXA) that intersect the consenting cable corridor. The closest firing practice area lies approximately 10NM south of the corridor. There are no restrictions on vessels' rights to transit the area.

There are three wind farms in the vicinity of the consenting corridor with the closest (Hywind Scotland Pilot Park) lying approximately 5-6NM to the south of the corridor (at its closest point). This is comprised of five floating wind turbines. The European Offshore Wind Development Centre (EOWDC), located 14NM south of the corridor landfall in Aberdeen Bay, is currently under construction. Finally, the Kincardine Offshore Wind Farm is located approximately 22NM south of the cable landfall and has been granted consent for the installation of seven turbines.

19.4.3 Metocean Data

A description of the tidal streams in the general area off the east coast of Scotland is provided below (extracted from Admiralty Sailing Directions (UKHO, 2016)):

> *The offshore stream runs generally N and S from Rattray Head to Bell Rock. The E-going stream out of the S part of the Moray Firth sets in the direction of the coast, that is gradually SE and S round Rattray Head before joining the S-going offshore stream. The N-going offshore stream divides N of Rattray Head, part of it sets NW and W into Moray Firth and part of it continues N.*
>
> *The change from the S-going to the N-going stream is through W and from the N-going to the S-going stream through the E.*

In the vicinity of the consenting corridor east of Peterhead, the peak spring and neap tidal rates are 2.1 knots and 1.0 knots (north), and 1.7 knots and 0.8 knots (south), respectively.

Mean tidal levels as presented on Admiralty Chart 213 for Peterhead are presented (heights in metres above chart datum):

- MHWS – 4.0m
- MHWN – 3.2m
- MLWN – 1.6m
- MLWS – 0.7m

Fog occasionally affects the east coast, particularly in the north, however it is not especially frequent over the open sea.

19.4.4 Maritime Incidents

Based on a recent ten years of data (2005-14), there were 97 maritime incidents recorded in the study area by the RNLI and 56 incidents recorded by the MAIB. Machinery failure was the most prominent cause of incidents although other frequent causes included “ill crewman” and “accidents to person.” The majority of incidents recorded were in Peterhead Port and in coastal waters off Peterhead with relatively few recorded further offshore.

19.4.5 Maritime Traffic Survey

A shipping analysis was performed using 12 months of Automatic Identification System (AIS) data from 2017 to account for seasonal variations. Analysis was undertaken in a study area covering 5NM around the consenting cable corridor. Figure 19.2 presents the AIS tracks recorded in the study area, colour-coded by vessel type.

It is noted that tracks associated with temporary (non-routine) operations such as those from vessels carrying out surveys, cable work, or fishing vessels carrying out guard duties (e.g., at Hywind during installation works) have been removed from the remaining analysis.

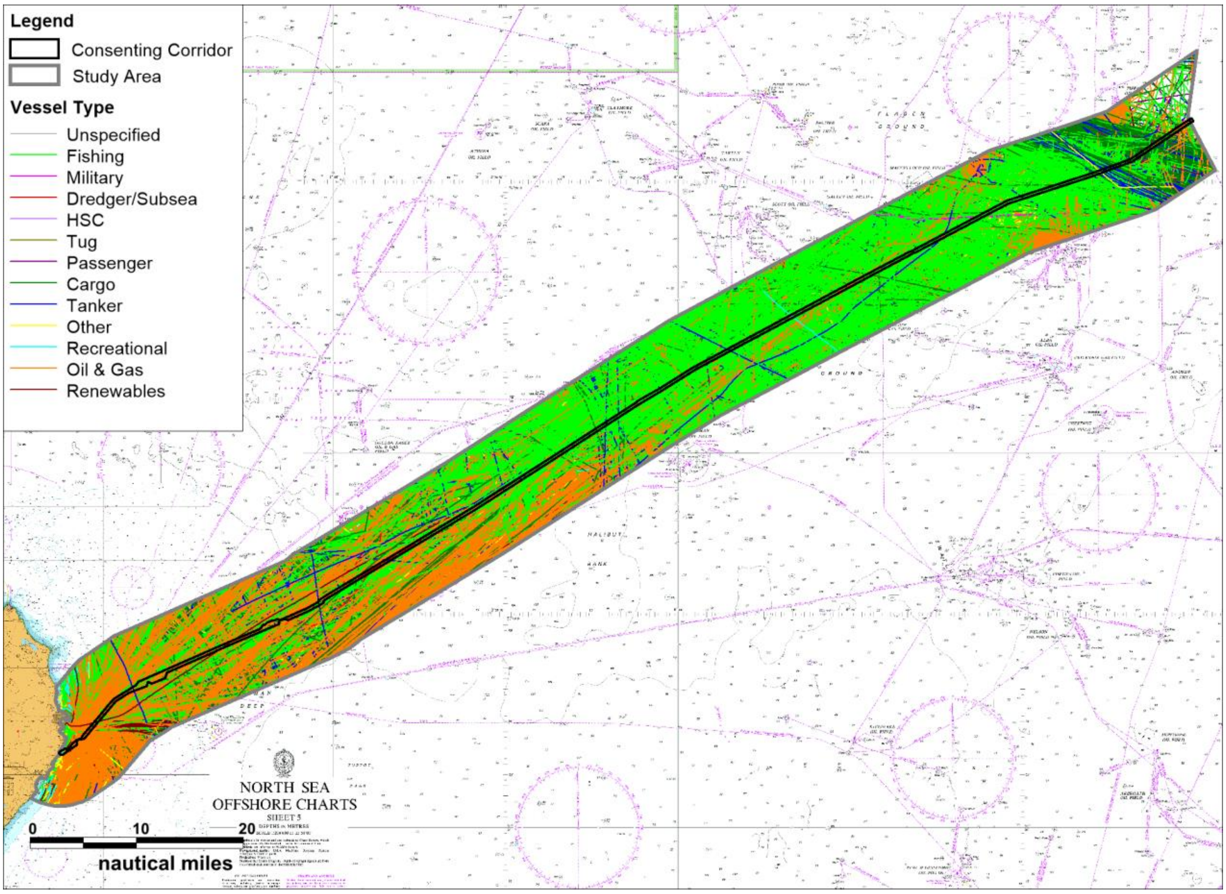

Figure 19.2. AIS Tracks by Vessel Type (2017).

Excluding temporary vessel activity, there was an average of 79 unique vessels per day recorded in the study area over the 12-month study period. August was the busiest month with an average of 96 unique vessels per day whilst January was the quietest with 58 unique vessels recorded per day.

The most frequently recorded vessel types in the area were associated with the oil and gas industry (contributing approximately 37%), followed by fishing vessels (34%). Commercial vessels accounted for approximately 21% of the total. It is again noted that fishing vessels below 15m in length and recreational vessels are not required to broadcast on AIS. The main vessel type distribution based on unique vessels per day is presented in Figure 19.3.

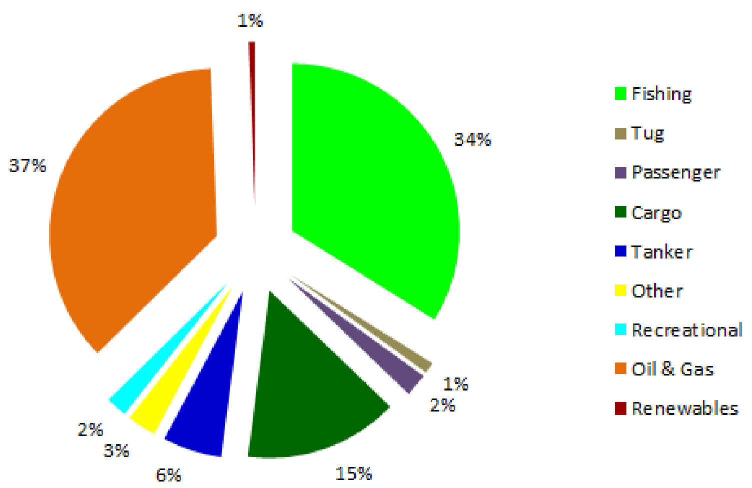

Figure 19.3. AIS Main Vessel Type Distribution (2017).

The average vessel length and deadweight tonnage (DWT) recorded in the study area was 73m and 7,125 DWT, respectively. The largest vessel recorded in the study area was the crane vessel Pioneering Spirit, with a DWT of 499,125.

The highest density area for all vessel types recorded was the coastal waters off Peterhead. Relatively low densities were seen farther offshore particularly at the far NE of the study area.

Vessels at anchor within 10NM of the consenting cable corridor during the twelve-month study period were identified using a combination of the information broadcast on AIS (navigation status) as well as a review of vessels' speeds versus headings over time, since it is known that anchored vessels do not always change their status on AIS which requires a manual update by the Officer of the Watch (OOW). Tracks were also manually checked to filter out low speed vessels that were holding position using DP (fixed heading) rather than anchor (swing circle) (Refer to Appendix G.1 for more details).

All anchoring activity was recorded within 6NM of the coast with over half (approximately 53%) from oil & gas related vessels. Other frequently recorded vessel types were cargo vessels (23%) and tankers (10%).

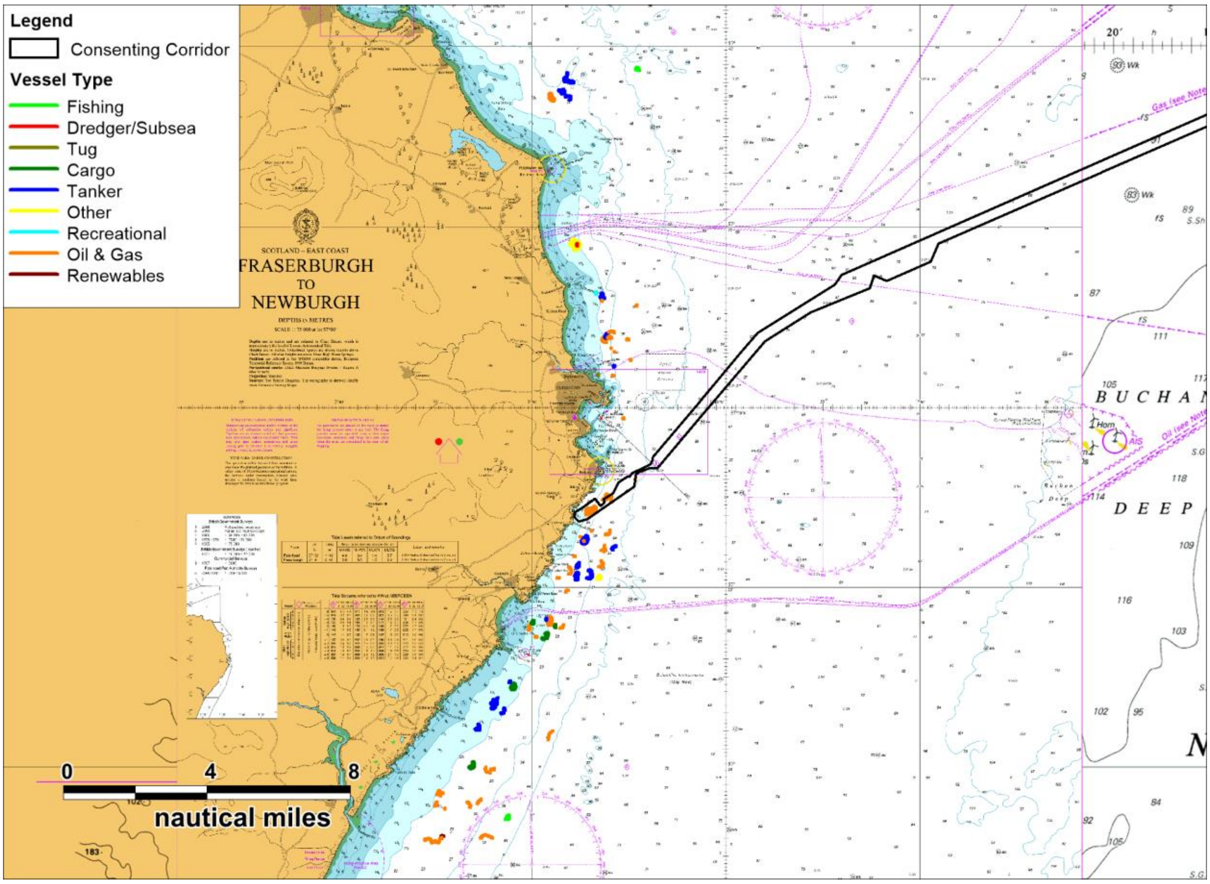

Figure 19.4. General View of Anchored Vessels near the Consenting Corridor (2017).

The majority of vessels recorded at anchor were in the 2,500 – 5,000 DWT category. The largest vessel recorded at anchor was the 145m oil & gas supply vessel Seven Atlantic, with a DWT of 11,885.

Three unique oil & gas related vessels were recorded at anchor within the consenting corridor on five separate occasions. Their details are given below in Table 19.6. One other anchored vessel was also recorded within 100m of the cable corridor in December 2017, a 3,100 DWT offshore support vessel.

Table 19.6. Vessels recorded at Anchor within the Consenting Corridor.

Vessel Name	Type	Length (m)	DWT	Date(s) at Anchor
Grampian Sovereign	Offshore Supply	83	2,515	11th – 12th January 2017
Olympus	Offshore Supply	80	4,000	26th July 2017
Vestland Cetus	Offshore Supply	86	4,260	11th January 2017 12th-13th January 2017 8th-9th December 2017

A detailed view of the vessels recorded at anchor within the consenting corridor is presented in Figure 19.5.

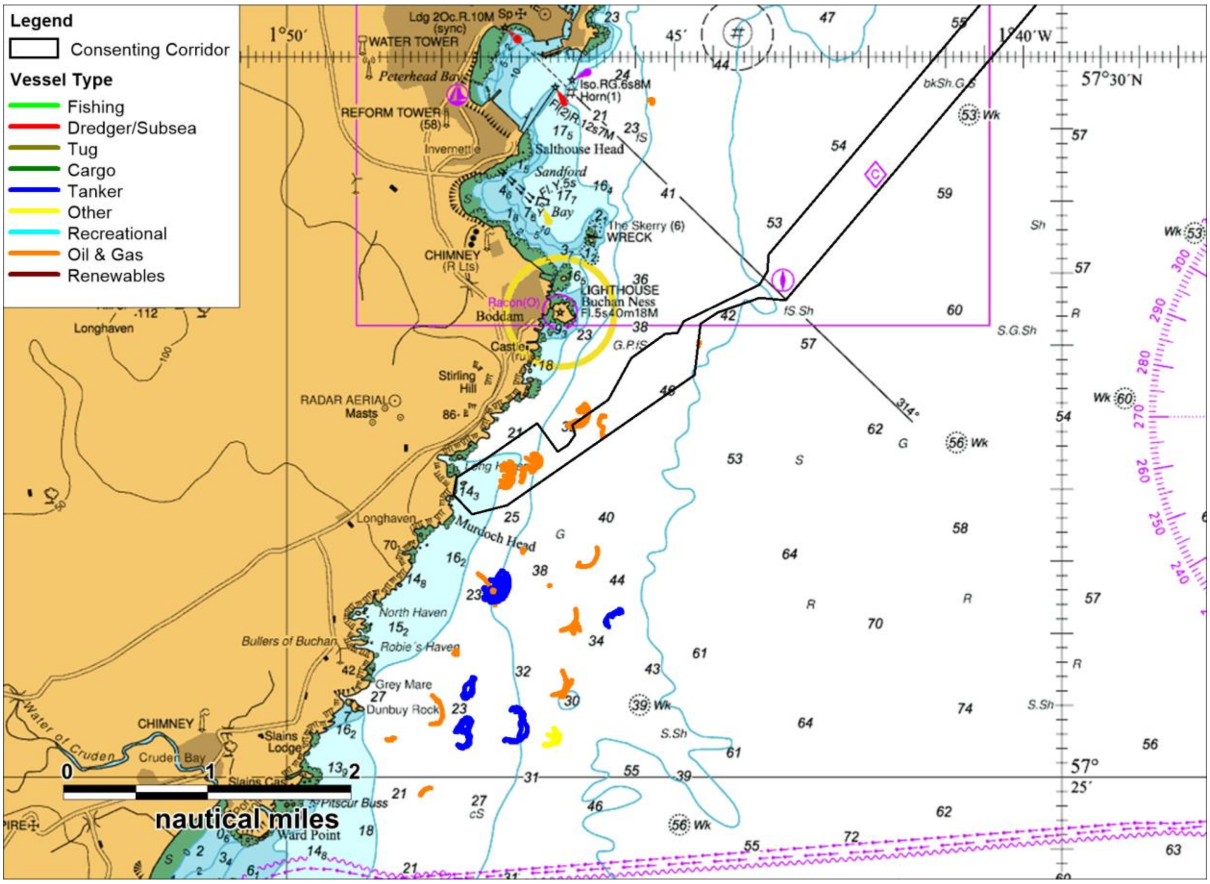

Figure 19.5. Detailed View of Anchored Vessels within and near the Consenting Corridor (2017).

19.4.6 Recreational Activity

Figure 19.6 presents the tracks of recreational vessels recorded on AIS within the study area during 2017. Density was highest in coastal waters off Peterhead, with fewer crossings of the cable corridor farther offshore. This agrees well with the recreational AIS intensity grid available on the National Marine Plan Interactive (NMPi) (Marine Scotland, 2018), which showed the highest density of recreational vessels in the approaches to Peterhead harbour based on AIS analysis provided by Anatec to the RYA for summer periods from 2011 to 2013.

It is noted that the consenting corridor is outside of indicative areas of general recreational boating identified by the RYA, which mainly relate to club training and racing areas.

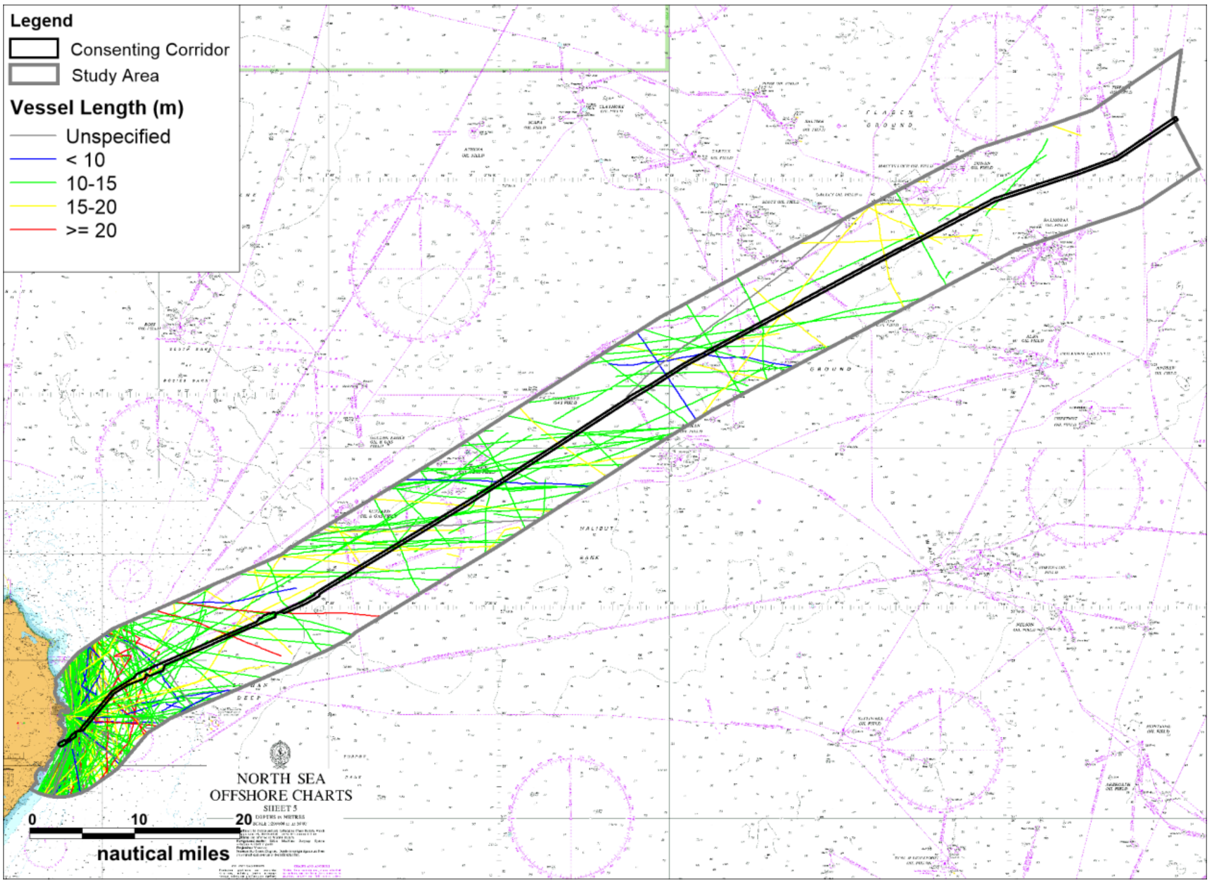

Figure 19.6. AIS Recreational Activity (2017).

In terms of nearby shore-based facilities, Peterhead harbour offers excellent shelter for recreational vessels in all weather. Peterhead Bay Marina accommodates visiting yachts up to 22m in length with 150 fully serviced berths, and ample berths for visiting yachts. It is also home to a sailing club (Peterhead Sailing Club) which carries out dinghy cruising, dinghy racing and yacht cruising. There are also three RYA training centres located in Peterhead:

- Sea Cadets;
- North East Scotland College; and
- Falck Safety Services.

19.4.7 Fishing Vessel Activity

Significant fishing activity was recorded in the study area along the entire length of the consenting corridor with a peak in the approaches to Peterhead Port, and in coastal waters due to creeling and scallop dredging. The most frequently recorded gear type in the study area overall was demersal trawlers (54%) followed by twin (13%) and pair (10%) trawlers.

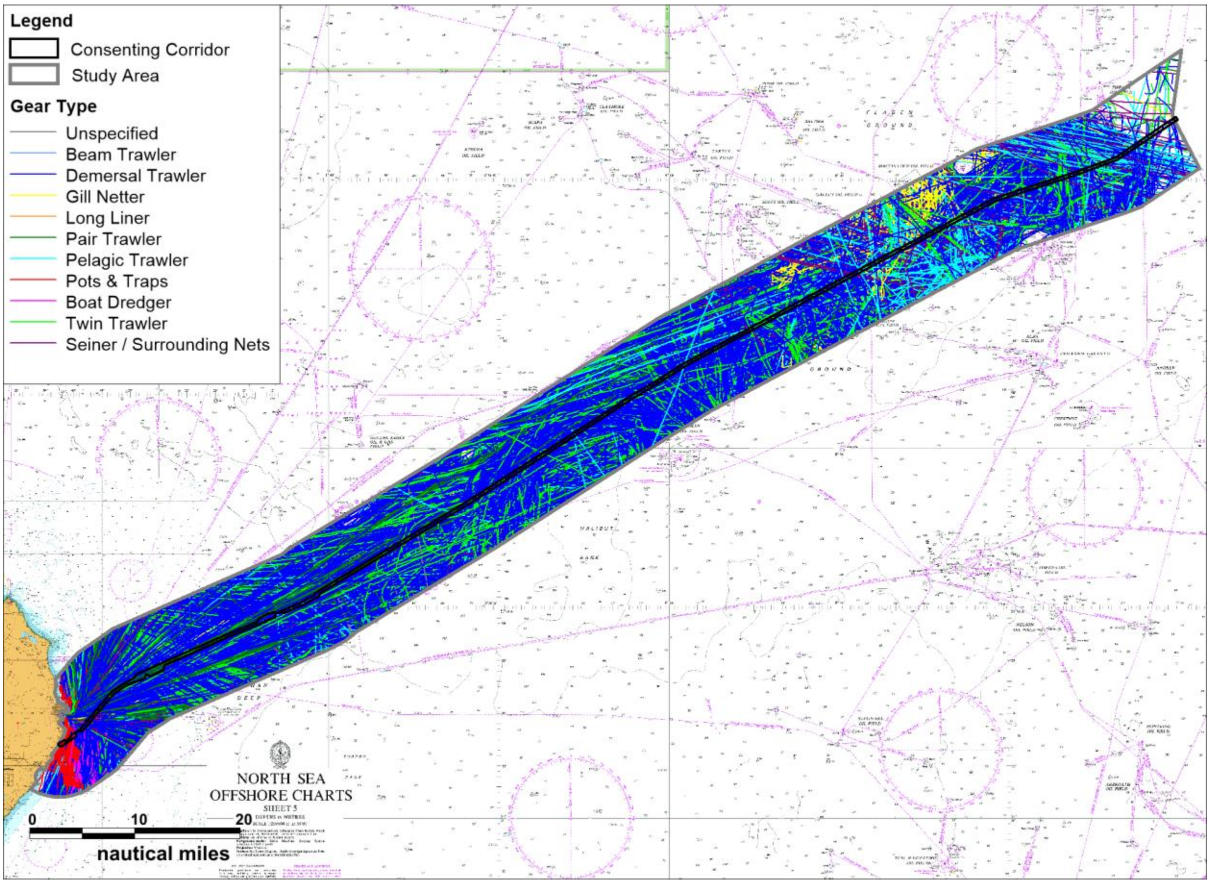

Figure 19.7. AIS Fishing Tracks by Gear Type (2017).

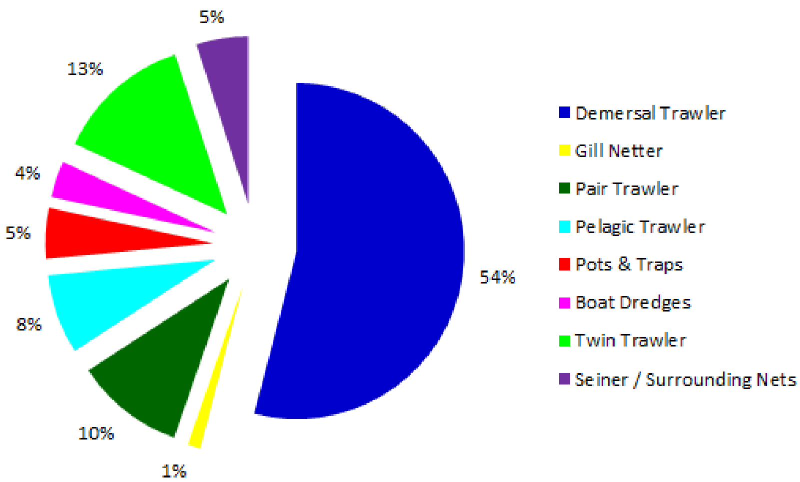

Figure 19.8. AIS Fishing Main Gear Type Distribution.

Demersal gear-types which include demersal trawls (single otter and paired) and scallop dredges are at most risk of snagging on subsea cables as they drag their gear along the seabed. It is estimated that vessels recorded with speeds less than 6 knots (approximately 79%) may be actively engaged in fishing. Detailed analysis was carried out to filter out any demersal vessels with slow speeds, e.g., vessels transiting in/out of Peterhead port, from those potentially fishing. A density plot revealed KP67-KP118 (approximately) was the busiest section of the cable corridor with active demersal fishing activity.

19.4.8 Data Gaps

The main data set used in this analysis was AIS data. The limitations of AIS data are as follows:

- AIS equipment carriage is not mandatory for all vessels. Recreational craft and smaller fishing vessels are not obliged to carry it, and are therefore will be under-represented in the AIS data;
- Coverage may temporarily be lost especially further offshore due to the range from receivers. However, vessels are normally on consistent courses when steaming at sea, so this was not found to be a significant limitation; and
- Navigational status broadcast on AIS is reliant on update by the OOW on the vessel. Where this was not done in a timely manner, interpretation of the vessel speed and heading was necessary to identify whether a vessel was anchored versus holding station using DP.

Appendix G.1 provides details on the other data sources that were used to supplement AIS, especially for smaller vessels.

19.4.9 Identification of Key Receptors

The following key receptors have been carried forward to the impact assessment:

- Passing traffic (encompasses all passing vessel types e.g., commercial, oil & gas, fishing and recreation);
- Vessels engaged in fishing (steaming fishing vessels on passage included in preceding point);
- Vessels at anchor; and
- Military exercises.

19.5 Impact Assessment

This section identifies aspects of the proposed development which have the potential to affect shipping and navigation. The methodology used to assess them is presented in Section 19.3.4.

19.5.1 Impact Overview

The impacts identified based on the shipping and navigation baseline assessment and stakeholder consultation are summarised and listed below in Table 19.7. The impacts are grouped by phase.

Table 19.7. Assessed Impacts.

Phase	Impact
Installation	Collision of a passing (third party) vessel with a vessel associated with the cable installation
	Cable installation causing disruption to passing vessel routeing
	Snag risk to fishing vessel while cable is exposed
	A vessel drags anchor across the cable while it is exposed
	A vessel drops anchor in an emergency over the cable while it is exposed
	Cable installation causing disruption to military exercises
Operation and Maintenance	A vessel drags anchor over the cable
	A vessel drops anchor in an emergency over the cable
	A vessel founders (sinks) onto the cable
	A vessel drops an object e.g., container, onto the cable
	A vessel grounds due to reduced under keel clearance
	A vessel engaged in fishing snags its gear on the cable or associated cable protection
	Collision of a passing vessel with a vessel associated with maintenance works/monitoring of the cable
	Interference with magnetic compass onboard passing vessels

Decommissioning is assumed to have similar (or lesser) impacts than installation. The decommissioning of the cables may be subject to a separate assessment nearer the time, as advised by Marine Scotland, and therefore has not been assessed in detail.

19.5.2 Primary and Tertiary Mitigation

This section details the primary and tertiary mitigation measures that are assumed to be in place prior to the installation phase as part of the Formal Safety Assessment process. The primary and tertiary mitigation are also laid out in Chapter 25: Schedule of Mitigation.

Installation Phase

- Circulation of information via Notices to Mariners, Radio Navigational Warnings, NAVTEX, and/or broadcast warnings in advance of and during the offshore works. The notices will include a description of the work being carried out.
- Cable vessels will display appropriate marks and lights, and broadcast their status on AIS at all times, to indicate the nature of the work in progress, and highlight their restricted manoeuvrability.
- Temporary aids to navigation will be deployed (if required) to guide vessels around any areas of installation activity.
- Guard vessels will be used to monitor and advise vessels in the vicinity of the installation works as appropriate.
- Compliance with International Regulations for the Prevention of Collision at Sea (IMO, 1972) and the International Regulations for the Safety of Life at Sea (SOLAS).
- Temporary (advisory) protection zones will be created around the installation works during the installation phase, and monitored by the guard vessel(s).
- Liaison with local ports and harbours, notably Peterhead.
- Fisheries Liaison Officer (FLO) will be employed to facilitate communications between the project and the fishing sector.
- The programming is such that the cables will not remain uncovered for longer than a 3-month period.

Operation & Maintenance Phase

- As built information will be provided to the UKHO for inclusion in admiralty charts, and the Kingfisher Cable awareness charts, with appropriate notes.
- Cable to be installed with appropriate protection as per the Construction Method Statement.
- Any protection measures used (e.g. rock placement) will not reduce the existing water depths by greater than 5%.
- Routine surveys will be carried out to verify that the cable protection status is adequate.
- Compass deviation effects will be minimised by keeping cable separation distance as short as practicable.

19.5.3 Installation Stage Impacts

This subsection describes the impacts that have been considered during the installation phase as part of the Formal Safety Assessment process. All are direct, short term, temporary, adverse impacts.

Increased Collision Risk (Passing Vessel with Installation Vessel)

There is an increased collision risk created during the installation phase for all passing traffic (including commercial, oil & gas, fishing and recreational) due to the presence of vessels associated with the installation of the offshore cabling. The nature of cable installation requires large, slow moving vessels which will be restricted in their ability to manoeuvre. Therefore, these vessels may have limited capability in taking avoidance action from a passing vessel on a collision course, should such a situation arise. Due to their size and mobility in comparison, smaller vessels associated with the installation phase, e.g., guard vessels, are considered to pose a lesser risk of collision than that of the cable installation vessels.

The collision risk is likely to be greater in higher density shipping areas. From the baseline assessment, the highest collision risk area will be in territorial waters near the landfall. However, there is third-party vessel traffic all along the consenting corridor, so encounters are also possible further offshore up to the UK/Norway median line.

It is expected that the majority of vessels in the area will be aware of the installation work before encountering the project vessels through tertiary mitigation measures (circulation of information such as Radio Navigation Warnings and NAVTEX). This will assist vessels in reviewing their passages prior to embarking, and revising their passage plans if necessary. During a voyage any passing vessels in the vicinity will become aware of the installation work via AIS broadcasts from work vessel(s), assuming the passing vessel has an AIS unit fitted. The installation and guard vessels will maintain visual, RADAR, and AIS watches. If a passing vessel is projected to be on a collision course, or their projected closest point of approach is within the safety zone, the guard vessel will have procedures in place to contact the vessel and request a safe clearance.

The frequency of this impact is considered to be **Extremely Unlikely**, and the severity **Serious**, resulting in a ranking of **Tolerable**.

Disruption to Vessel Routeing

Installation of the cables may also cause disruption to vessel routeing/timetables. This will most likely affect busier areas of shipping where vessels are transiting on regular routes with a time schedule, such as oil & gas vessels and passenger ferries. The risk of a collision between two third-party vessels may also be increased as a result of route deviation.

However, the additional vessel activity due to the installation work, in the context of the existing baseline traffic using the area, is low, and there will normally be room for vessels to re-route a safe distance from the installation work, assuming a rolling (advisory) safety zone around the cable installation activity. Through circulation of information, the vast majority of vessels should be aware of the installation work in advance, allowing alternate routes to be planned with minimal impact on schedules.

It is noted the consenting corridor overlaps the Pilot Station for Peterhead Port. Liaison with the Peterhead Harbour Master has taken place on this issue to ensure any disruption can be managed by temporarily relocating the station. Further liaison is planned as per the list of tertiary mitigation measures in Section 19.5.2.

The frequency of this impact is considered to be **Reasonably Probable**, and the severity **Minor**, resulting in a ranking of **Tolerable**.

Snagging Risk to Fishing Vessel on Exposed Cable

From the baseline fishing analysis, activity was observed along the consenting corridor, including in the vicinity of the landfall which is close to the busy fishing port of Peterhead.

During installation, there may be a period of time of between 7 days to 3 months after laying when the cable is exposed and not protected through burial or other means such as rock placement. This short period represents a potentially higher risk of snagging should a fishing gear interact with the exposed cable. Consequences of snagging to the fishing vessel could range from damage to gear (and cable), loss of vessel stability due to lines being put under strain and in the worst case, capsize of vessel, men overboard and risk of injury or fatality. For example, a risk of capsize could occur if the vessel attempted to free its gear by raising the cable rather than slipping the gear.

The impact is likely to be greatest in higher density active fishing areas such as the coastal waters off Peterhead and certain sections further offshore. Further detail is provided in Chapter 20: Commercial Fisheries and Appendix G.1.

It is expected that tertiary mitigation measures including having the FLO in place, circulation of information (via Kingfisher and local communications) as well as the presence of guard vessels at no more than 15km intervals along any sections of exposed cable, will help ensure fishermen are aware of the hazard and avoid fishing over the exposed cable.

The frequency of this impact is considered to be **Extremely Unlikely**, and the severity **Serious**, resulting in a ranking of **Tolerable**.

Anchor Dragging onto Exposed Cable

All anchoring activity recorded in the baseline shipping analysis was within 6NM of the coast. Two anchorages (Peterhead and Cruden Bay) were identified in literature, but vessels were found to anchor at various locations off the coast within 10NM of the cable consenting corridor.

There were three unique oil and gas industry vessels that were recorded at anchor within the cable consenting corridor on five separate occasions. After the installation and charting of the offshore cabling, it is expected that vessels will not plan to anchor in its immediate proximity. However, immediately following laying it is possible vessels will not be aware of the cable.

While exposed any vessel anchor could interact with the cable. If an anchor becomes snagged on the cable, there could be a risk of injury in trying to free it. If the anchor cannot be freed the safest action is to slip it, and not attempt to raise or cut the cable. Smaller vessels may be at risk of losing stability and capsizing in the worst case.

Mitigation will include circulation of information including chart depiction (ideally pre-installation), guard vessels, and minimising the duration the cable is exposed (maximum of three months).

The frequency of this temporary impact is considered to be **Extremely Unlikely** and the severity is ranked as **Serious**, taking into account mitigation. This results in an assigned ranking of **Tolerable**.

Emergency Anchoring onto Exposed Cable

If a vessel suffers engine failure, there is a chance it may drop anchor to avoid drifting into an emergency situation such as a collision or grounding. Should this happen in the vicinity of the HVDC marine cables, the anchor may come into contact with the cable.

A vessel suffering engine failure is only likely to drop anchor if there is immediate danger nearby. This is more likely to occur in the shallower, coastal waters near the landfall where there is a higher risk of grounding. In open waters further offshore, the vessel may attempt to fix the problem first or await assistance, particularly in deeper waters where anchoring may not be feasible.

In general, the highest risk areas of emergency anchoring are where traffic levels are high and water depths are shallow. The coastal waters off Peterhead were identified as a busy area of shipping and fishing, and have experienced a number of machinery failures on vessels in recent years based on the review of recent maritime incidents (MAIB and RNLI), thus are likely to be highest risk.

During the short period when the cable may be exposed, any anchor could interact with the cable. If the anchor fouls the cable, there could be a risk in trying to free it. Smaller vessels may be at risk of losing stability and capsizing in the worst case. If the anchor cannot be freed it should be slipped, and no attempt made to raise or cut the cable.

During the installation period, mariners may not be as aware of the newly laid cable although this can be mitigated through circulation of information including chart depiction (ideally pre-installation), guard vessels, and minimising the duration the cable is exposed (maximum of three months).

The frequency of this temporary impact was considered to be **Extremely Unlikely**, the consequences are estimated to be **Moderate**, resulting in an overall ranking of **Broadly Acceptable**.

Disruption to Military Exercises

The corridor landfall and approach lie approximately within 10NM of two designated firing practice areas. These areas are operated under a clear range procedure, that is, no firing will take place unless the area is considered to be clear of all shipping.

Assuming embedded mitigation measures (e.g. circulation of information including UKHO) are in place preceding any installation works, there is not expected to be significant disruption to military exercises, due to the distance between the areas, and because the installation work timetable will be taken into consideration by the Ministry of Defence (MoD).

The frequency of this impact was considered to be **Remote**, and the severity **Minor**, resulting in a ranking of **Broadly Acceptable**.

19.5.4 Operation and Maintenance

This subsection describes the impacts that have been considered for the operation and maintenance phases as part of the Formal Safety Assessment process. All are direct, long-term, permanent, adverse impacts.

Anchor Dragging

Anchoring activity in the vicinity of the consenting corridor has been described previously under the description of this hazard during the Installation Phase. Once protected, only larger vessels are likely to threaten the buried cable as their anchors are able to penetrate deeper. If the anchor is snagged on the cable, there could be a risk of electrocution or other injury in trying to free it, with the worst case being capsize of the vessel and loss of life. However, this is less likely for larger vessels such as oil & gas support vessels, with the cable being more likely to be damaged / severed.

Based on experience and consultation with the Peterhead Harbour Master, the frequency of an anchor drag over the cable is considered to be **Remote**, i.e., likely to occur during the span of the project. The severity is ranked as **Moderate**, taking into account mitigation including cable protection informed by the Cable Burial Risk Assessment (CBRA), which includes a review of anchoring risks based on vessels identified to be anchoring in the area. Protection will be designed, where possible, to bury the cable below the depth that an anchor can penetrate. Where sufficient protection is not provided by burial, additional external protection such as rock berms will be utilised. This is especially important in the first few KP where oil & gas vessels were seen to be anchoring in proximity to (or inside) the corridor. This results in an assigned ranking of **Tolerable**.

Emergency Anchoring

This scenario has already been described under the Installation Phase.

As with anchor dragging, larger anchors pose the biggest threat to the protected cable, as they are capable of penetrating deeper into the seabed, and can cause greater damage than smaller anchors if contact is made. If the anchor fouls the cable, there could be a risk of electrocution or other injury in trying to free it. If the anchor cannot be freed it is safest to slip it, and not attempt made to raise or cut the cable.

The frequency of this effect was considered to be **Extremely Unlikely**, as even in an emergency Masters should consult charts before dropping anchor, and therefore avoid anchoring directly over the cable. The consequences are estimated to be **Moderate**, taking into account the planned cable protection informed by the CBRA which is designed to bury the cable below the depth that an anchor can penetrate. This results in an overall ranking of **Broadly Acceptable**.

Vessel Foundering

Foundering refers to a vessel losing its structural integrity, and subsequently sinking over the offshore cabling. Areas along the cable where traffic levels are higher generally correspond to areas of higher foundering risk.

Historically, fishing vessels have been seen to have the greatest risk of foundering, particularly in bad weather. From the baseline analysis, fishing vessels accounted for approximately 34% of vessel traffic recorded in the study area. It is noted that other small vessels such as recreational craft also have a higher risk of foundering compared to larger vessels, especially in bad weather.

Should a vessel founder over the offshore cabling, the consequence would be potential damage to the cable. Burial of the cable (and/or alternative protections) may provide a degree of protection against damage from smaller vessels.

The frequency of this impact is considered to be **Extremely Unlikely**, and the severity **Moderate**, resulting in a ranking of **Broadly Acceptable**.

Dropped Object from Vessel

This hazard refers to a vessel dropping an object when over the marine cabling. Areas along the cable where traffic levels are higher generally correspond to areas of higher dropped object risk. There is also higher risk from vessels that carry containers on deck, which includes oil and gas supply vessels, as well as container ships.

An incident is most likely to occur in heavy seas, due to cargo being shifted. There is also the possibility of smaller objects being dropped, e.g., from a fishing vessel operating in the area, but this is unlikely to threaten the cable.

The frequency of this impact is considered to be **Extremely Unlikely**, and the severity **Minor**, resulting in a ranking of **Broadly Acceptable**.

Vessel Grounding due to Reduced Under Keel Clearance

This hazard refers to a vessel grounding due to reduced under keel clearance associated with cable crossing points and protection methods, which could lead to subsequent capsize, injury, loss of life, oil spill, etc. In general, the higher risk areas are coastal waters where water depths are shallower.

The minimum water depth along the HVDC offshore cabling is at the HDD exit point where depths are 26.5m. In line with MCA guidance, it is not planned to reduce the existing water depth by more than 5% along any section of the cabling, which would correspond to approximately 1.3m at the HDD exit point. The cable protection level put in place directly at the HDD exit point will not be more than 1.3m, and thereafter is expected to be 0.8-1m within the first 12NM. The water depth increases to over 40m within 1NM of the shore. The small fishing and recreational vessels which were generally seen in the AIS survey data to be transiting this close to shore would be at no risk of grounding (less than 5m draught).

Further offshore (in over 40m depths), the maximum vessel draught recorded within 6 miles of the coast was approximately 14m from a bulk carrier transiting to Rotterdam. The maximum draught vessel that Peterhead Port can accommodate is c. 14m. Vessels such as these would not be at risk of grounding based on the planned cable protection and the existing water depths over the parts of the corridor they cross. The deepest draught vessel overall in the 2017 survey was 24m, however this was recorded transiting at water depths between 80m and 120m outside UK territorial waters (approximately 50nm NE of the Scottish coastline).

The frequency of this impact is considered to be **Extremely Unlikely**, and the severity **Moderate**, resulting in a ranking of **Broadly Acceptable**.

Fishing Gear Snagging

Fishing vessels carrying demersal gear that interacts with the seabed when deployed are at risk of snagging on subsea cables. Demersal trawling was the most frequent activity observed however, dredging activity was also recorded near the coast off Peterhead, as well as creeling using static gear. A detailed analysis revealed that high density areas of demersal activity occurred close to the coast as well as between KP67 and KP118 (approximately). The depiction of the cable on nautical and Kingfisher charts (embedded mitigation measures) may discourage fishing in the cable's vicinity, however, evidence shows that this is not always the case with laid cables.

If a fishing vessel snags its gear on a cable, the crew should attempt to make contact with the Coastguard, and if possible the cable operator. However, as it is extremely likely that the crew will be advised to abandon the gear, attempts will sometimes be made to free the gear without consulting the Authorities. This can cause further damage to the cable and gear, pose a risk of injury including electrocution if the cable is raised or cut, can threaten the stability of the vessel due to lines being put under strain, and in the worst-case lead to capsize and loss of life. Cable protection such as trenching and burial, rock placement with suitable profiling (as detailed in Chapter 2: Project Description), etc., is assumed to provide effective mitigation. Further detail is provided in Chapter 20: Commercial Fisheries.

The frequency of this impact is considered to be **Remote**, and the severity **Serious**, resulting in a ranking of **Tolerable**.

Increased Collision Risk (Passing Vessel with Maintenance/Survey Vessel)

It is planned that two years after completion of the installation period and every fifth year, the Inspection, Maintenance and Repair (IMR) Contractor shall conduct a survey of the entire cable route. The findings from the survey shall be documented and compared with as-built documentation and latest route information. Based on discrepancies, the IMR Contractor shall propose which sections to survey on a more frequent basis, where applicable. IMR Contractor shall perform Time Based Maintenance (TBM) activities on the critical areas identified, typically every 12 months, if not agreed otherwise.

Whilst this provides important mitigation against cable interaction, it will require vessel(s) working over the cable, resulting in a potential collision risk with passing traffic.

As the IMR work will be relatively infrequent during the operational phase, and assuming circulation of information of the intended works is undertaken in advance, the risk is not considered to be significant. It is noted that the IMR work is expected to be much less disruptive and span a much shorter period than for cable installation.

The frequency of this impact is considered to be **Extremely Unlikely**, and the severity **Moderate**, resulting in a ranking of **Broadly Acceptable**.

Magnetic Compass Interference

The static magnetic fields created by HVDC cables can interact with the earth's natural magnetic field, which can result in interference with magnetic navigational equipment, particularly in shallow waters. A high-level review of this potential impact has been conducted.

The vast majority of commercial vessel traffic uses GPS and non-magnetic gyrocompasses as the primary means of navigation, which are unaffected by EMF. Therefore, it is considered unlikely that any created interference will have a significant impact on vessel navigation. However, magnetic compasses still serve as an essential means of navigation in the event of power loss or a secondary source, and some smaller craft (fishing or leisure) may rely on it as their sole means of navigation, especially in bad visibility or at night. The important factors that affect the resultant deviation are:

- Water depth;
- Burial depth;
- Spacing or separation of the two cables in a pair; and/or
- Cable route alignment relative to the earth's magnetic field.

The highest risk area is waters up to 12NM from the HDD exit point where water depths are as shallow as 26.5m. In this nearshore area, there will be an indicative 60m construction corridor with a likely cable separation distance of 20m which will not cause a compass deviation of more than five degrees. However, if the worst-case scenario (e.g. cable separation distance of 40m) is applied, there will be a compass deviation of six degrees for approximately 500m from the HDD exit point, at nominal DC current. Following this, no compass deviation greater or equal to 5 degrees is anticipated as cable separation is expected to reduce to 20m.

If for some reason the cable separation was 28m or above until a water depth of 30m, a compass deviation of more than five degrees would be detected for approximately 1km north east from the HDD exit point.

There is not expected to be compass deviation in waters from the 12-mile limit to the UK-Norway median line as water depths are greater than 45m and thus cables could be separated from anything between 20m and 450m without causing significant deviation.

Although the potential maximum deviation slightly exceeds the five degrees recommended by the MCA, this would be worst-case, and also transitory as a vessel would pass over the cables. Only a small number of vessels when operating close to shore directly over the cable would potentially be affected. If not equipped with GPS, such vessels will normally be able to identify their position using landmarks onshore by day or lights by night.

Assuming the worst-case cable separation and hence magnetic compass deviation, this impact is considered to be **Frequent**, with **Minor** severity, resulting in a ranking of **Tolerable**.

19.5.5 Decommissioning

It is noted that the decommissioning of this project will most likely require a separate environmental assessment at the time due to the scale of the removal of the cables from the seabed. With regard to impacts on shipping and navigation, if the marine cabling were to be removed, the installation operation would be reversed and thus all temporary impacts assessed in the installation phase will apply.

Elsewhere if the cable is left in situ, for example at crossings, the future risk to fishing vessels will require to be assessed using updated baseline data.

19.6 Mitigation Measures

This section provides additional mitigation measures to be implemented to bring impacts assessed as tolerable to ALARP. Impacts assessed as broadly acceptable have not been included in this part of the assessment, although they may also benefit from the additional mitigation. It is noted that no hazards were assessed to be unacceptable.

- Consultation and circulation of information to the Marine Safety Forum (MSF) whose members represent the oil & gas vessels anchoring in proximity to the cable landfall; and
- Circulation of information to marinas located along the east coast of the UK (including Peterhead and others north and south) to increase the likelihood of non-local sailors being made aware of the temporary installation work.

19.7 Residual effects

The additional mitigation measures presented above will benefit the anchor drag and recreational activity however the overall rankings remain as **Tolerable** (with mitigation).

19.8 Cumulative effects

This section describes cumulative and in-combination developments potentially relevant to the NorthConnect HVDC marine cabling, including the expected cumulative impacts. This is based on a review of all developments listed in Chapter 6: Cumulative Assessment. Specific discussion of key developments is provided below.

Moray East/West Offshore Windfarm Development

The Moray East and West Offshore windfarm developments are considered as one effect and are located approximately 47NM NNE of the consenting corridor landfall. The Moray East project was granted consent in 2014 with a Contract for Difference (CfD) awarded in 2017. The Moray West however, is still in the early planning stage.

Due to the distance between the projects, there is not expected to be a significant cumulative impact resulting from either of the Moray Wind Farm developments.

Inch Cape Offshore Windfarm

The Inch Cape Offshore Wind Farm (OWF) is located around 8 miles off the Angus coastline (approximately 53NM south of the cable corridor landfall). It is currently under development and expected to enter construction in 2020.

Despite the predicted overlap of construction periods, the distance between the two projects means there are no significant cumulative impacts anticipated.

Neart na Gaoithe Offshore Windfarm

The Neart na Gaoithe (NnG) Wind Farm is located approximately 25km off the coast of Fife. The wind farm was granted consent in October 2014 and is the second Scottish wind farm to be awarded a contract for difference (CfD).

Due to the distance between the projects, there is not expected to be a significant cumulative impact resulting from the NnG Wind Farm.

Seagreen Phase 1 Windfarm

The Seagreen Phase 1 comprises two sites (Alpha and Bravo) and is awaiting consent for a new proposal. The sites are located approximately 25km off the east coast of Fife (i.e. approximately 47NM south of the NorthConnect consenting corridor landfall).

Due to the distance between the projects, there is not expected to be a significant cumulative impact resulting from the Seagreen Phase 1 Wind Farm.

Beatrice Offshore Windfarm

Beatrice Offshore Wind Farm is located in the Moray Firth, approximately 13km from the Caithness coast. Onshore construction of this wind farm began in May 2016 whilst offshore construction began later in April 2017. The aim is to energise the wind farm in phases with the expectation of being fully operational in 2019.

The construction and marshalling harbour for the Beatrice OWF is located in Nigg, thus should not increase the collision risk/disruption risk of passing vessels. Additionally, once fully operational, the operations and maintenance base will be located in Wick, meaning any maintenance traffic will be expected to travel between Wick and the wind farm site.

Overall, it is concluded that there should be no significant cumulative impact with this wind farm.

EOWDC (European Offshore Wind Development Centre), Aberdeen Bay

The EOWDC is currently under construction (beginning October 2016), with the first power generated expected in summer of 2018. The site is located in Aberdeen Bay approximately 12NM (from its closest point) to the NorthConnect corridor landfall. The installation base for this project is located in Denmark and the operations and maintenance base is located in Aberdeen.

The construction periods for the projects are unlikely to overlap however maintenance works may be required at the EOWDC. It is anticipated the routine maintenance vessels will be travelling from Aberdeen to the site however a small rise in collision/disruption risk in the area may occur. If both operators follow best practise guidelines, then the cumulative impact is expected to be minimal.

Hywind Scotland Pilot Park Offshore Windfarm

The Hywind Scotland Pilot Park Offshore Wind Farm is the closest site to the HVDC offshore cabling (approximately 5.4NM south of corridor). This floating wind farm was fully commissioned in Q4 2017. The onshore maintenance and operation base is located in Peterhead; however, resources are also obtained from existing offices in Aberdeen.

Due to the location of the maintenance and operation base, any vessel carrying out operations on the wind farm may overlap with the installation period of the NorthConnect HVDC offshore cabling. This could cause an increase in collision risk and/or disruption due to the close proximity of the two developments.

If both operators follow best practise guidelines during construction and/or maintenance operations, then the cumulative impact is likely to be minimal.

The risk of one of the five floating turbines at Hywind losing station and dragging anchor across the NorthConnect cable is also considered to be minimal due to the third-party verification of the Hywind moorings and the redundancy in the mooring system.

Kincardine Offshore Windfarm

The authorised Kincardine Offshore Wind Farm began its installation works in November 2017, and is expected to continue until 2020. The site is located SE of Aberdeen, approximately 22NM south of the consenting corridor landfall.

If there is an overlap between the construction periods, there may be a slight increase in collision and/or disruption risk in the area. However, if this were to occur, the cumulative impact is not anticipated to be significant due to the distance between the projects.

Aberdeen Harbour Development

Aberdeen Harbour have commenced construction of new facilities in the South Harbour (Nigg Bay) to expand the port's capacity and ability to accommodate larger vessels (e.g. commercial vessels and cruise vessels). This development is expected to finish in 2020 however there may be a slight overlap in construction works if any delays occur.

Following these developments, there is potential for future traffic within the area to change. The number of larger vessels transiting over the offshore cabling to/from Aberdeen may increase in the future due to the new facilities. A slight increase in traffic may also occur if construction periods overlap however the large distance between the projects means that cumulative impacts are assessed to be minimal.

Peterhead Harbour Developments

Peterhead Port Authority are currently developing the harbour by widening the harbour entrance through improved realignment of existing quay walls as well as strengthening and deepening the port to accommodate larger vessels. These works are scheduled for completion in September 2018 and thus there will be no overlap of construction periods.

The port of Peterhead lies within the 5NM study area surrounding the consenting corridor. In addition to being a busy fishing port, Peterhead also services offshore traffic associated with oil fields in the North Sea. The completion of the harbour development could lead to changes in future traffic to that identified using the 2017 AIS data, for example, the number and/or size of vessels visiting or anchoring outside the harbour may increase in future, but any changes are not expected to be significant.

Peterhead port has been kept updated on the NorthConnect project and this will be continued to help manage potential cumulative issues.

North Sea Link Interconnector

The North Sea Link (NSL) is an interconnector project, the offshore component of which runs between Blyth (UK) and Kvilldal (Norway). This project is jointly being undertaken by the National Grid and Statnett.

The installation of the subsea cable is due to start in 2018 and continue on until 2021 therefore, there is potential for overlap of construction periods. A possible increase in collision risk due to the presence of multiple installation vessels may occur. However, it is noted the projects are sufficiently far apart (approximately 70NM) that no significant cumulative impacts are anticipated.

NorthConnect HVDC Subsea Cable (from UK median line-start of Norwegian Fjord)

The installation of the Norwegian section of the NorthConnect HVDC marine cabling is likely to have similar impacts to those identified in this study, affecting vessels operating in Norwegian waters. Whilst a proportion of vessels may operate on both sides of the median line, and hence encounter the project in UK and Norwegian waters, no significant cumulative impacts are anticipated on the basis suitable mitigation measures, including protection, will be applied over the entire length of the cable.

19.9 Summary

This chapter has used baseline shipping and navigation conditions to identify the significant effects that may arise as a result of the NorthConnect HVDC offshore cabling. This was based on the IMO Formal Safety Assessment Process (IMO, 2002).

The baseline summary comprised a review of relevant navigational features, and an analysis of passing shipping, fishing and anchoring based on real time AIS data. The fishing analysis also used longer term data.

Of the effects considered, seven were considered to be tolerable. These included four from the installation phase (increased collision risk, potential disruption to vessel routeing/timetables and fishing / anchor dragging interaction with exposed cable) and three from the operation phase (anchor dragging, snagging from fishing gear and EMF interference).

Additional mitigation measures identified were liaison with the Marine Safety Forum (MSF) whose members represent the oil & gas vessels anchoring in proximity to the landfall, and further communication with the MCA regarding potential magnetic compass deviations, including test results proving the extent of deviation following the cable-laying operation.

The impacts considered within the preceding assessment are summarised in Table 19.8. The assessment takes into account the planned mitigation.

Table 19.8. Summary Table of Impacts.

Receptor	Phase	Impact Description	Frequency of Occurrence	Severity of Consequence	Impact Significance	Key Mitigation (Sample)
Passing Traffic	Installation	Increased collision risk	Extremely Unlikely	Serious	**Tolerable**	Guard vessels, Circulation of Information, Compliance with COLREGS, Advisory Safety Zone
Passing Traffic	Installation	Disruption to vessel routeing/timetables	Reasonably Probable	Minor	**Tolerable**	Circulation of Information, Marks and Lights, Guard vessels
Fishing Vessels	Installation	Snag risk to fishing vessels from exposed cable	Extremely Unlikely	Serious	**Tolerable**	Circulation of Information, FLO, FLMAP, Guard Vessels
Anchoring Vessels	Installation	Vessel dragging anchor over exposed cable	Extremely Unlikely	Serious	**Tolerable**	Circulation of Information, Guard Vessels
Passing Traffic	Installation	Emergency anchoring over exposed cable	Extremely Unlikely	Moderate	**Broadly acceptable**	Circulation of Information, Guard Vessels
Military Vessels	Installation	Disruption to military exercises	Remote	Minor	**Broadly acceptable**	Circulation of Information, Guard Vessels
Anchoring Vessels	Operation	Vessel dragging anchor over cable	Remote	Moderate	**Tolerable**	Chart depiction, Cable Protection
Passing Traffic	Operation	Vessel anchoring over cable in an emergency	Extremely Unlikely	Moderate	**Broadly acceptable**	Chart depiction, Cable Protection
Cable Route	Operation	Vessel foundering onto cable	Extremely Unlikely	Minor	**Broadly acceptable**	Cable Protection, Routine Surveys
Cable Route	Operation	Vessel dropping object onto cable	Extremely Unlikely	Minor	**Broadly acceptable**	Cable Protection, Routine Surveys
Passing Traffic	Operation	Vessel grounding due to reduced under keel clearance	Extremely Unlikely	Moderate	**Broadly acceptable**	Chart depiction, < 5% reduction in existing depth
Fishing Vessels	Operation	Fishing gear snagging on cable	Remote	Serious	**Tolerable**	Chart depiction, FLO, FLMAP, Cable Protection, Routine Surveys
Passing Traffic	Operation	Increased collision risk with maintenance/repair vessels	Extremely Unlikely	Moderate	**Broadly acceptable**	Guard vessels, Circulation of Information, Advisory Safety Zone
Passing Traffic	Operation	Interference with magnetic compass	Frequent	Minor	**Tolerable**	Minimising cable separation, Cable Protection Plan, Post-Lay Test of Deviation

19.10 References

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