Regional Cumulative Shipping and Navigational Review - Outer Firth of Forth and Tay Wind Farm Developments

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1 INTRODUCTION

1.1 Background

Proposals are being developed for the construction of offshore wind farms in the North Sea to the East of the Firths of Forth and Tay in Scotland.

Overall are three wind farm sites being considered in this area, two located in the Scottish Territorial Waters and one Round 3 development Zone in the area beyond the UK territorial limits.

The Crown Estate has formed the "Forth and Tay Offshore Wind Developers Group" (FTOWDG) to collaboratively identify potential cumulative effects of multi wind farm development.

This report has been commissioned by FTOWDG to review the shipping and navigational aspects of the proposals on a regional level, to ensure the developments are carried out in a coherent manner.

1.2 Objectives

To assess the shipping and navigational aspects of the following offshore renewable developments:

- Firth of Forth Round 3 Zone
- Neart Na Gaoithe (NnG) Scottish Territorial Waters site
- Inch Cape Scottish Territorial Waters site

1.3 Applicable Guidance

The following guidance is applicable to shipping and navigation for offshore wind farms:

- DECC Methodology for Assessing Marine Navigational Safety Risks of Offshore Wind Farms (Ref. i).
- Marine Guidance Note (MGN) 371 Offshore Renewable Energy Installations (OREI's) - Guidance on UK Navigational Practice, Safety and Emergency Response Issues including 'Shipping Template' (Ref. ii); and
- MGN 372 Guidance to Mariners Operating in the vicinity of OREI's (Ref. iii).

1.4 Abbreviations

The following abbreviations are used throughout this report:

AIS	-	Automatic Identification System
ALB	-	All-weather lifeboat

ALARP	-	As Low as Reasonably Practicable
ARPA	-	Automatic Radar Plotting Aid
BMAPA	-	British Marine Aggregates and Producers Association
CA	-	Cruising Association
CPA	-	Closest Point of Approach
DWT	-	Dead Weight Tonnage
EOWDC	-	European Offshore Wind Farm Deployment Centre
FTOWDG	-	Forth and Tay Offshore Wind Developers Group
HSC	-	High Speed Craft
IMO	-	International Maritime Organisation
ILB	-	In-shore-lifeboat
MCA	-	Maritime and Coastguard Agency
MEHRA	-	Marine Environmental High Risk Area
MMO	-	Marine Management Organisation
MMSI	-	Mobile Maritime Service Identity
NLB	-	Northern Lighthouse Board
nm	-	Nautical Mile (1,852 metres)
NRA	-	Navigational Risk Assessment
Ro-Ro	-	Roll on / Roll off
RYA	-	Royal Yacht Association
SAR	-	Search and Rescue
SOLAS	-	Safety of Life at Sea
TSS	-	Traffic Separation Scheme
UKCS	-	United Kingdom Continental Shelf
UKHO	-	United Kingdom Hydrographic Office
VTS	-	Vessel Traffic Services

2 POTENTIAL IMPACTS

2.1 Potential Effects on Individual Vessels

The impacts on navigation in the area will be assessed for both vessels transiting through the wind farm developments and those vessels transiting in close proximity to the development sites. The following are considered:

- Recreational Vessel Hazards / Operational Hazards
    - Collision
    - Foundering
    - Contact
    - Loss of sailing area
    - Diverting from route
    - Increase in fuel costs
    - Time costs

- Fishing Vessel Hazards / Operational Hazards
    - Collision
    - Foundering
    - Contact
    - Snagged Nets
    - Loss of fishing grounds
    - Diverting from route
    - Increase in fuel costs
    - Time costs

- Commercial Vessels / Operational Hazards
    - Grounding
    - Collision
    - Foundering
    - Contact
    - Diverting from routes
    - Increase in fuel costs
    - Time costs

2.2 Potential Effects on Routeing

The proposed wind farms are located in the approaches to the Firth of Forth and Tay ports and in proximity to routes passing between Northern and Eastern UK ports. Therefore a routeing analysis is presented to calculate the likely impact to ship routeing throughout the region.

3 Wind Farms Overview

A chart overview of the outer Firth of Forth and Tay is presented in Figure 3.1.

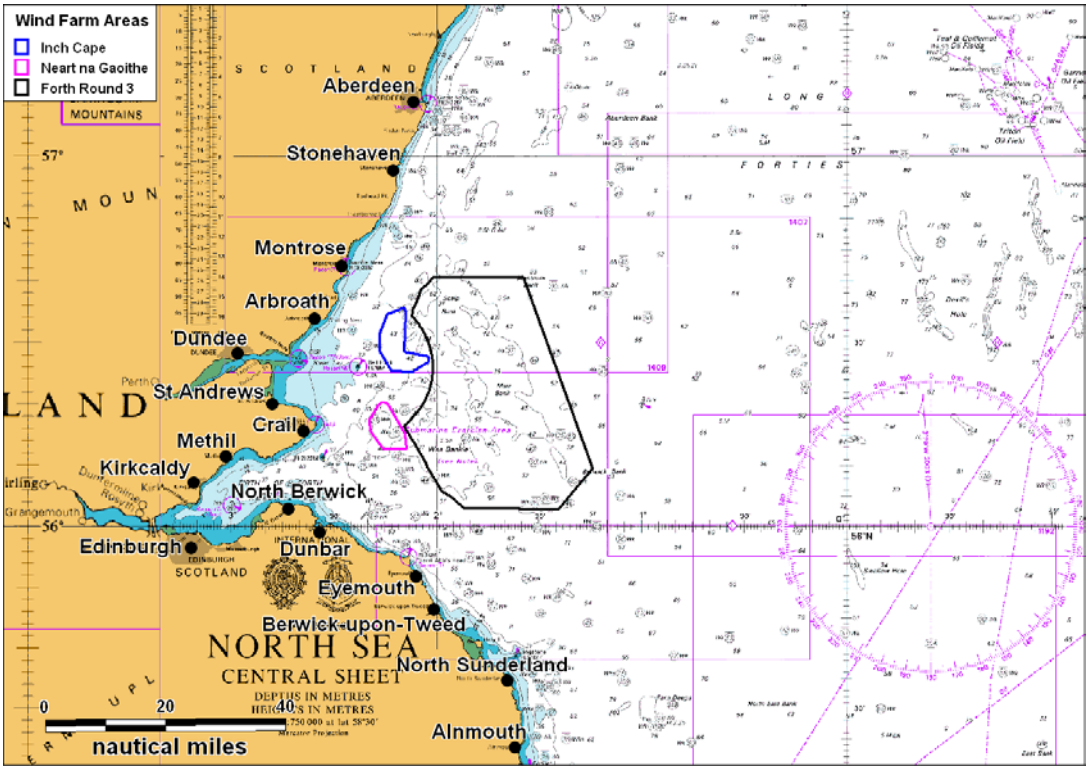

Figure 3.1 General Chart Overview of the Forth Wind Farm Developments

A summary of the locations of the outer Firth of Forth and Tay wind farm developments are given below:

- Firth of Forth Round 3 zone – 12.1nm north east of St Abb's Head
- Neart na Gaoithe – 8.7nm east of Fife Ness
- Inch Cape – 8.4nm ESE of Red Head (north of Arbroath)

4 Data Sources

4.1 Overview

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

- The Forth and Tay Offshore Wind Developers Group (FTOWDG) AIS data;
- UK Coastal Atlas of Recreational Boating;
- Marine aggregates dredging data from The Crown Estate (TCE) and British Marine Aggregates and Producers Association (BMAPA);
- UK Admiralty Charts;
- Admiralty Sailing Directions (NP 54);
- Fishing VMS (2006 & 2008) and Over flight data (2005-09);
- Master Mariner Experience (Ref. iv); and
- Shipping Operator Stakeholder consultation responses/comments.

Details of each data source are summarised in the following sections:

4.2 FTOWDG AIS Data

Two sets of AIS data have been used for this project:

- Coastal Coverage AIS data
- M.V. Clupea AIS data

Coastal based AIS data was collected during November 2009 to May 2010 from four strategic locations at Stonehaven, Dundee, Inner Forth and Dunbar. This data covered annual/seasonal fluctuations and formed a basis for the regional navigational review.

Additional survey data was collected from the survey vessel Clupea during November 2010 to February 2011 whilst operating within the Forth area. This AIS data was processed and validated against the long-term coastal data to provide a comprehensive overview of shipping activity in the outer Forth and Tay areas.

4.3 Recreational Data

The RYA, supported by the Cruising Association (CA), who represent the interests of cruising sailors and motor-boaters worldwide, have identify recreational cruising routes, general sailing and racing areas for UK waters. 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. The results of this work were published in Sharing The Wind (Ref. v) and updated GIS layers published in the Coastal Atlas (Ref. vi). Data from 2010 has been used for this study.

4.4 Aggregates Data

Aggregates dredging data (licence areas and active areas) were supplied by BMAPA and The Crown Estate. A desk based study was carried out using this information to identify commercial aggregates dredging activity in the region.

4.5 UK Admiralty Charts

Admiralty charts are nautical charts issued by the United Kingdom Hydrographic Office (UKHO) and are subject to Crown Copyright. The charts have been used to consider approaches and entrances to port and harbours in the area. The charts also include data on 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 – *Montrose to Berwick-upon-Tweed*
- 1409 – *Buckie to Arbroath*
- 273 – *North Sea Offshore Charts (Sheet 7)*
- 2182B – *North Sea Central Sheet*
- 2 – *British Isles*

4.6 Admiralty Sailing Directions

The principal navigational features and ports/harbours are those listed in Admiralty Sailing Directions for the area. A desk based study was carried out using the North Sea (West) Pilot (NP 54).

4.7 Fishing VMS and Over flight 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. Section 8.2 presents the sightings data analysis.

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 was analysed in Section 8.3 for two periods covering both UK and non-UK vessels (2006) and UK vessels only (2008).

4.8 Master Mariner Experience

Master Mariner experience was considered during the navigational impact review (Ref. iv).

4.9 Stakeholder Consultation

Refer to Section 5.

5 Consultation

5.1 Introduction

Consultation on navigational issues has been carried out during this project to gather input from the marine community. It was carried out using three different methods as follows:

1. Meetings

Meetings were held with the following:

- The Chamber of Shipping
- Forth Ports
- Northern Lighthouse Board
- Department for Transport
- Maritime and Coastguard Agency

2. Remote Consultation

The most regular vessels using the area were identified and provided with an information pack detailing the proposals. The pack requested feedback on the proposals and also invited further consultation should the stakeholder consider this necessary.

3. Presentations

Presentations were given to the following:

- RYA
- [TBC by Project]

All the meetings held were minuted and the remote consultation recorded. Summary details of the main feedback are provided in the following sections.

5.2 The Chamber of Shipping

A meeting was held at The Chamber of Shipping offices in London on 11th January 2011. The objective of the meeting was for FTOWDG to present an overview of the regional shipping and navigation study approach, to seek a preliminary response from The Chamber of Shipping on the study methodology and proposed strategy to communicate the findings to key shipping and navigation stakeholders. A summary of the main points is provided below:

- The scope of the regional study was considered and FTOWDG, stated that the Forth Array project was not being considered as part of this regional assessment.

- The regional navigation overview was provided and The Chamber of Shipping stated that FTOWDG should consider ‘entire route impacts’ – not just Scottish sections and FTOWDG confirmed this is the approach.

- The Chamber of Shipping stated that FTOWDG need to consider ship-to-ship transfers (which were proposed near the entry of the Firth of Forth in 2008). These ships have deeper draughts (up to 23m) and need to be considered in the assessment. (It is noted that at the time of writing in June 2011, regulations were to be implemented by the UK Government which would ban ship-to-ship transfers in open water apart from off the Suffolk coast. Therefore rules would prevent oil transfers occurring outside port/harbour authority limits, (i.e. in the outer Firth of Forth off Bass Rock and Isle of May)).

- The Chamber of Shipping also commented on a number of the shipping routes identified to pass through the region (See Section 10.3 and Figure 10.3 for current routes and Figure 12.19 for the alternative routes). Their main comments were as follows:

    - Route 1 (shipping passing through the Forth Zone north / south from Aberdeen to north east England) – current alternative route scenario (vessels will pass east of all of the developments) is worthy of consideration, however it limits ships to 'non-sheltered waters', giving them no inshore route for over 30 miles (assuming the entire Forth Zone is developed). Dialogue with vessel operators and seasonal AIS data could provide some information about current navigation strategies in extreme weather circumstances.
    - Route 4 (shipping passing through Inch Cape and the Forth Zone from Montrose to Holland) – Merging traffic issues (tankers, cargo affected). The alternative route scenario presented (vessels will pass west of developments/inshore) increases the density of shipping along an existing shipping route east and west of Bell Rock. Safety concerns raised by The Chamber of Shipping. Should also consider alternative route between Inch Cape and Neart na Gaoithe.
    - Route 6 and 9 (coastal shipping passing west of Inch Cape and Neart na Gaoithe from northern Scottish ports to the Forth (Route 6 is east of Bell Rock and Route 9 is west of Bell Rock)) – Use of shipping route north of Isle of May – The Chamber of Shipping stated that this route was used due to the high volume of traffic entering the Firth of Forth south of Isle of May. Safety concerns were raised by The Chamber of Shipping over the proposed alternative scenario (vessels will pass west of developments/inshore) due to increasing the volume of vessel traffic along an existing route. Need to assess 'safe passage' and probability of collision risk resulting from all alternative route scenarios being considered in the regional study. Dialogue with vessel operators could provide some information about current strategies in use when navigating east and west of Bell Rock.

- In general discussion The Chamber of Shipping stated that even one vessel per day on any given route could be strategically important and must therefore be given due consideration in the regional shipping and navigation study.

- The Chamber of Shipping supports the concept of shipping lanes through offshore wind farm sites. Future designated shipping lanes within the UK will provide clarity for prospective offshore wind farm developers.

5.3 Forth Ports

A meeting was held with the Forth Ports in January 2011. The objective of the meeting was for FTOWDG to consult with the main ports in the area which are operated by Forth Ports PLC. A summary of this meeting is provided below.

Vessel Activity in the Region:

- Forth ports have 20-22 movements a day (in 24hr period). They stated that this is not that busy in terms of the number of movements, but is significant in terms of tonnage.

- Oil and gas accounts for 80-90% of Forth Ports business and around 60 cruise liners visit in the summer.

- BP lost the contract (*regarding coastal tankers routeing to/from Grangemouth), hence the *Border* vessels now mainly work out of Immingham, and these vessels now pass further east when supplying fuel to ports around Scottish coast.

- It was noted that no ship-to-ship transfers take place in the Forth area as government regulations only permit ship-to-ship transfers inside their port limits. In addition, it was stated that anchorages are generally further inshore as depicted on admiralty charts.

- No major tidal variation. The vessels will sit at anchor as opposed to slowing down in the North Sea.

- It was thought that it is probably personal preference as to why vessels go East/West of Bell Rock. It could be that smaller vessels go closer to the coast for shelter.

- If fishing pots are in a navigational channel, they can be moved, i.e. if they are in a port limits, approaches etc.

- The sand eel fishery has been suspended on Marr bank, which was mostly operated by Danish fishing vessels.

Issues Discussed:

- General concerns were expressed regarding smaller vessels being pushed further offshore and the impact on them being further east and hence out in heavier weather.

- Forth ports felt the impact could be reduced by having a route through the middle between Neart na Gaoithe and Inch Cape for the deviated route from both Forth and Dundee.

- In general it was thought it best vessels went to the East as opposed to having a North/South channel through the Forth Zone.

- It was stated that cargo/container vessels are working to small margins, so any deviation (even a small percentage) will mean a lot from a commercial perspective. Containers and general cargo will be the greatest concern.

Future Developments:

- Future developments in the Forth include the potential for 3-4 biomass plants, which if constructed could bring in an increased number of large bulk carriers.

5.4 Marine Stakeholder Consultation

An analysis of AIS shipping data was carried out to identify the regular vessels using routes within the outer Firth of Forth and Tay. Shipping operators were identified and contacted for feedback on the potential impact of the proposals on the navigation. An 'Information Pack' was sent to gain feedback from marine operators and vessel contacts. A summary of the main feedback received is presented below.

DFDS (Rosyth – Zeebrugge route):

- The area in question will not require re-routeing from normal approaches on the passage between Zeebrugge and Rosyth.

- Based on this DFDS stated they do not need to be kept informed unless anything changes to the area under discussion.

Solstad (offshore vessels):

- The developments will not affect operations. In general port callings are to Aberdeen or Peterhead.

- If vessels pass through the region following construction of the three developments, Solstad indicated that they would not have any problems navigating through the wind farms.

Marine Scotland - Compliance (views from different fisheries law enforcement vessels):

- Inch Cape and the Neart na Gaoithe proposals will cause vessels to route in shallower water and close proximity to Bell Rock and the coastline. Whilst being in close

proximity to Bell Rock is not usually a problem - I would not feel comfortable in this area in an Easterly or South Easterly Gale.

- Not all vessels have AIS fitted. Smaller vessels and fishing vessels do not necessarily carry AIS equipment. Thus your data would exclude these vessels.

- We would have to adapt our routeing to navigate around the development area to gain access to the Forth.

- As a Shipping Stakeholder, we do not believe these proposals will impact on normal navigation for this vessel when entering and leaving the Firth of Forth. Frequently, tracks to west of the Bell Rock are taken to monitor compliance with St Andrews Bay closed area, and the Gourdon Box further north.

- The prevailing wind is south westerly in this area; it is not perceived this will pose any problems with the proximity of the wind farms. Conversely, with a north easterly to south easterly onshore wind, an assessment would be made during passage planning whether it was considered feasible to take the 'inshore' route via Bell Rock, or to transit further east prior to turning and passing east of the wind farms.

<u>Transmarine Management ApS (tankers bound for Dundee):</u>

- Initial findings are that when our ships are bound to Dundee (in-ward) the developments are not a problem, but when leaving Dundee for direction Skaw (Skagen), Denmark they will require re-routeing.

- Therefore ships will need to deviate for a total of approximately 40nm to go around each time. So there will be some extra time, costs and fuel used in this respect.

<u>Northern Lighthouse Board (NLB) (view from service vessels):</u>

- The main role of the NLB is providing for the safety of all at sea in the waters surrounding Scotland and the Isle of Man and in pursuance of this role will access all sea areas around the coast and not be limited to regular sea routes or shipping lanes.

- We also require to conduct operations involving airlifting cargo and equipment to our sites during maintenance periods. These may not be included in the data regarding your site investigations.

- We would therefore comment that although our vessels would not be directly affected by the installation of offshore wind farms within the Forth and Tay area, we would however respond directly through the consenting and licensing process, ensuring a Navigational Risk Assessment (NRA) is carried out for each development and raising any issues specific to the intended site.

SAGA Cruises (cruise vessels)

- On occasion we use Leith for embarking customers, perhaps once a year. We also operate up to ten cruises a year that operate around the UK, which may or may not transit the East Coast of Scotland.

- On our cruises that travel to the North of the region we would be forced to travel inshore of our ideal route, particularly by the Inch Cape development. However this would not be a major issue and would add little distance onto the planned route.

- In general the proposals do not pose a safety risk to our vessels and we would like to be retained on the list of Marine Stakeholders.

Fred Olsen Cruises (cruise vessels):

- Whilst we do transit the area with our vessels, especially during the summer months, we have no concerns regarding the impact on our operations.

James Fisher Everard (coastal tankers bound for Forth, Tay and Northern Ports):

- We have discussed with our Marine team, and have no comments at this time.

Armac Marine Management Ltd (cargo vessels bound for Montrose):

- Some routes will be affected but provided that the constructions are adequately marked and correctly charted I do not have any concerns regarding safe navigation, this is the opinion of several Masters in our company.

6 Navigational Features and Ports

6.1 Navigational Features

Figure 6.1 presents an overview of the main navigational features in the vicinity of the proposed wind farm developments.

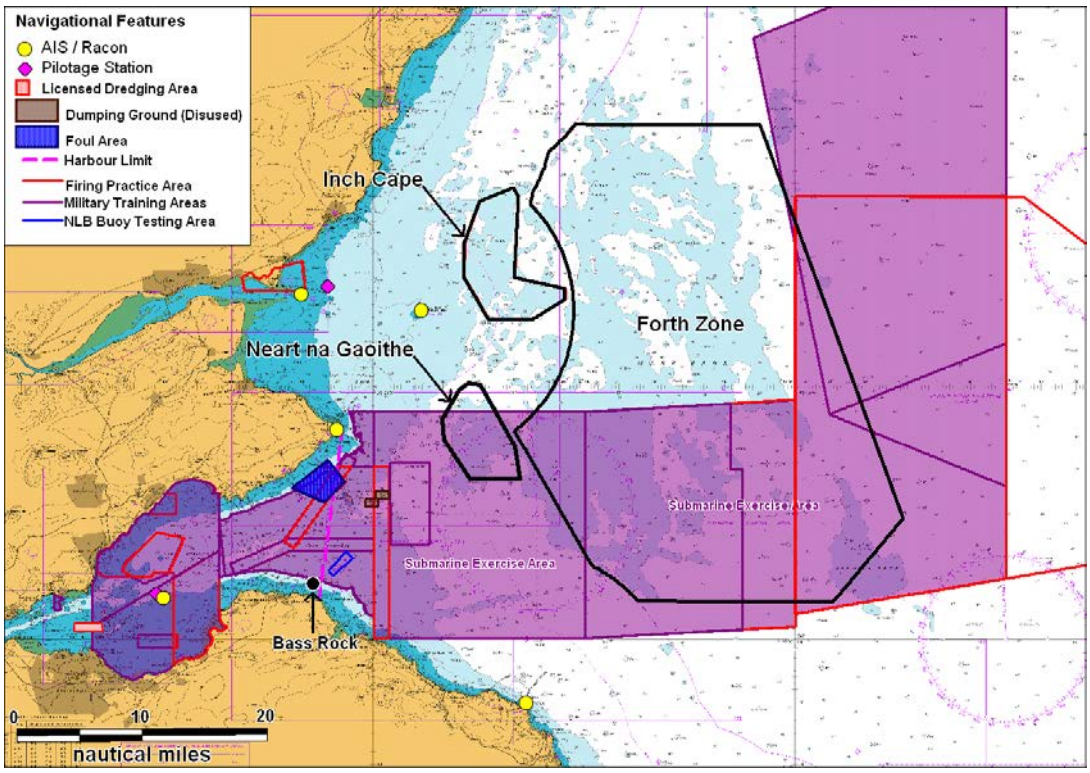

Figure 6.1 Overview of Navigational Features in the Region

Submarine practice exercise areas intersect part of the Neart na Gaoithe site and Firth of Forth Zone, with general firing practice areas within the Firth of Forth, Buddon Ness and north west of Berwick Bank (in the southern section of the Forth Zone). No restrictions are placed on the right to transit firing practice areas at any time. Exercises and firing only take place when the areas are considered to be clear of all shipping.

The only aggregate dredging license in Scotland (leased to Westminster Gravels Ltd) is located within the inner Firth of Forth, approximately 30nm south east of the Neart na Gaoithe.

The International Maritime Organisation (IMO) recommends that laden tankers should avoid the area between Bass Rock and the coast (due to water depth restrictions).

Areas around Bass Rock near Dunbar, Isle of May and St Abb's Head/Eyemouth were also candidate Marine Environmental High Risk Areas (MEHRAs) identified in 2002.

6.2 Ports

The main ports and marinas in the region from Montrose in the north to Eyemouth in the south are presented in the Figure 6.2.

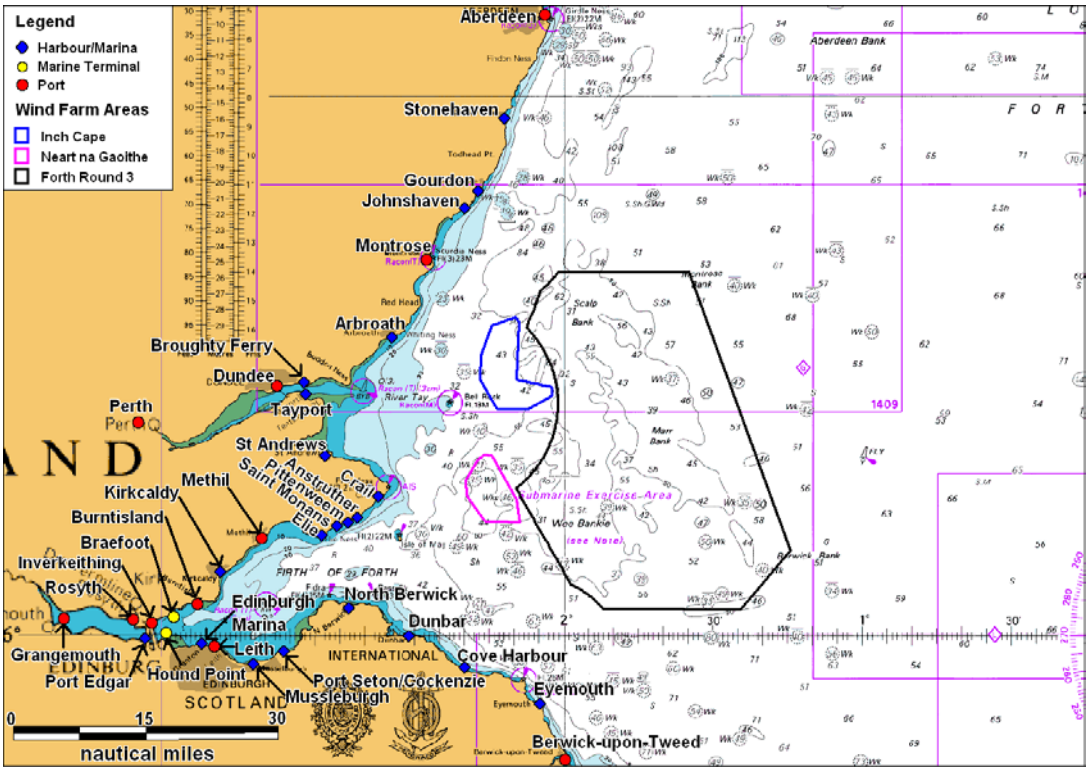

Figure 6.2 Overview of Ports and Marinas in Region

The ports, marine terminals, harbours and marinas are summarised below based on a review of the Admiralty Sailing Directions North Sea (West) Pilot (NP 54).

North & East of the Firth of Tay (Buddon Ness):

- Aberdeen – the port is the main marine support centre for the North Sea oil and gas industry. In addition to the oil and gas support services there are regular shipping services to Orkney, Shetland and Scandinavia via Ro-Ro services for passengers and cargo. Aberdeen also has a large modern fish market and although there are no commercial fisheries within the area of jurisdiction of Aberdeen Harbour or proximity, deep-sea fishing vessels and a number of locally registered potters land their catches at the Aberdeen fish market located at Palmerston Quay. The maximum size of a vessel accommodated is 160m, beam 23m and draught of 9.1m.
- Stonehaven – formerly a fishing port, now mainly used by recreational craft and a small number of inshore fishing boats. The maximum size of a vessel accommodated is 34m and draught of 3m.

- Gourdon – this is a fishing station 1 mile SSW of Inverbervie. There is an outer harbour and a breakwater, which is used by recreational vessels. The main harbour is used by fishing vessels.
- Johnshaven – the harbour dries and consists of two basins separated by a jetty. The harbour provides shelter for fishing boats in all weathers.
- Montrose –formally a small commercial and fishing port but has seen an increase in its commercial activity over recent years, mainly as a result of the offshore industries. Vessels up to 165m in length and 7m in draught can be accommodated.
- Arbroath - mainly a fishing port used by medium and small fishing vessels. Also has a small marina for sailing vessels.

Tay Ports:

- Broughty Ferry – harbours a lifeboat station, with one All-weather lifeboat (ALB) and one Inshore-lifeboat (ILB).
- Dundee – the port handles general cargo and imports of crude oil. The repair and servicing of offshore gas and oil installations is undertaken also. Vessels with a maximum length of 250m, beam 50m and draught up to 9m can normally be accommodated.
- Perth – handles about 100,000 tonnes of cargo a year, mainly agricultural products, sand, chemicals and forest products. The largest vessel received at the port was 94.7m in length in 2009.
- Tayport Harbour – is a small tidal harbour and marina which dries on low tide.

East Neuk and St Andrews:

- St Andrews – minor harbour used by small fishing vessels, potters and recreational craft.
- East Neuk harbours (including Crail, Anstruther, Pittenweem, Saint Monans and Elie) are mostly used by small to medium sized fishing vessels and recreational craft.

Forth Ports:

- Methil – a commercial port handling wood pulp and timber, fertiliser, stone and general cargoes. The maximum size of vessel handled is up to 102m in length, 14.6m beam and 5.5.m draught.
- Kirkcaldy – little or no commercial traffic and is mainly used by local fishing vessels.
- Burntisland – small commercial port handling general cargo. The maximum size of vessel handled is 122m in length, beam 16.8m and draught 6.7m.
- Braefoot Gas Terminal – is situated on the north west side of Mortimer's Deep on the north bank of the Firth of Forth. It is a gas tanker terminal serving the Mossmorran petro-chemical complex. The maximum size of vessel handled is draught of 10.8m.
- Inverkeithing – vessels up to 90m in length (approx.) load scrap at the Deep Water Berth and No 1 Berth. Smaller vessels up to 70m load stone at the quarry berth.

- Rosyth –is a commercial port handling general cargo and cruise liners. Additionally there is a Ro-Ro passenger and freight service to Zeebrugge. There is no restriction on length and beam for vessels using the tidal harbour but the maximum permitted draught is 7.8 m. It is noted that de-commissioned nuclear submarines are also located in the Royal Dockyard.
- Grangemouth – handles all types of vessels including container vessels, tankers and LPG carriers, with a maximum draught to of 11.7m at the entrance lock at high water.
- Port Edgar – accommodates a yacht marina, with vessels up to 18m in length using the harbour at all states of the tide.
- Hound Point Oil Terminal – is on the western extremity of the Forth Deep Water Channel. The terminal can accommodate tankers of draught 21.64m (springs) and 20.71m (neaps) tides.
- Edinburgh Marina (Granton Harbour) – formerly a small commercial port, now used by leisure craft.
- Leith – the port for Edinburgh and handles cruise liners, general cargoes and dry and liquid cargoes in bulk. It is also a support base for the North Sea offshore industry. The port can accommodate vessels up to 210m in length, beam 30m draught 9.1m, however larger vessels can be accommodated dependant on the high tide.
- Musselburgh – mainly used by recreational vessels up to 18m in length and 2m in draught.
- Port Seton/Cockenzie – used by small to medium sized fishing vessels and a number of recreational craft.

<u>South & East of the Forth:</u>

- North Berwick – mainly used by recreational vessels and a small number of fishing boats.
- Dunbar – used for landing fish and recreational vessels.
- Cove Harbour – a small fishing harbour.
- Eyemouth – busy fishing harbour, with marina facilities.
- Berwick-upon-Tweed – is a small commercial and fishing port. The largest vessel that can be handled is length 115m (with a bow thruster), beam 16.5m and a draught of 4.6m at high water springs and 3.7m at high water neaps.

7 RECREATIONAL REVIEW

7.1 Overview

An overview of the recreational sailing activity and facilities in eastern Scotland and north eastern England is presented in Figure 7.1. This is based on the latest RYA data (2010) as described in Section 4.3.

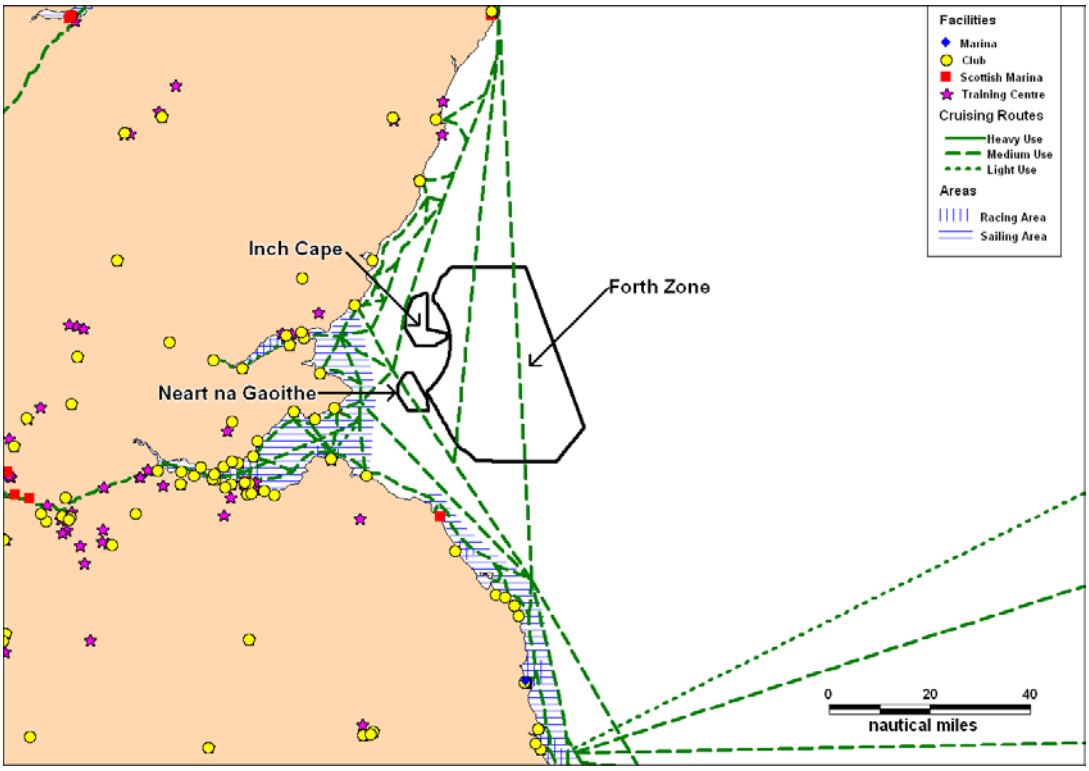

Figure 7.1 Recreational Information for Eastern Scotland and North East England

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 cruising 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 cruising routes: - Popular routes on which some recreational craft will be seen at most times during summer daylight hours.
- Light cruising routes: - Routes known to be in common use but which do not qualify for medium or heavy classification.

The recreational vessel activity and facilities in the vicinity of the Firth of Forth and Tay developments are presented in Figure 7.2.

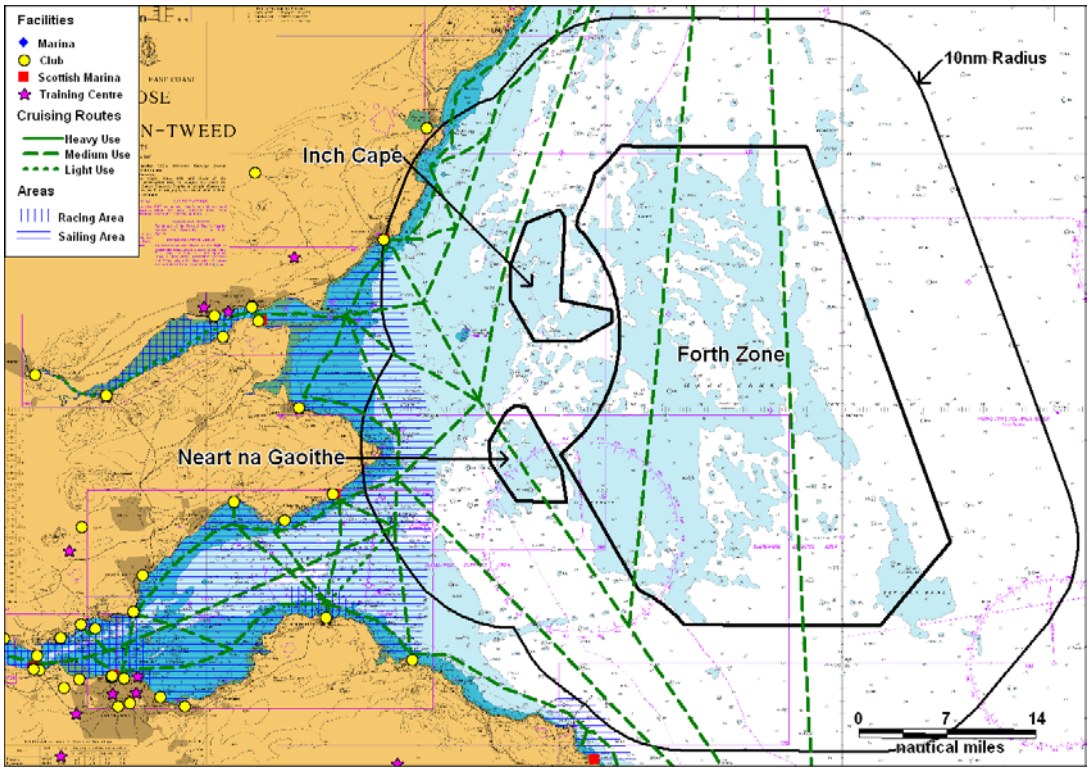

Figure 7.2 Detailed Recreational Data for Region

Based on the RYA published data, Neart na Gaoithe is approximately 4nm east of the general sailing areas off the Fife coast, Inch Cape is 8nm east of sailing areas in the outer Tay and the Forth Zone is 9.5nm north east of sailing areas off Saint Abb's Head. There is one 'medium use' cruising route passing through Neart na Gaoithe and three 'medium use' cruising routes passing through the Forth Zone, heading from the Tay, Arbroath and Scottish marinas to north eastern English marinas including Amble and South Shields.

In terms of facilities, there are established marinas at Anstruther, Tayport, Arbroath, Eyemouth and within the Firth of Forth. A full description of harbours and marinas is provided in Section 6.2.

7.2 Summary of Potential Impacts

The following potential impacts were highlighted within Section 2.1.

- Collision
- Foundering
- Contact
- Loss of sailing area
- Diverting from route

- Increase in fuel costs
- Time costs

By review, the AIS and radar survey data gathered to date recorded limited recreational activity within the outer Firth of Forth and Tay region. However as shown in Figure 7.2 the recreational sailing atlas indicates that medium use cruising routes pass through two of the developments, with a higher density of recreational activity taking place off the Fife and within the Firth of Forth and Tay.

The main potential impacts are therefore more likely to relate to the navigation of recreational vessels further offshore, in closer proximity to the proposed developments.

With an assumed turbine blade clearance over 22m (at lowest astronomical tide), buoyage and marking on admiralty charts, vessels will be able to navigate between the wind farm turbines in a safe manner. As a result it is expected that the potential impacts will be low overall, with the main hazards likely to be associated with these smaller craft as they exit the sites in proximity to shipping routes.

It is noted that these conclusions assume that standard mitigation measures are put in place and that the spacing between turbines is adequate to allow safe navigation by these vessels.

It is also highlighted that alignment of turbines may require further discussion with relevant stakeholders. However, from initial feedback following a consultation meeting at Royal Tay Yacht Club this did not appear a major concern.

8 FISHING REVIEW

8.1 Overview

This section reviews the fishing vessel activity within the region based on surveillance and satellite data for the area. A plot of fishing vessel tracks recorded during the maritime shipping surveys is also presented in the AIS Shipping Data section (Figure 9.11).

8.2 Surveillance Data

Fisheries statistics in the UK are reported by International Council for Exploration of the Sea (ICES) statistical Rectangles and Subsquares. The three developments are located within ICES Rectangles (41E7, 42E7, 41E8 and 42E8) as shown in Figure 8.1.

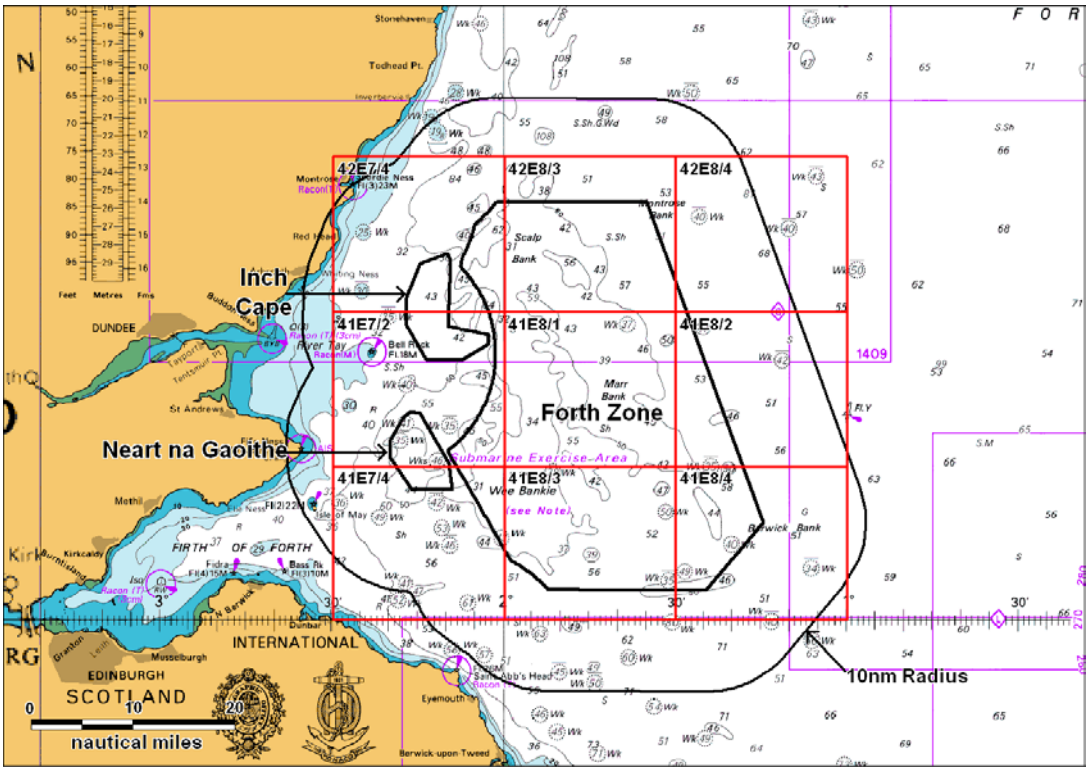

Figure 8.1 ICES Subsquares Encompassing the Proposed Developments

Data on fishing vessel sightings were obtained from Marine Scotland Compliance, 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. All vessels are logged, irrespective of size, provided they can be identified by their Port Letter Number (PLN).

Data were obtained for the five-year period 2005 to 2009. Analyses are presented within the following subsections.

8.2.1 Sightings per Patrol

The numbers of fishing vessel sightings, surveillance patrols and hence average sightings per patrol within each ICES Subsquare encompassing the proposed wind farm site in the five-year period 2005-09 are presented in Table 8.1.

Table 8.1 Average sightings per patrol (2005-09)

ICES Subsquare	Sightings	Patrols	Sightings per Patrol
41E7/2	154	264	0.6
41E7/4	129	184	0.7
41E8/1	22	57	0.4
41E8/2	2	32	0.1
41E8/3	17	12	1.4
41E8/4	0	44	0.0
42E7/4	209	326	0.6
42E8/3	82	151	0.5
42E8/4	7	73	0.1

Therefore, the Subsquares had an average of approximately 1 fishing vessel sighting every two patrols. Subsquare 41E8/3 had a slightly larger average sighting per patrol due to the low number of patrols.

8.2.2 Sightings Nationality Analysis

The fishing vessel sightings colour-coded by nationality are presented in Figure 8.2.

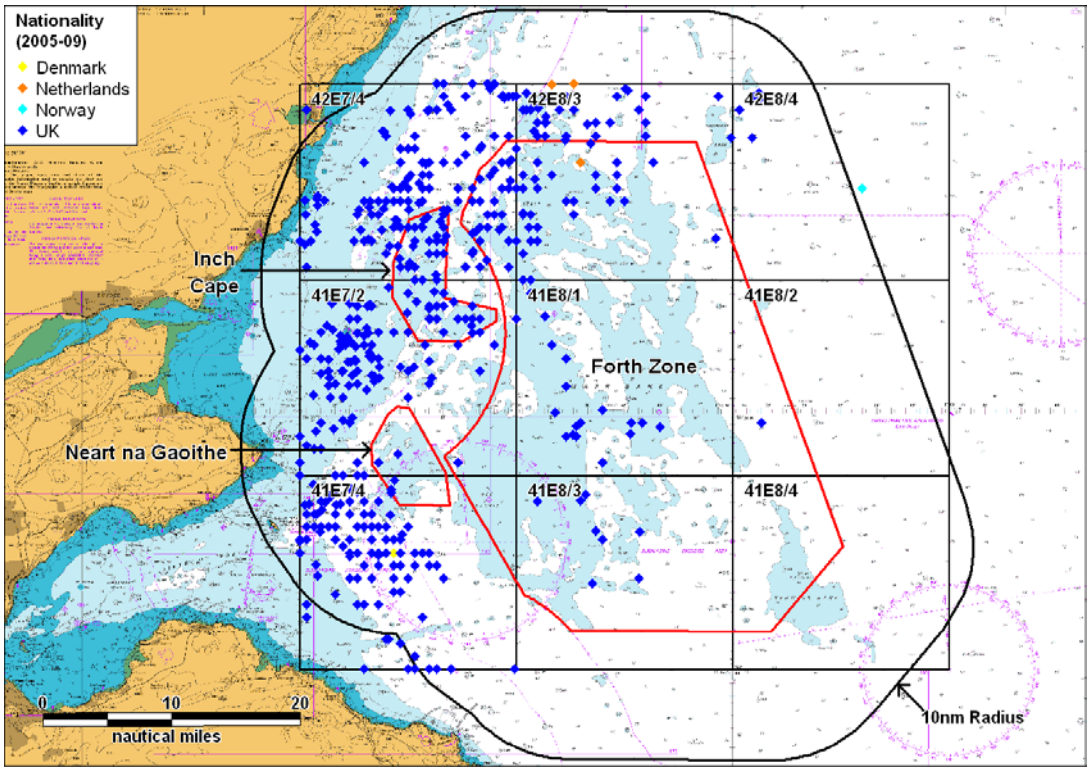

Figure 8.2 Fishing vessel sightings by nationality (2005 – 2009)

It can be seen that all but four fishing vessel sightings were none UK-registered with one Danish fishing vessel and three Dutch vessels recorded.

8.2.3 Sightings Gear Analysis

The fishing vessel sightings colour-coded by gear type are presented in Figure 8.3.

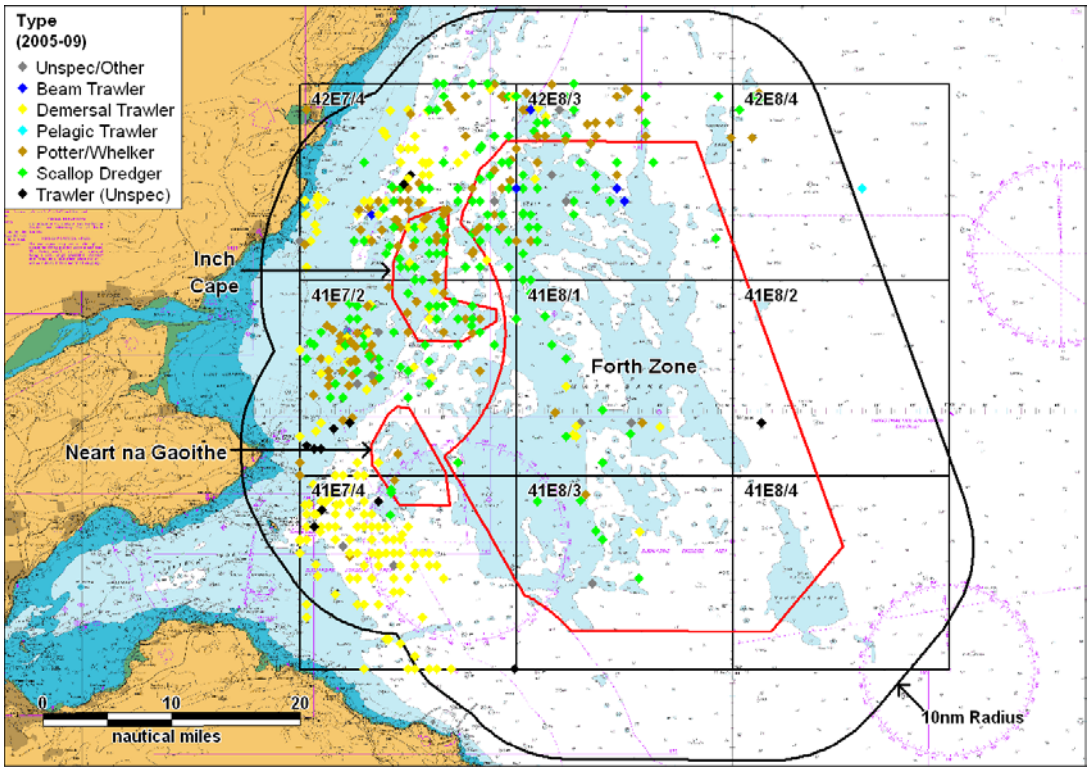

Figure 8.3 Fishing Vessel Gear Types

The main fishing method was scallop dredging (37%), demersal stern trawling (32%) and potter/whelkers accounting for 24%.

8.2.4 Sightings Activity Analysis

The fishing vessels colour-coded by activity when sighted are presented in Figure 8.4.

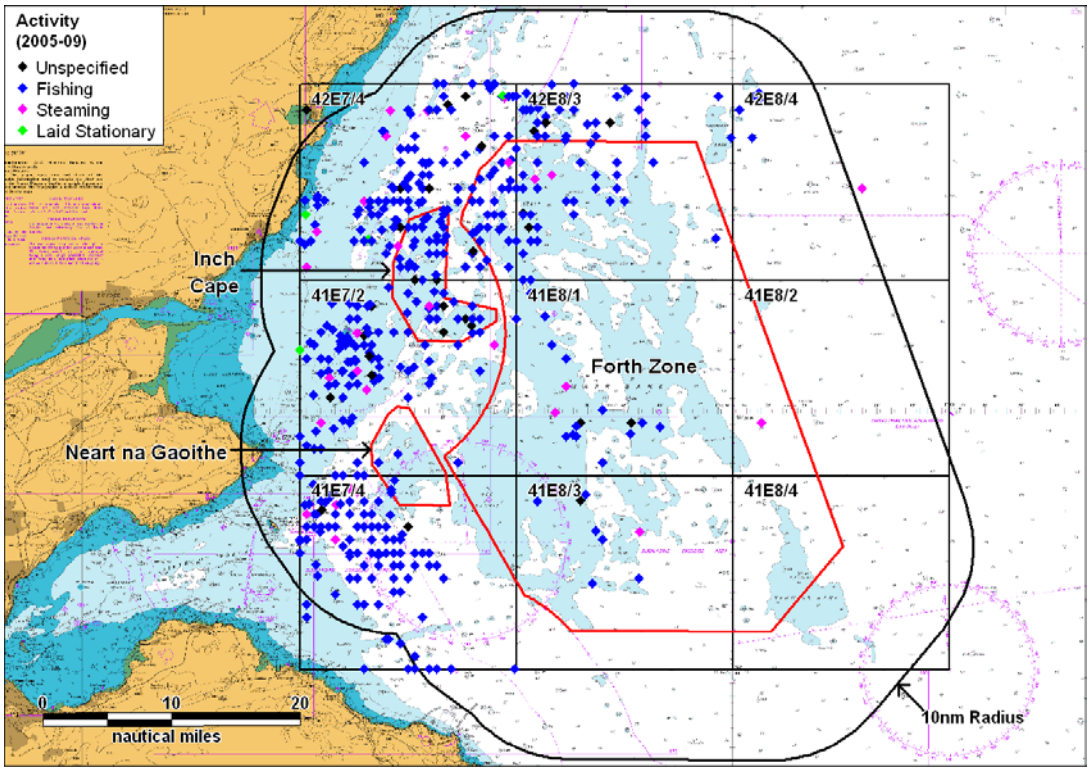

Figure 8.4 Fishing Vessel by Activity

Excluding unspecified, 93.6% of vessels sighted were engaged in fishing, i.e., gear deployed, 5.7% were steaming (transiting to/from fishing grounds) and less than 0.7% were laid stationary (vessels at anchor or pair vessels whose partner vessel is taking the catch whilst the other stands by).

8.3 Satellite Data

The Marine Management Organisation (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 2 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 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.

Two periods of Satellite data were analysed including UK and non-UK fishing vessels:

- 2006 (including non-UK vessels)
- 2008 (UK vessels)

Analyses are presented within the following sub-sections.

8.3.1 Satellite Data (2006)

The latest data set analysed including non-UK fishing vessels is from 2006. Figure 8.5 presents the 2006 satellite data by vessel nationally (where available) operating in the area.

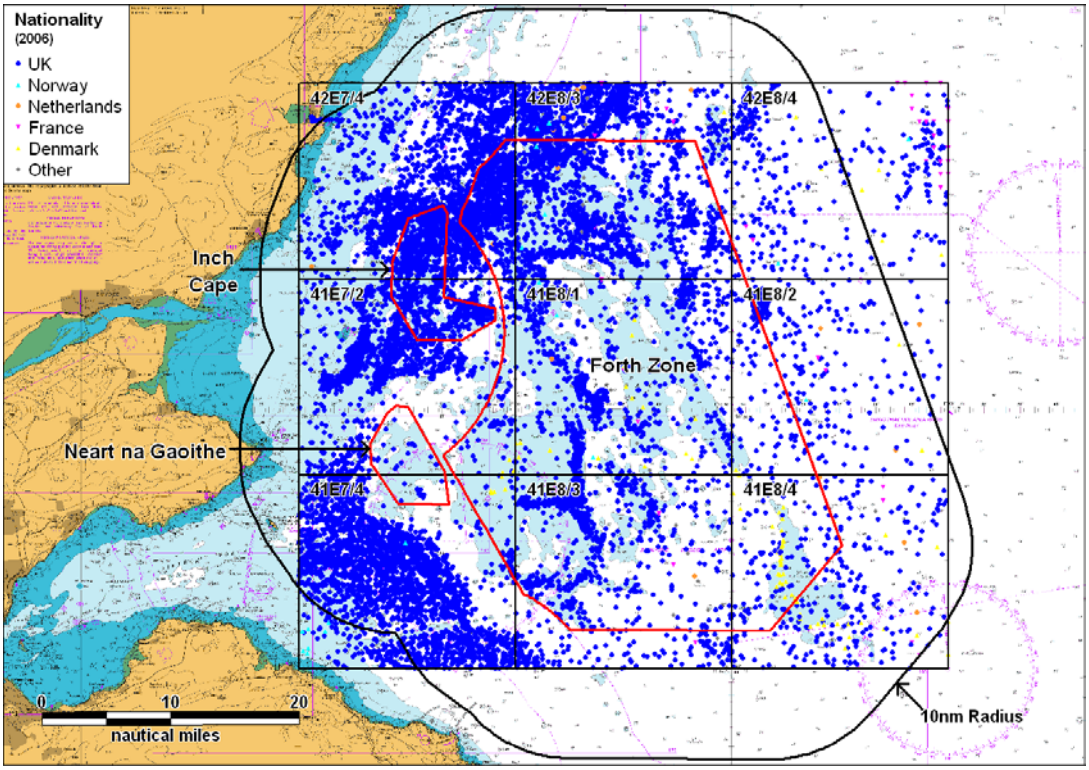

Figure 8.5 Chart of Fishing Vessel Positions by Nationality (2006)

The nationally analysis shows that 98.7% of vessels recorded in the region were UK registered. Of the vessels registered outside the UK (1.3%), the majority were made up of Danish and French vessels, 41% and 22% respectively.

The fishing vessel satellite positions, colour-coded by vessel type (where available), are presented in Figure 8.6.

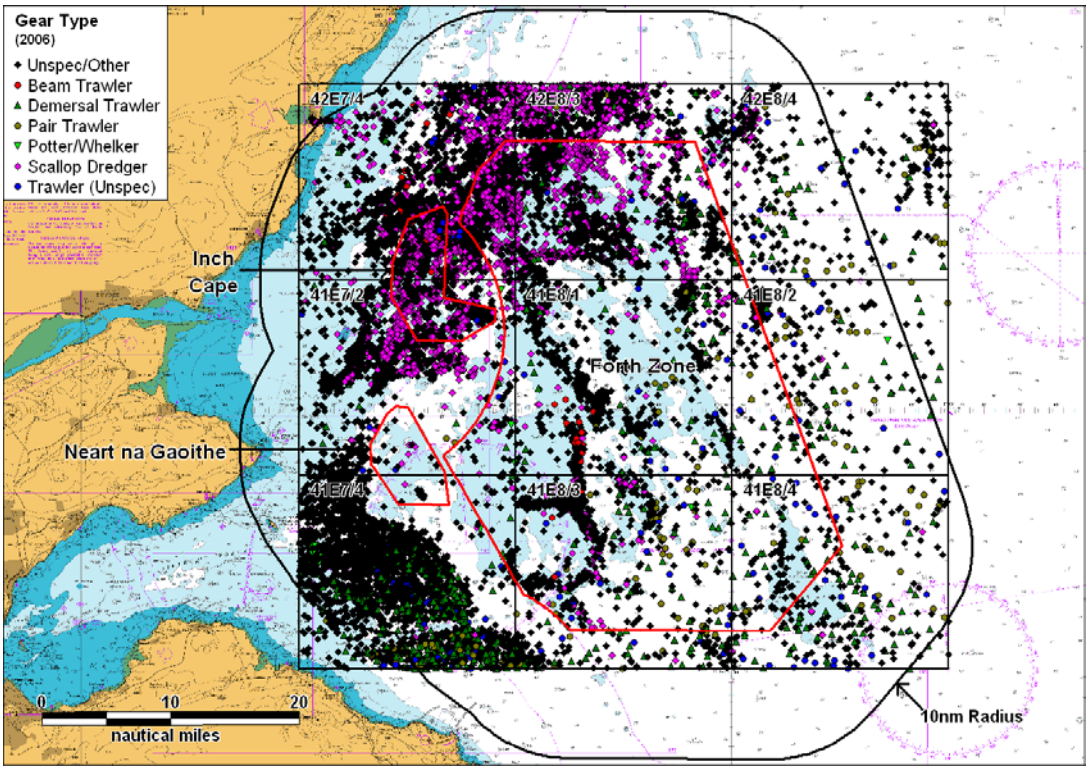

Figure 8.6 Chart of Fishing Vessel Positions by Type (2006)

It can observed that the large majority of vessels sighted in the area were unspecified vessels (71%), with scallop dredgers (22%), demersal trawlers (4%), pair trawlers (1%) and unspecified trawler (1%) the main vessels operating in the region.

8.3.2 Satellite Data (2008)

Figure 8.7 presents the positions of these the fishing vessel data (2008) by vessel type.

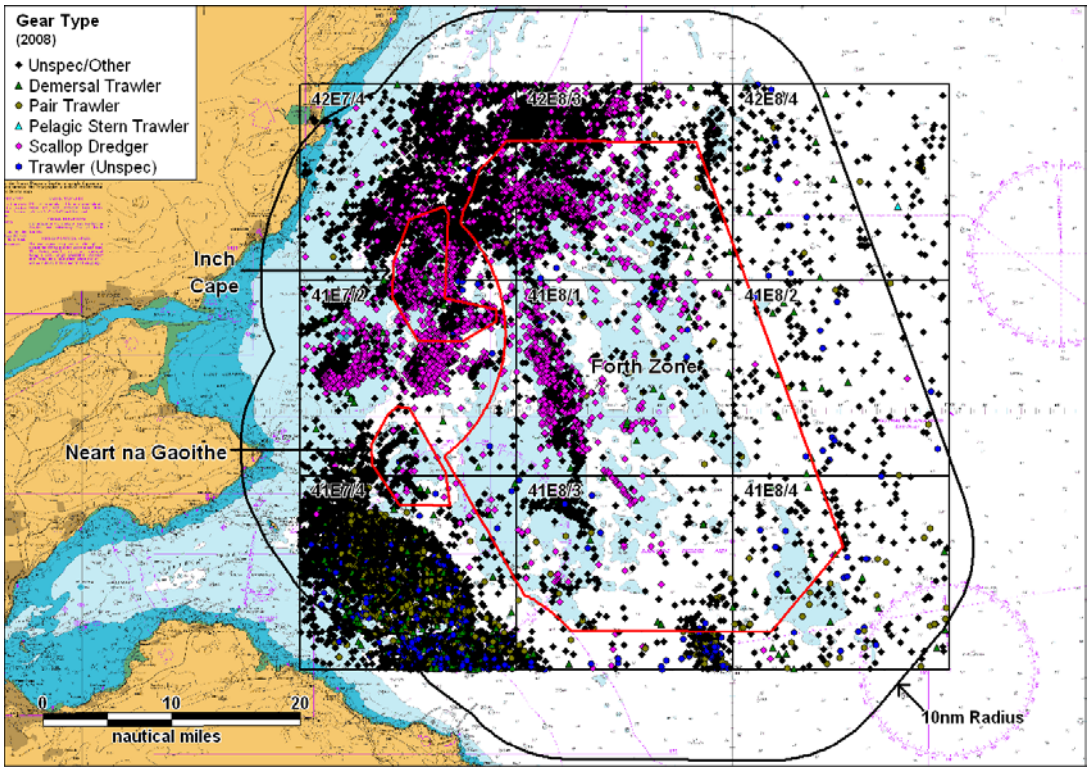

Figure 8.7 Chart of UK fishing Vessel Positions by Type (2008)

Excluding unspecified (70%), the majority of UK vessels logged by satellite were scallop dredgers (21%), pair trawlers (4%), demersal trawlers (3%), and unspecified trawlers (2%).

In terms of fishing gear type recorded in 2006 and 2008, scallop dredgers, pair trawlers and demersal trawlers were the most common gear type recorded in the area.

8.4 Summary of Potential Impacts

The following potential impacts were highlighted within Section.

- Collision
- Foundering
- Contact
- Snagged Nets
- Loss of fishing grounds
- Diverting from route
- Increase in fuel costs
- Time costs

By review of the data it is observed that the higher areas of fishing activity are in and around the Inch Cape Scottish Territorial Waters site and the NW corner of the Firth of Forth Round 3 Zone. In addition there is a higher density area to the SW of the Neart Na Gaoithe (NnG) Scottish Territorial Waters site.

The impact of the proposals on the fishing carried out by these vessels is to be considered within the Commercial Fisheries Study.

In terms of navigation of these vessels travelling to and from fishing grounds it is considered that the potential impact will be low provided these vessels have access to the sites and are not forced to migrate into the busier shipping lanes.

As with recreational vessels review, the main hazard identified relates to exiting the wind farms into shipping routes. However it is noted that over time the risks associated with this "interface" will reduce further as AIS carriage on fishing vessels becomes mandatory. The schedule for mandatory carriage of AIS by fishing vessels is summarised below:

- Fishing vessels of overall length 24 metres and upwards but less than 45 metres: not later than 31 May 2012;
- Fishing vessels of overall length 18 metres and upwards but less than 24 metres: not later than 31 May 2013; and
- Fishing vessels of overall length exceeding 15 metres but less than 18 metres: not later than 31 May 2014.

New built fishing vessels of overall length exceeding 15 metres are subject to carrying AIS from 30 November 2010.

It is noted that this conclusion assumes that reasonable safe measures are adopted by the projects, including: buoyage / lighting, notification to FISHSAFE of subsea structures and chart updates via the UKHO / Kingfisher awareness will aid navigation between the wind farm developments. Cables will also require trenching/protection to reduce the likelihood of fishing gear interactions.

Turbine alignment may require further discussions with this stakeholder group.

9 PRELIMINARY AIS ANALYSIS

9.1 Introduction

AIS data was collected to analyse the movements of shipping through the outer Firth of Forth / Tay and adjacent wind farm development areas. A representative dataset (28 days) covering seasonal fluctuations was selected for analysis to provide an indication of shipping in the region.

It is highlighted that the SE corner of the Forth Round 3 Zone adjacent to Berwick Bank is on the edge of AIS coverage so there is increased uncertainty on shipping behaviours in this area. However as vessels approach the Forth they are likely to be picked up so this limitation is not considered to be significant.

9.2 AIS Data Analysis

AIS data for a 28 day period was analysed which included data from November 2009 (14 days) and August 2010 (14 days). Figure 9.1 presents an overview of all vessels recorded during this period excluding survey ships operating within the region on behalf of the project developers, to focus the assessment on passing shipping.

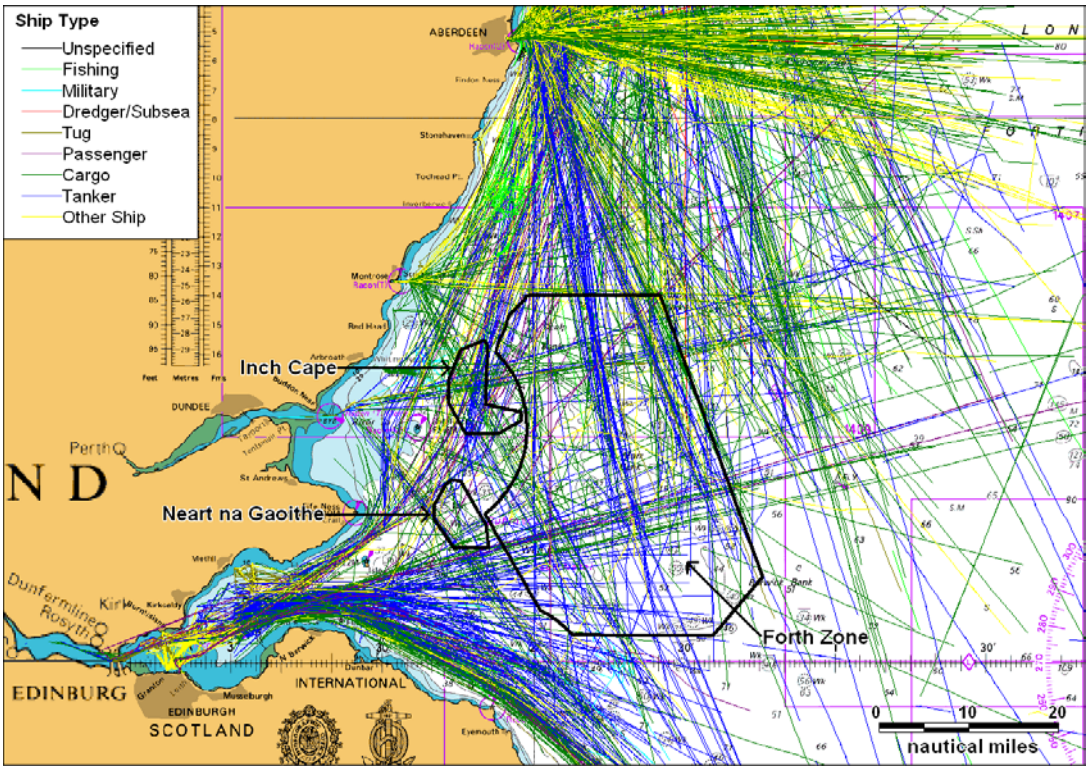

Figure 9.1 Overview of 28 Days AIS by Ship Type Excluding Survey

Overall it can be seen that the vast majority of vessels passing through or in proximity to the sites are destined for or have departed from East coast Scottish parts; mainly Aberdeen and

the Forth ports. A smaller number of ship tracks were also recorded in/out of the River Tay (Dundee/Perth) and Montrose.

Figure 9.2 presents a detailed overview of the ships recorded over the 28 period relative to a 10nm buffer of the three developments colour-coded by ship type.

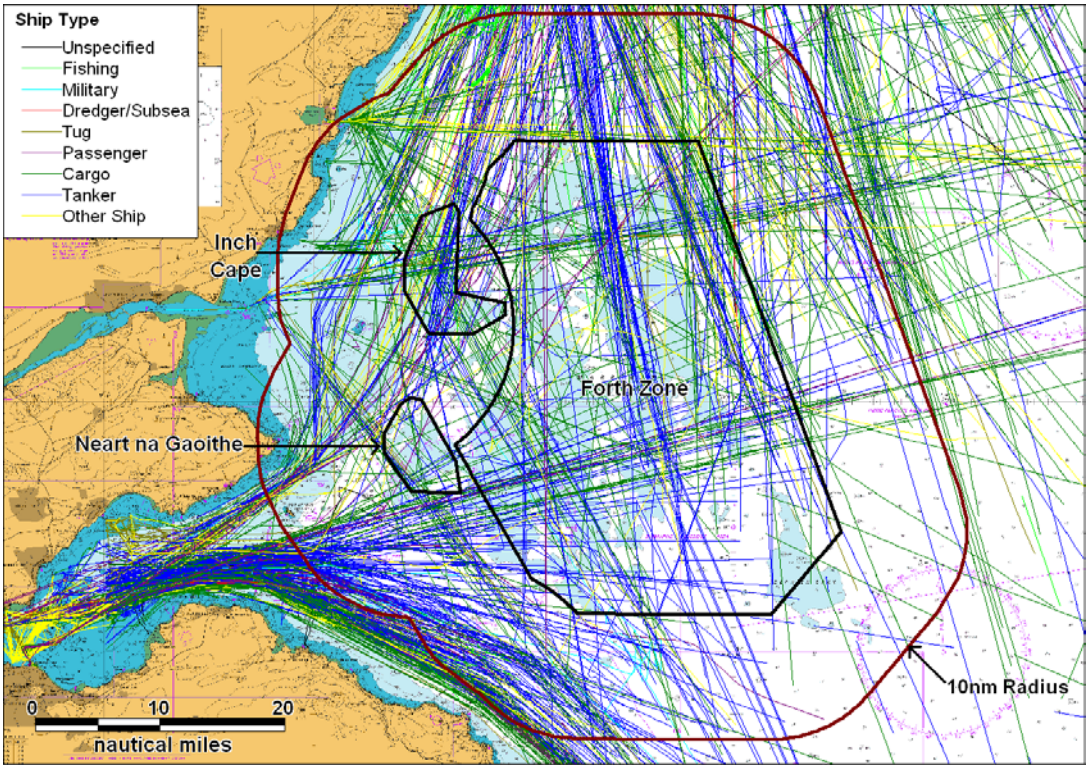

Figure 9.2 Plot of 28 Days AIS by Ship Type relative to a 10nm Buffer

On average 26 tracks per day were recorded within 10nm of the wind farm developments, with approximately 40% of vessels headed to ports of the Forth, i.e. (Grangemouth, Leith, Rosyth, Methil and Hound Point / Breafoot Bay oil and gas terminals.)

A graph of daily number of unique ships passing within 10nm of the each wind farm development is presented in Figure 9.3.

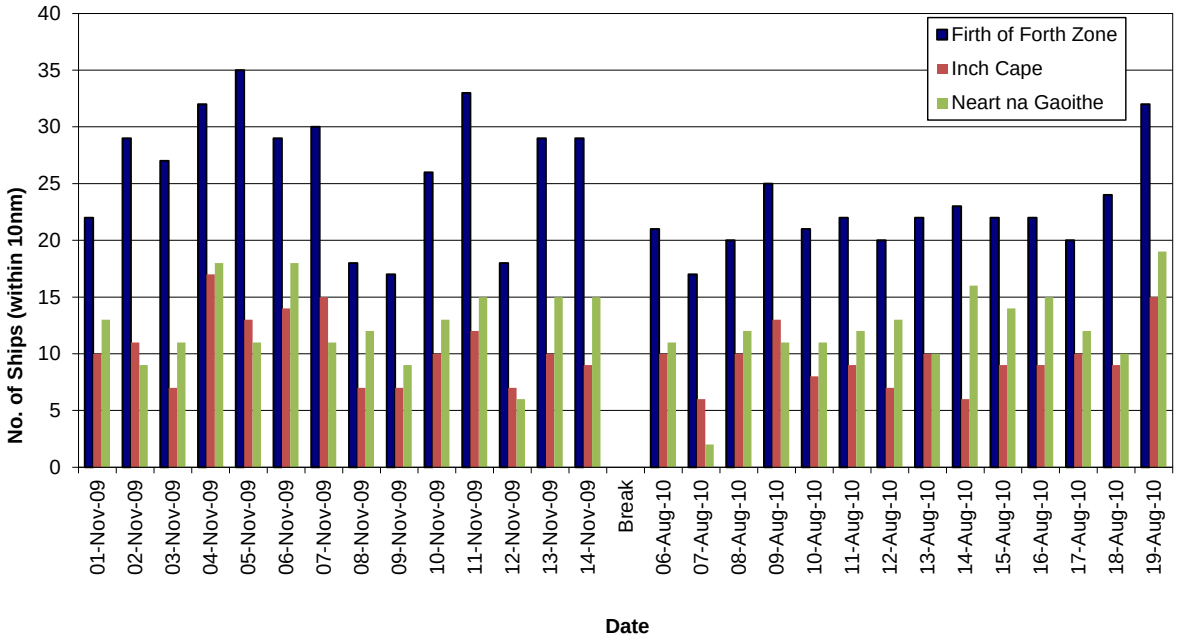

Figure 9.3 Daily Number of Vessels recorded within 10nm of Each Development

On average there were 25 ships passing within 10nm of the Forth Zone, 12 ships within 10nm of Neart na Gaoithe and 10 vessels within 10nm of Inch Cape recorded per day.

Figure 9.4 and Figure 9.5 present combined busiest and quietest days within 10nm of the three developments with Figure 9.6 showing a typical (average) day.

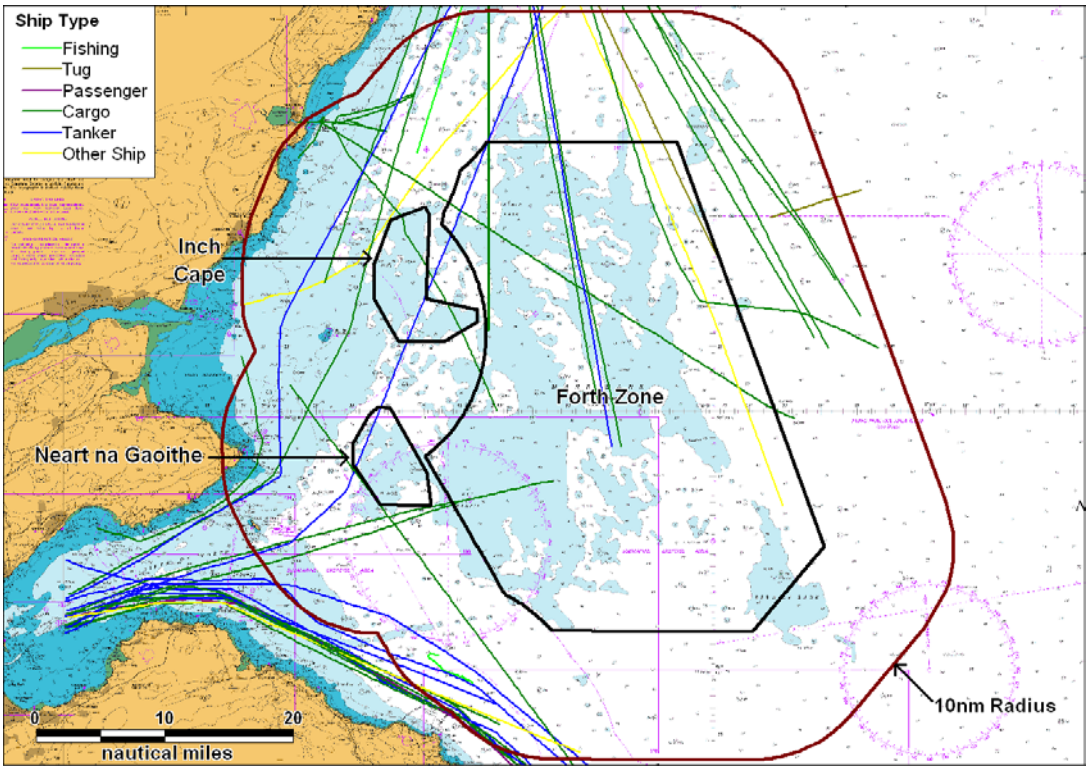

Figure 9.4 Typical 'Busy' Day – 5th November 2009

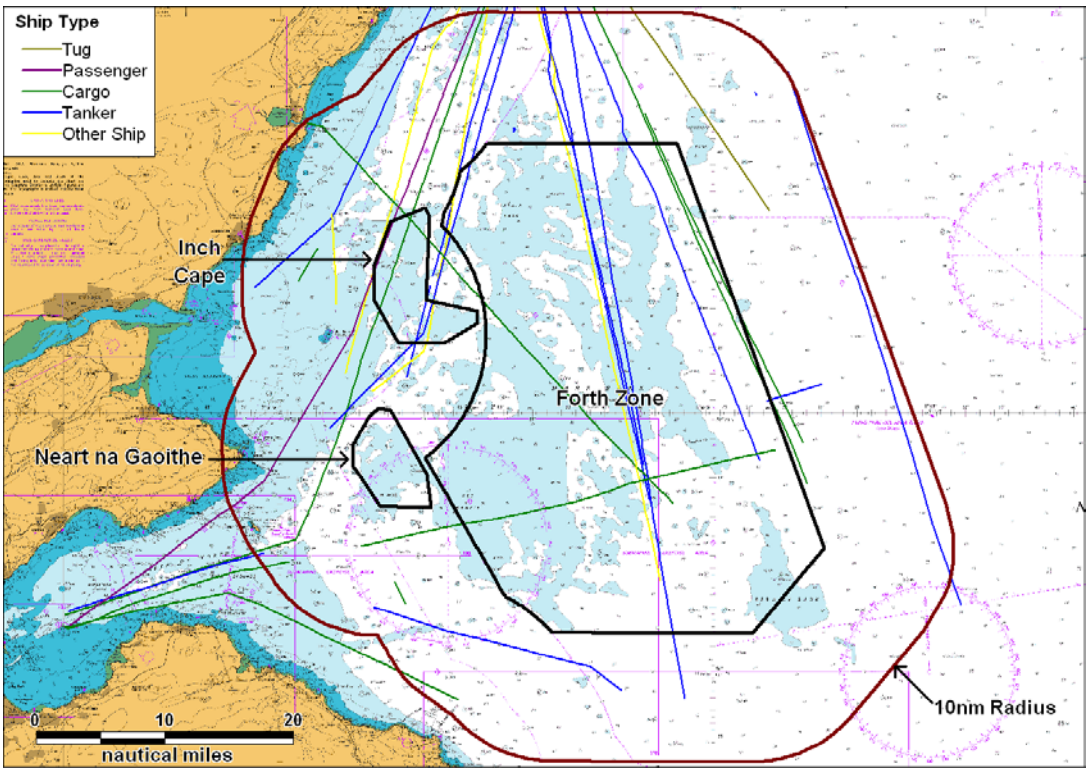

Figure 9.5 Typical 'Quiet' Day – 9th August 2010

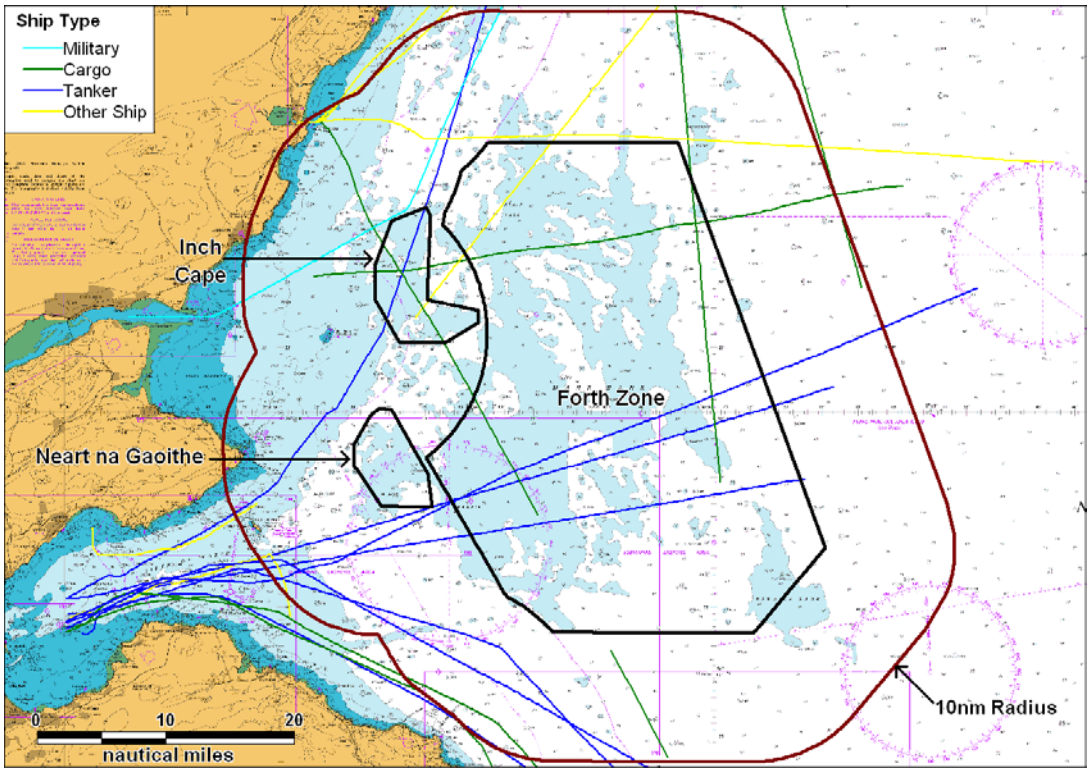

Figure 9.6 Typical Day (Mean) – 9th November 2009

The following sections analyse the main ship types passing through the region.

9.2.1 Tankers

A plot of tankers relative to a 10nm buffer of the three developments in the outer Firth of Forth and Tay is presented in Figure 9.7.

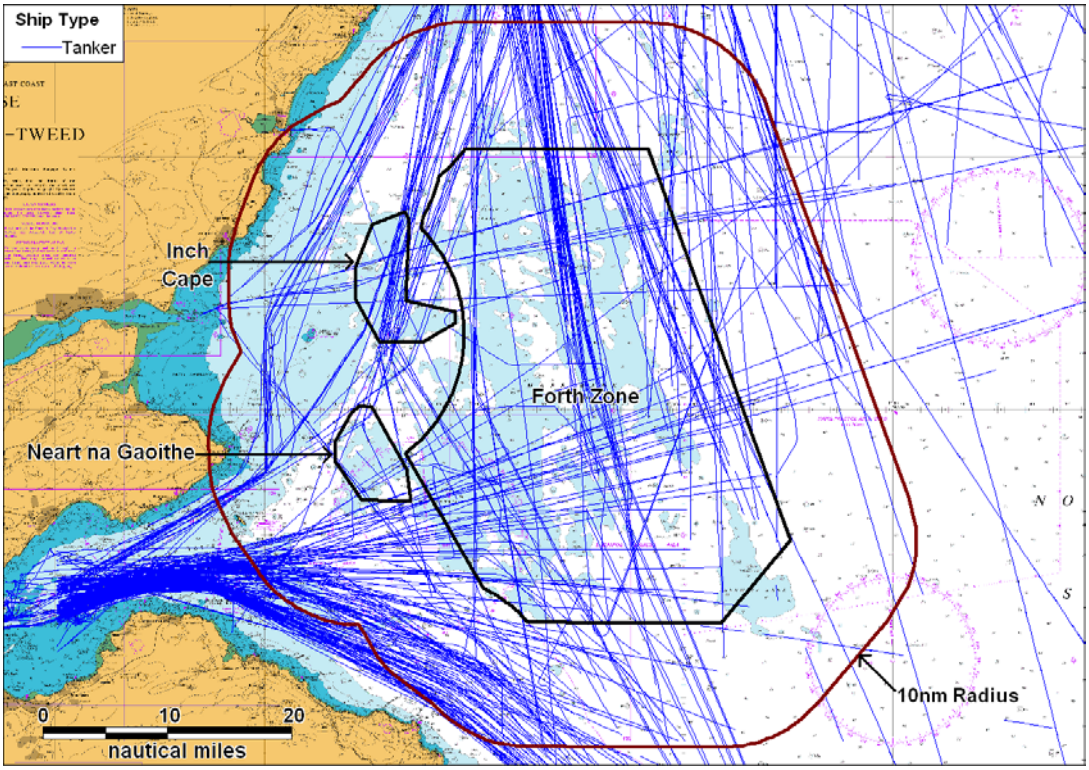

Figure 9.7 Plot of Tanker Tracks (28 Days)

There was an average of 9 tankers per day passing within 10nm of the 3 sites. Approximately 49% of traffic within 10nm was associated with the Firth of Forth ports (62% on the southern route, 18% on the northern route and 19% from the Scandinavian route).

Tankers are the main vessel type passing through the area which is characterised by vessels heading into the Firth of Forth (associated with the Braefoot Gas Terminal, Hound Point Oil Terminal and Grangemouth).

The different types of tanker i were extracted from the 28 days of data. The tanker type (Chemical, Gas and Oil) broadcast on AIS (where available) is presented in Figure 9.8.

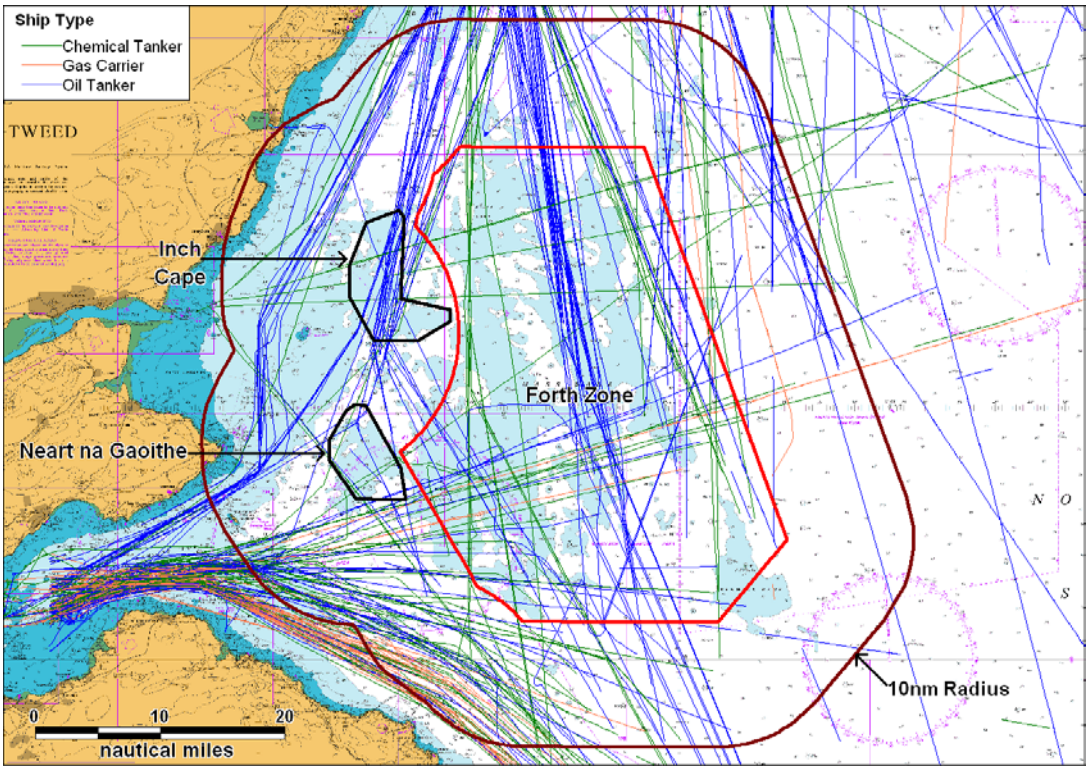

Figure 9.8 Plot of Tanker Type (28 Days)

The majority of tankers recorded within 10nm of the three developments were Oil tankers (59%), Chemical tankers (28%) and Gas carriers (14%).

Oil tankers were generally recorded routeing from Northern ports (i.e., Aberdeen, Peterhead and Inverness) to the Forth (Grangemouth) and Immingham. Chemical tankers were regularly routeing from the North (Aberdeen) to Immingham and Forth ports to Europe, with a number of vessels also headed to Dundee and Scandinavia. The majority of Gas carriers were recorded headed between Grangemouth/Braefoot terminal and Eastern UK and European Ports. Two vessels were recorded headed north through the area, bound for Belfast and Dublin.

It is noted that BP operated three vessels during the period of data collection *Border Thistle* (now *Don Pancho*), *Border Tartan* (now *Don Gonzalo 1*) and *Boarder Heather* (now *Whitstar*). These vessels stopped operating under BP during February/March 2010. The Oil products tanker *Whitstar* is now operated by John H Whitaker (Tankers) Ltd, and transits between north eastern UK and Scottish ports (i.e. Grangemouth, Scrabster and Wick).

9.2.2 Cargo Vessels

A plot of cargo vessels relative to a 10nm buffer of the three developments in the outer Firth of Forth and Tay is presented in Figure 9.9.

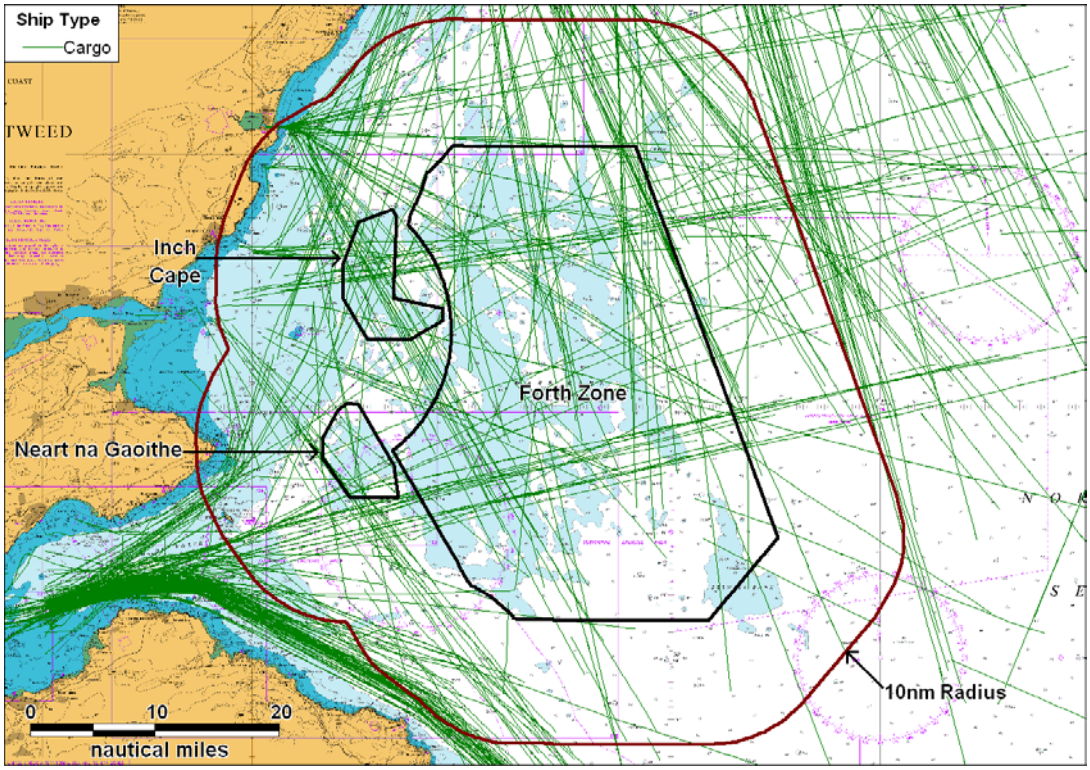

Figure 9.9 Plot of Cargo Vessel Tracks (28 Days)

There was an average of 8 cargo vessels per day passing within 10nm of the three developments. Approximately 37% of cargo vessels were headed in/out of the Forth, with the remaining vessels either passing through the area or headed to the Tay (Dundee or Perth) and Montrose.

9.2.3 Other Ships

A plot of other ships (mostly offshore support and fisheries protection vessels) relative to the three developments in the outer Firth of Forth and Tay is presented in Figure 9.10.

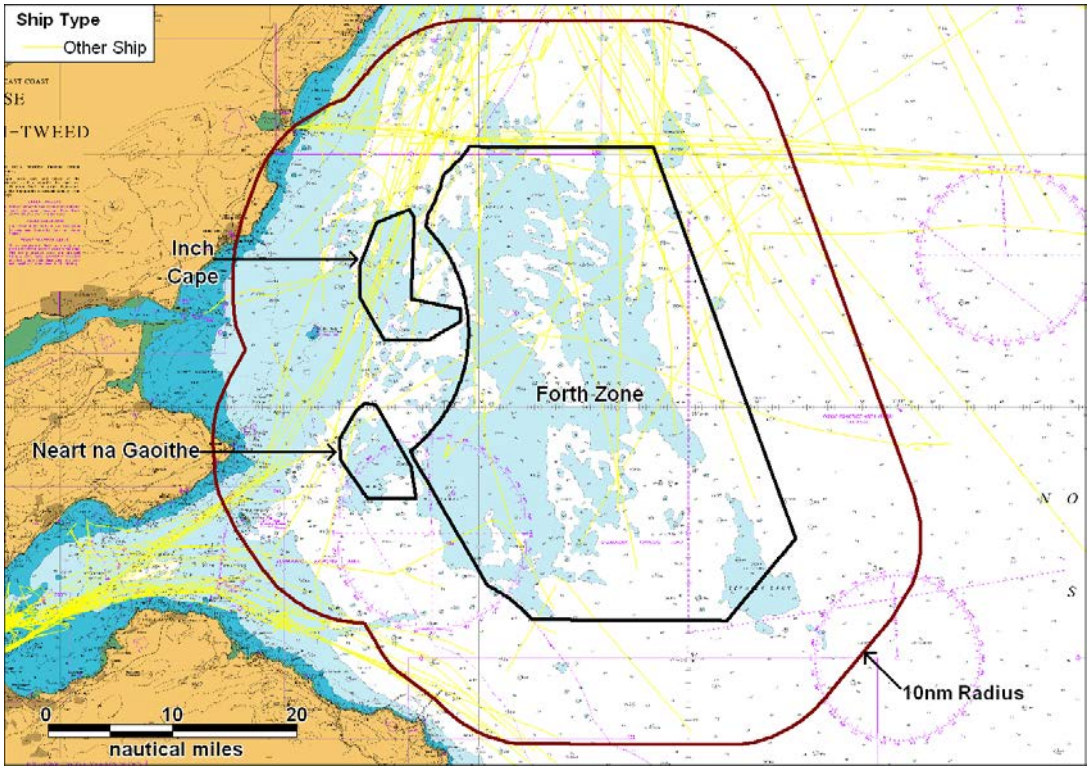

Figure 9.10 Plot of Other Vessels Tracks (28 Days)

There was an average of 3 other ships per day passing within 10nm of the 3 developments. It is noted that the majority of 'other' vessels within 10nm of the areas are made up of fisheries protection and research vessels (55%) with oil and gas related vessels accounting for (45%).

9.2.4 Fishing Vessels

A plot of fishing vessels recorded relative to a 10nm buffer of the three developments in the outer Firth of Forth and Tay is presented in Figure 9.11. It is noted that fishing activity can be seasonal and fishing vessels <45m may not carry AIS.

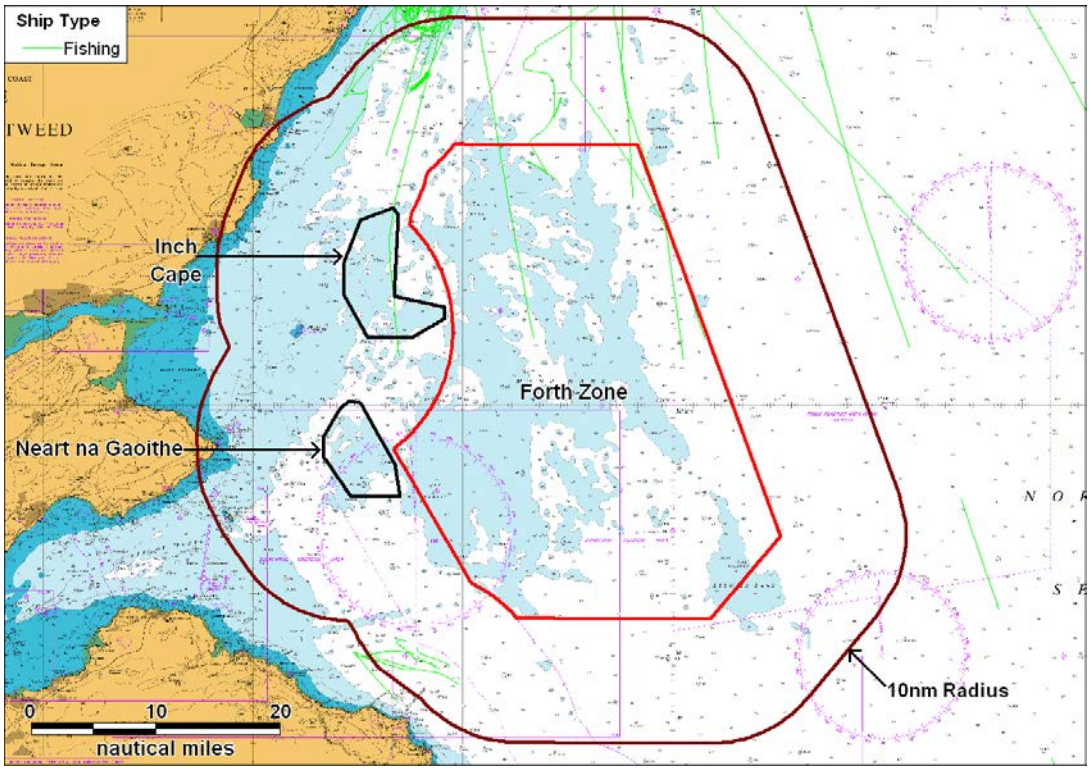

Figure 9.11 Plot of Fishing Vessels Tracks (28 Days)

There was an average of less than 1 fishing vessel per day passing within 10nm of the 3 areas.

Further information on fishing vessels has already been discussed under Section 8.

9.2.5 Ferries/Cruise Liners

A plot of ferries and cruise liners recorded relative to the three developments in the outer Firth of Forth and Tay is presented in Figure 9.12.

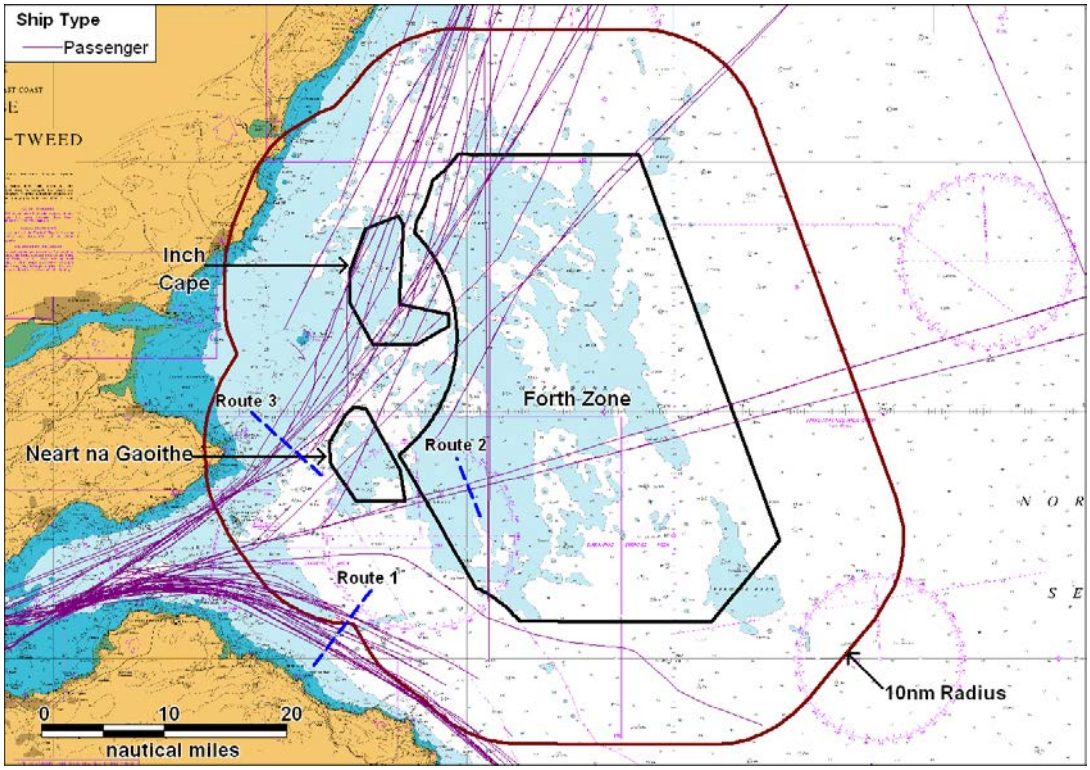

Figure 9.12 Plot of Ferries/Cruise Vessel Tracks (28 Days)

There was an average of just over 1 passenger / cruise vessel per day passing within 10nm of the 3 areas. It is noted that cruise vessel activity (Route 2 and 3) is generally seasonal and all cruise vessels were recorded during August 2010 (14 days).

The Norfolkline passenger ferry between Rosyth and Zeebrugge (Route 1) was taken over by DFDS Seaways in July 2010, and operated as a Ro-Ro only freight service after December 2010. DFDS has withdrawn one of the vessels from this route leaving the *Tor Finlandia* operating three weekly sailings from May 2011.

Cruise liners from other UK ports also use Route 1 (Dover, Tilbury, Newcastle, Kirkwall and Invergordon) and mainland Europe (Amsterdam, Le Havre, Calais and Bremerhaven).

Route 2 is used by cruise liners heading to/from Scandinavia – Norway (i.e., Molde, Oslo) and Denmark and other ports including Kiel and Gothenburg inbound to Leith.

Route 3 is composed of cruise liners headed between the Northern Isle (Kirkwall, Stromness, Lerwick and Invergordon) to Leith and onwards to Le Havre and southern UK and European cruise liner destinations.

9.2.6 Anchored Vessels

A plot of anchored vessels recorded relative to the three developments in the outer Firth of Forth and Tay is presented in Figure 9.13. There is one charted anchorage area within 10nm of the developments, this is located 8.5nm WNW of Inch Cape in Lunan Bay (4nm south of Montrose).

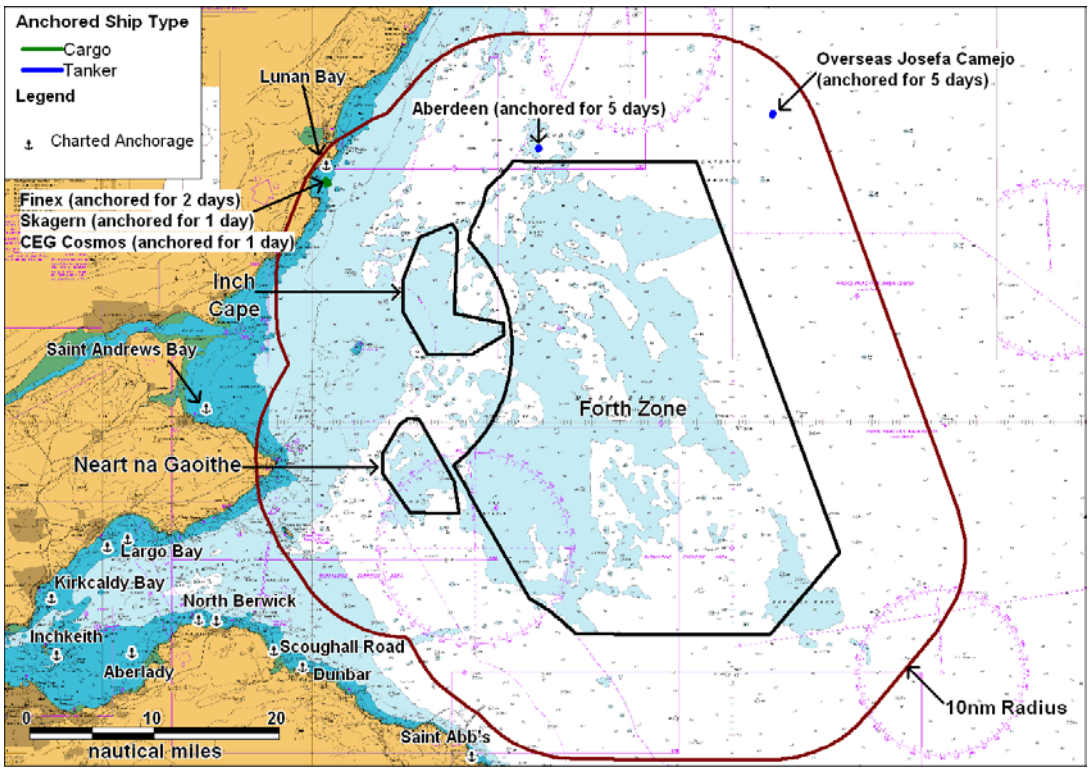

Figure 9.13 Plot of Anchored Vessel Tracks (28 Days) and Anchorage Areas

There were three cargo vessels recorded at anchor within Lunan Bay, with two vessels broadcasting destination as Montrose and one as Aberdeen. In addition, two crude oil / shuttle tankers were recorded at anchor for five days 1nm north and 7nm north east of the Forth Zone.

Outside the 10nm radius of the developments there are a number of charted coastal anchorages which are mainly used by small/medium sized cargo vessels and coastal tankers.

10 MCA TEMPLATE REVIEW

10.1 Introduction

The MCA have produced a wind farm/shipping route template to provide guidance on the distances which should be established between shipping routes and offshore wind farms. This is based on the impacts that turbines may have on the performance of marine radar systems. This section discusses the template then reviews the shipping lane boundaries passing through and close to the proposed zone based on the Template distances.

10.2 MCA Template

The MCA's wind farm Shipping Route Template (Ref. ii), reproduced in Figure 10.1, indicates that turbines within 0.5nm of a route will be Very High Risk. Close scrutiny and potentially mitigation will be needed between 0.5nm and 5nm to ensure risks are ALARP, particularly between 0.5nm and 2nm which is considered Medium to High Risk. Beyond 2nm is Low Risk although an adjacent wind farm or TSS introduces cumulative effects which have to be scrutinised.

The template is not a prescriptive tool but needs intelligent application to explore where the distance should be measured from, e.g., route centre, 90% traffic level, nearest ship, etc. The potential boundaries are illustrated in Figure 10.2.

WIND FARM: "SHIPPING ROUTE" Template

Distance in miles (nm) of Turbine Boundary from Shipping Route	Factors	Risk	Tolerability
< 0.25nm (500m)	500m inter-turbine spacing = small craft only recommended	VERY HIGH	INTOLERABLE
0.25nm (500m)	X band radar interference	VERY HIGH	
0.45nm (800m)	Vessels may generate multiple echoes on shore based radars	VERY HIGH	
			TOLERABLE IF ALARP (As Low As Reasonably Practicable)* * Descriptions of ALARP can be found in a) Great Britain Health and Safety Executive (2001) Reducing risks protecting people b) IMO (2002) MSC Circ 1023 dated 5th April 2002 Formal Safety Assessment c) IMO (2007) MSC 83-21-INF2 Consolidated guidelines for Formal Safety Assessment
0.5nm (926m)	Mariners' high traffic density domain	HIGH	
0.8nm (1481m)	Mariners' ship domain	HIGH	
1 nm (1852m)	Minimum distance to parallel boundary of TSS	MEDIUM	
1.5nm (2778m)	S band radar interference ARPA affected	MEDIUM	
2 nm (3704m)	Compliance with COLREGS becomes less challenging	MEDIUM	
>2nm > (3704m)	But not near TSS	LOW	
3.5nm (6482m)	Minimum separation distance between turbines opposite sides of a route	LOW	
5nm (9260m)	Adjacent wind farm introduces cumulative effect Distance from TSS entry/exit	VERY LOW	BROADLY ACCEPTABLE
10nm (18520m)	No other wind farms	VERY LOW	

Figure 10.1 Wind Farm "Shipping Route" Template (Ref. ii)

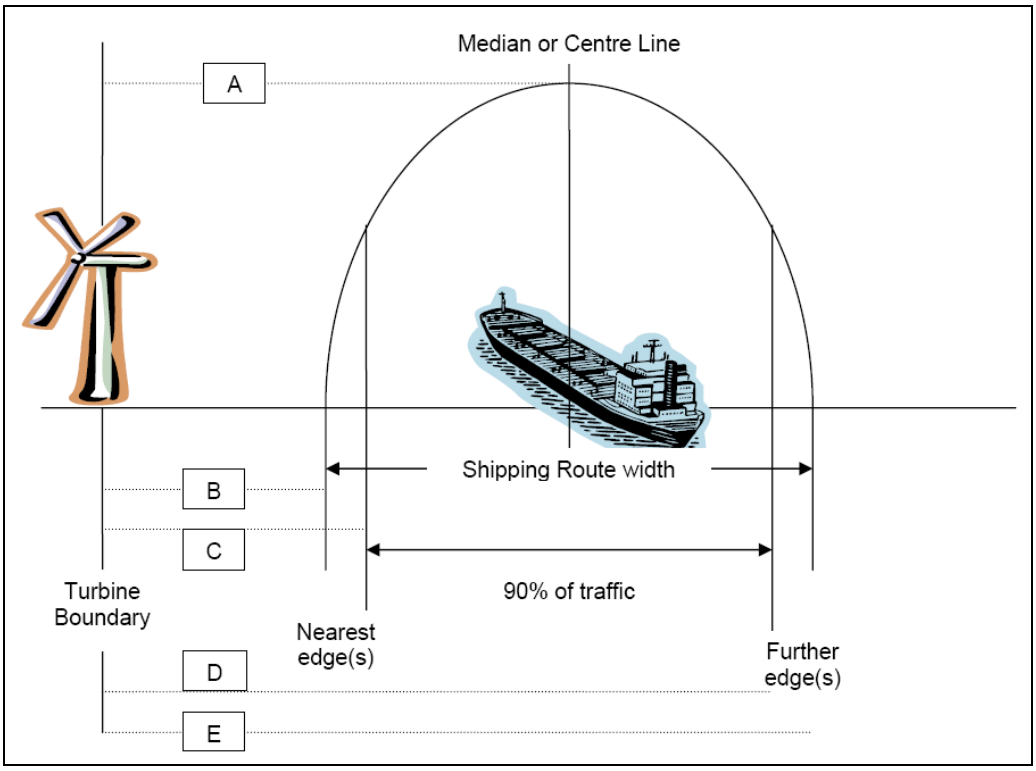

Figure 10.2 Interactive Boundaries (require Interpretative Flexibility, Ref ii), where:

A = Turbine boundary to the shipping route median or centre line
B = Turbine boundary to nearest shipping route edge
C = Turbine boundary to nearest shipping 90% traffic level*
D = Turbine boundary to further shipping 90% traffic level*
E = Turbine boundary to further shipping route edge
(* = or another % to be determined)

10.3 Current Shipping Lanes

The main shipping lanes passing through and close to the region have been identified based on the AIS shipping data. The tracks following each lane have been identified and their lateral distribution analysed to define the 90% traffic level.

The 90% lane boundaries are presented in Figure 10.3. Lanes are shaded according to their approximate daily traffic levels.

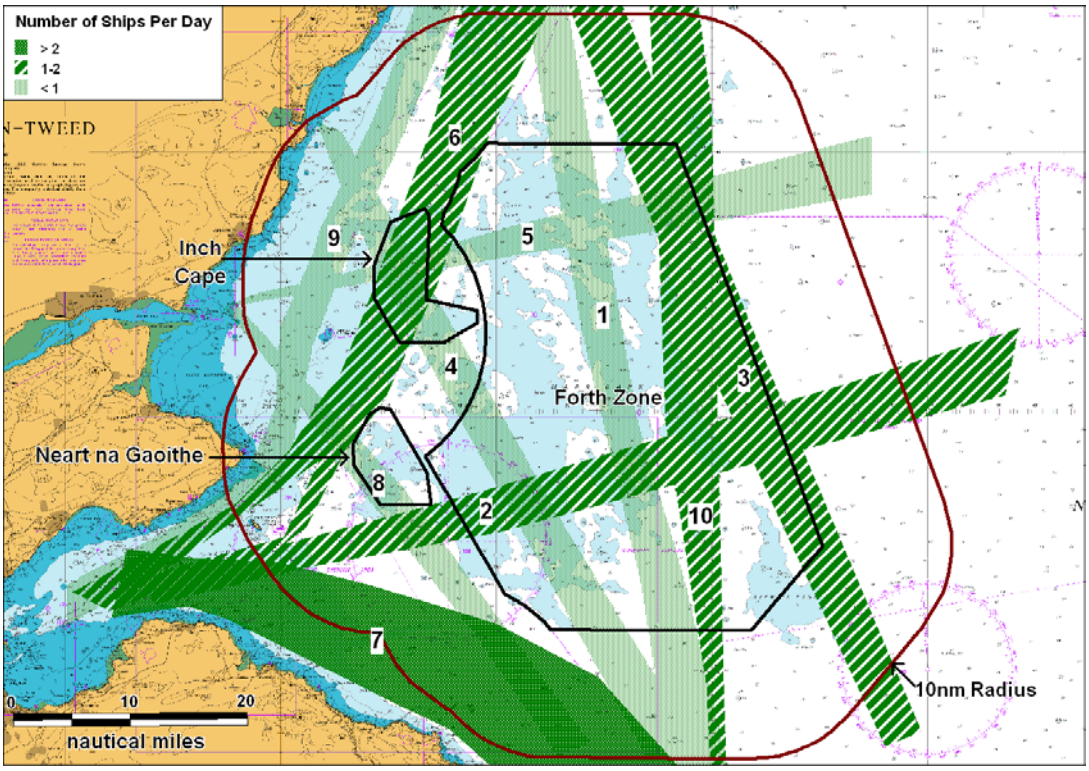

Figure 10.3 90% Shipping Lanes (shaded according to Ships per Day)

A brief description of the lanes is presented below. The traffic volumes on the lanes vary considerably from an average of less than one vessel per day up to about 7 per day.

- Route 1 is used by medium sized tankers, cargo vessels and offshore support vessels heading between east coast ports in the UK (e.g., Aberdeen, Immingham and Tees / Tyne).

- Route 2 is used by traffic routeing between the Forth and northern European / Baltic Sea ports.

- Route 3 is used by cargo vessels and offshore support vessels headed north to Aberdeen or south to various ports such as Immingham and Antwerp.

- Route 4 is used mainly by small/medium sized cargo vessels headed to/from Montrose.

- Route 5 is used by east-west traffic between the Tay (mainly Dundee) and either North Sea offshore platforms or northern European / Baltic Sea ports.

- Route 6 is used by coastal traffic between the Forth and ports to the north, in particular, Aberdeen. (Route 9 is a slightly busier, alternative route, closer to shore.)

- Route 7 is a busy route used by merchant traffic between the Forth (mainly Grangemouth and Leith) and ports to the south, such as Rotterdam, Antwerp and Amsterdam.

- Route 8 is used mainly by coastal traffic heading between the Tay and ports to the south, such as Tees / Tyne.

- Route 9 is used mainly by coastal traffic heading between the Forth and ports to the north, such as Inverness and Aberdeen.

- Route 10 is used by medium sized cargo vessels and tankers headed north, in particular to Invergordon, Peterhead and Inverness or south, (mainly to Immingham).

A plot of the lane boundaries buffered by the key template distances of 0.5nm and 2nm is presented in Figure 10.4.

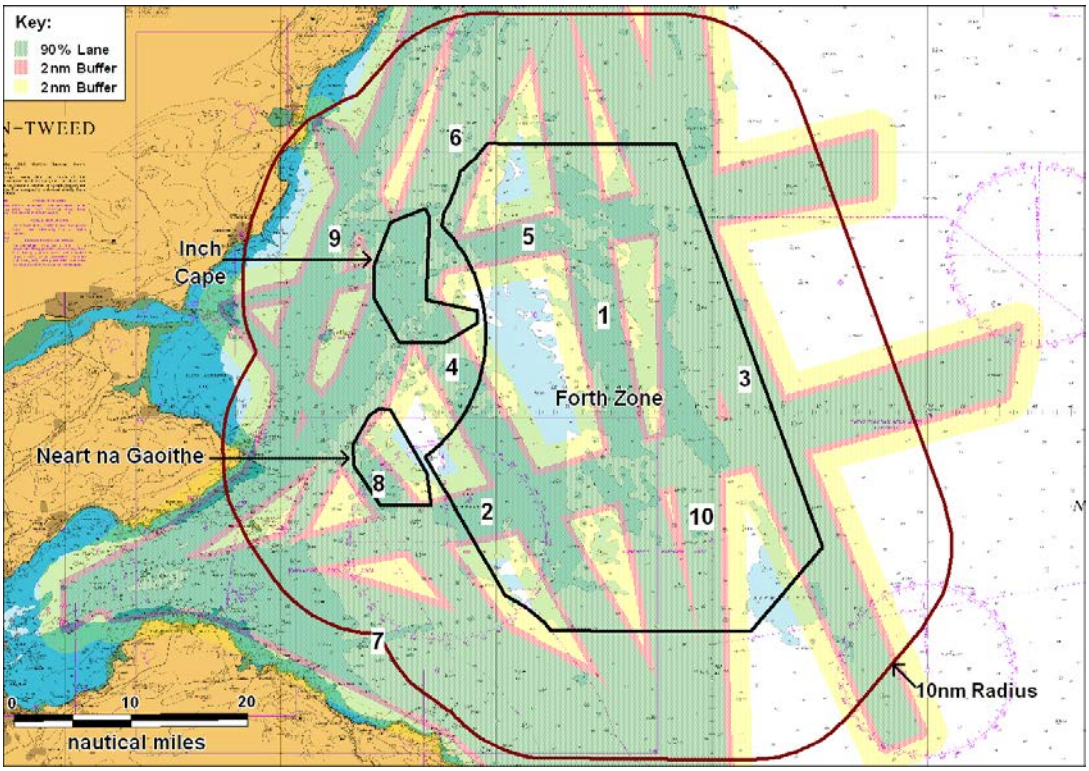

Figure 10.4 90% Shipping Lanes (shaded according to Ships per Day)

11 DETAILED AIS ANALYSIS

11.1 Introduction

The following section presents a detailed analysis of the outer Firth of Forth and Tay wind farm developments relative to the main shipping lanes derived from the AIS data. The shipping on each route is characterised based on the following:

- Ship Type
- Destination
- Ship Size (length and draught)
- Ship Speed

11.2 Route 1

A plot of the shipping on Route 1 is presented in Figure 11.1.

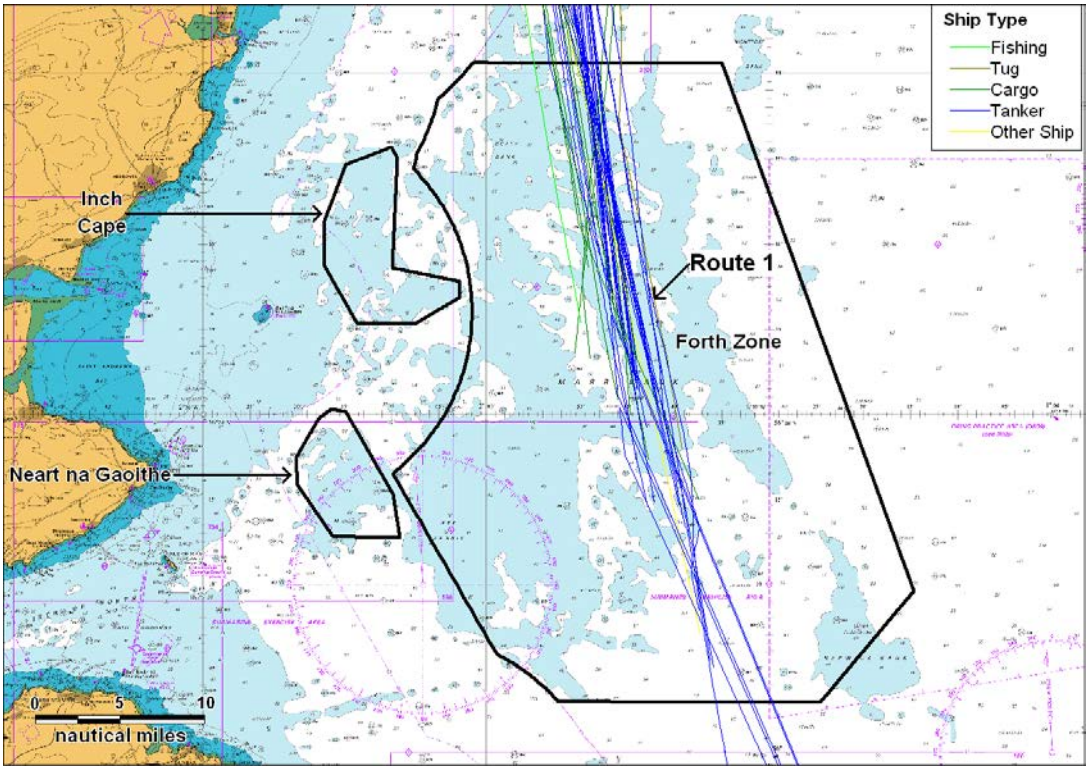

Figure 11.1 Route 1 Shipping Lane with extracted AIS Tracks by Type (28 Days)

Route 1 is used by an average of just under 1 vessel per day. A description of the traffic on this route is given below.

Ship Type:

Vessels are composed of tankers (57%), cargo vessels (32%), offshore support vessels (8%) and fishing vessels (3%).

Destination:

Traffic is heading between east coast ports in the UK (e.g., Aberdeen, Immingham and Teesport).

11.2.1 Ship Size (Length & Draught)

The size of vessels (length and draught) recorded on Route 1 is presented in Figure 11.2 and Figure 11.3.

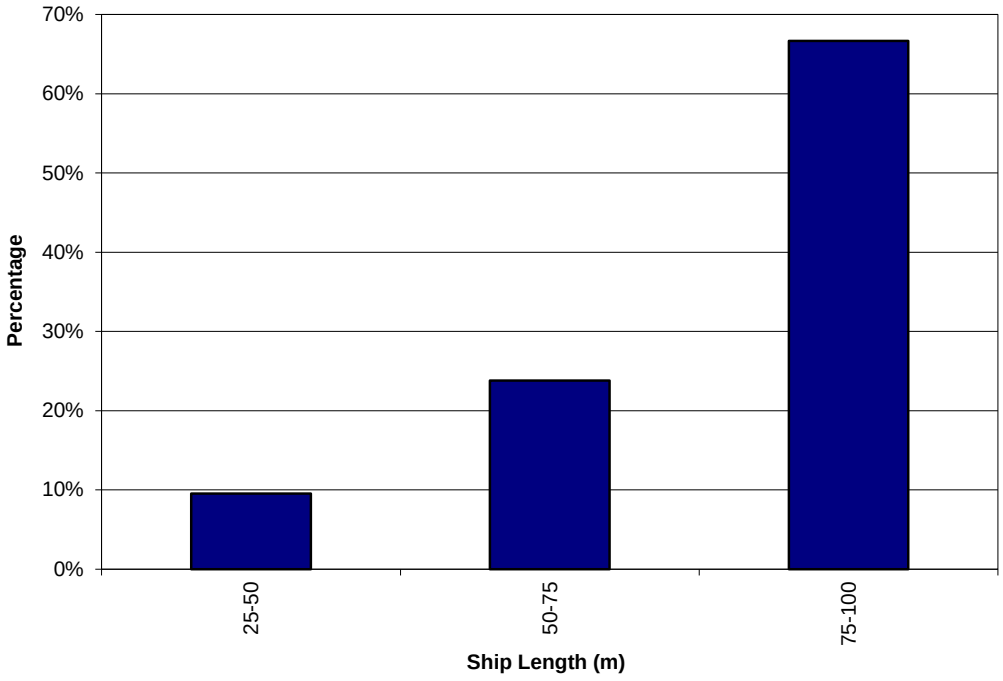

Figure 11.2 Route 1 Ship Length

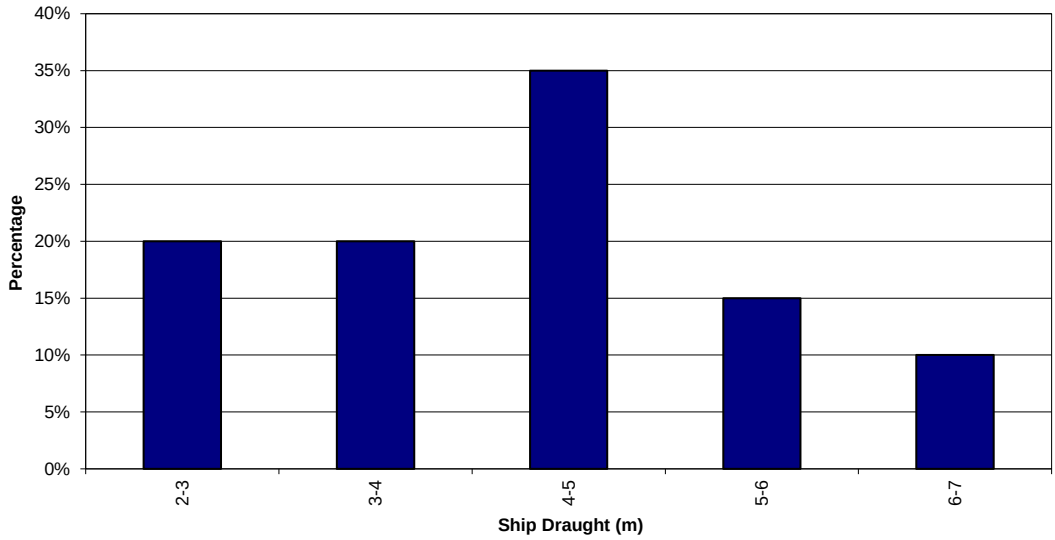

Figure 11.3 Route 1 Reported Ship Draught

The average ship length on Route 1 was 75m, with a draught of 3.9m.

The largest vessel recorded on this route during the 28 day survey period was the products tanker *Mersey Fisher* at 92m in length and draught of 6.3m bound for Aberdeen. A library image of this vessel is presented in Figure 11.4.

Figure 11.4 Library Image of *Mersey Fisher*

11.2.2 Ship Speed

The average speed of vessels recorded on Route 1 is presented in Figure 11.5.

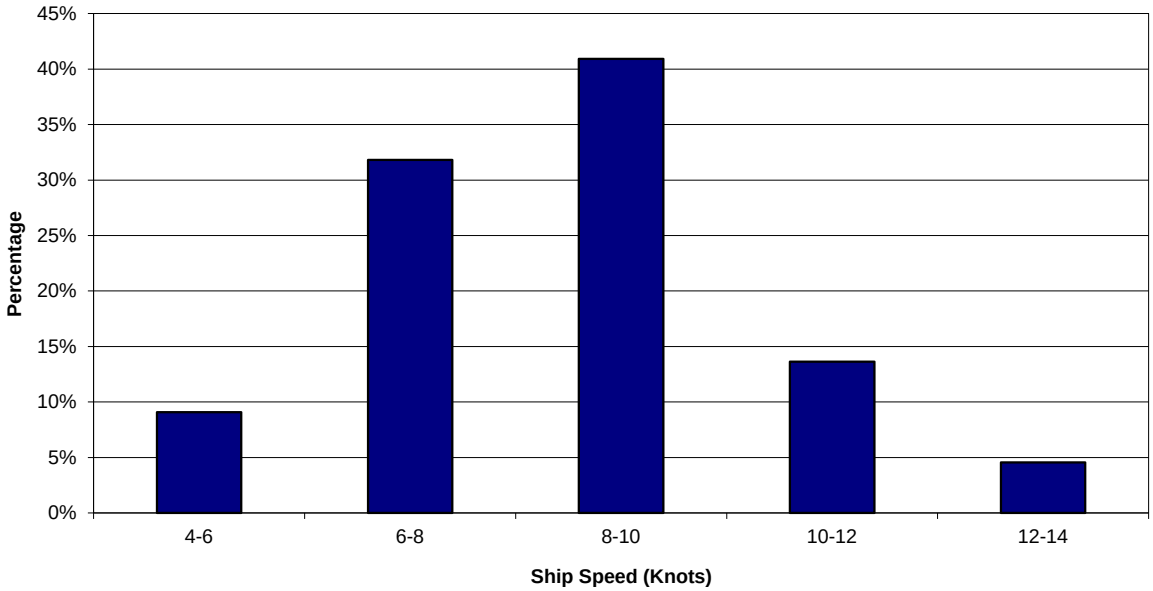

Figure 11.5 Route 1 Average Ship Speed

The average speed of vessels on this route was 8.5 Knots.

11.3 Route 2

A plot of the shipping on Route 2 is presented in Figure 11.6.

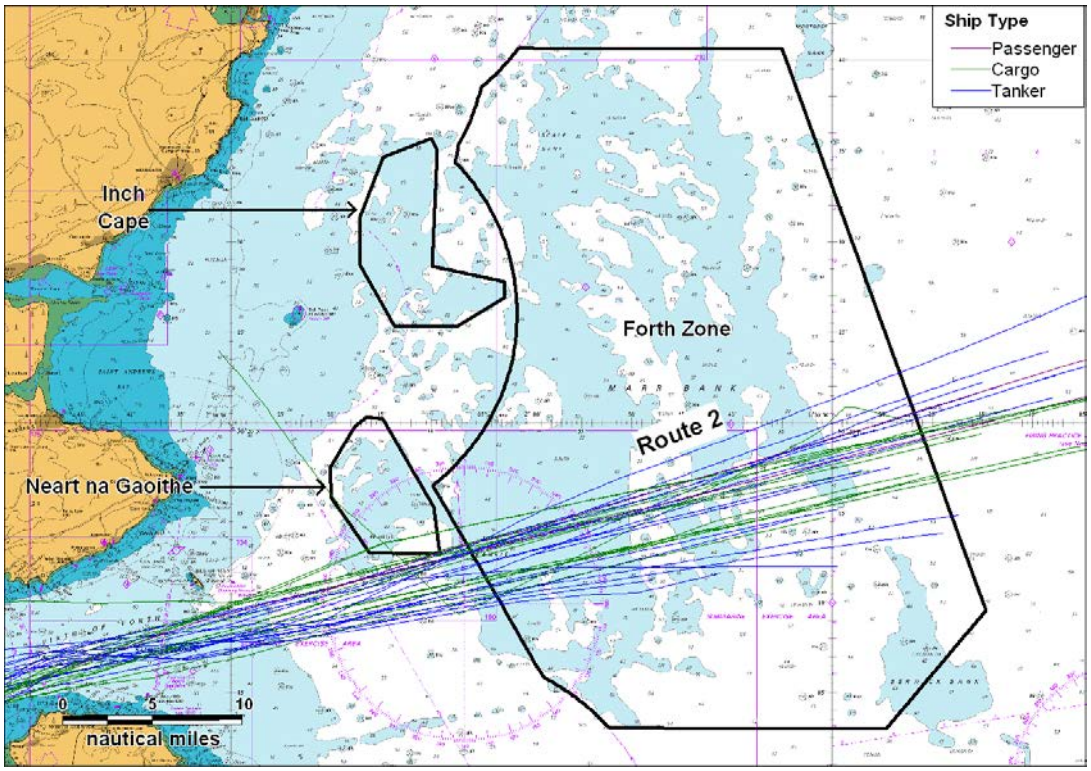

Figure 11.6 Route 2 Shipping Lane with extracted AIS Tracks by Type (28 Days)

Route 2 is used by an average of just over 1 vessel per day. A description of the traffic on this route is given below.

Ship Type:

Vessels are composed of cargo vessels (50%), tankers (45%) and passenger vessels (5%).

Destination:

Traffic is heading between Forth ports (Leith, Grangemouth, Hound Point, Rosyth and Breafoot Bay) and northern European / Baltic Sea ports.

11.3.1 Ship Size (Length & Draught)

The size of vessels (length and draught) recorded on Route 2 is presented in Figure 11.7 and Figure 11.8.

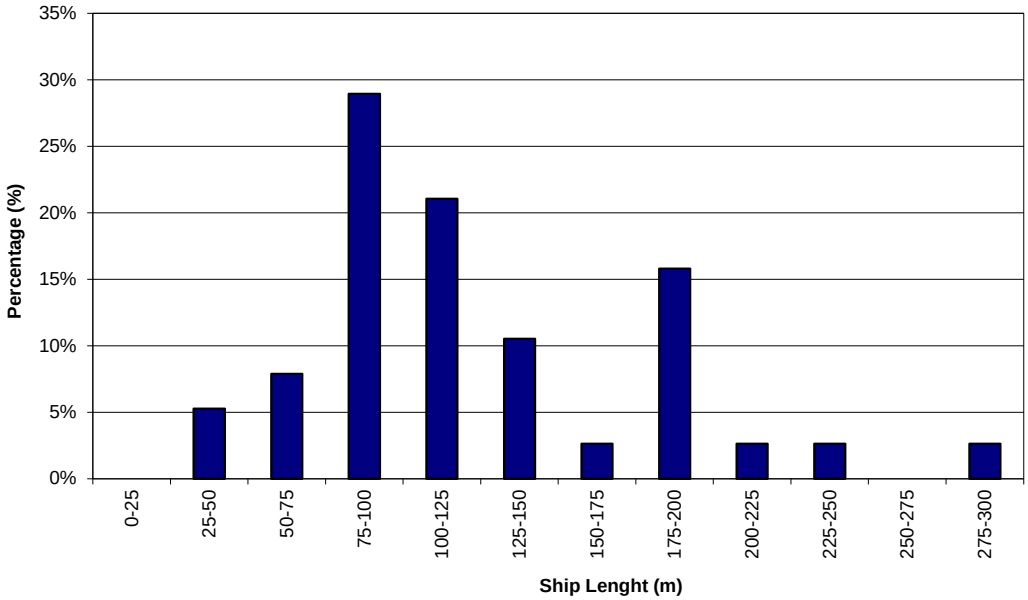

Figure 11.7 Route 2 Ship Length

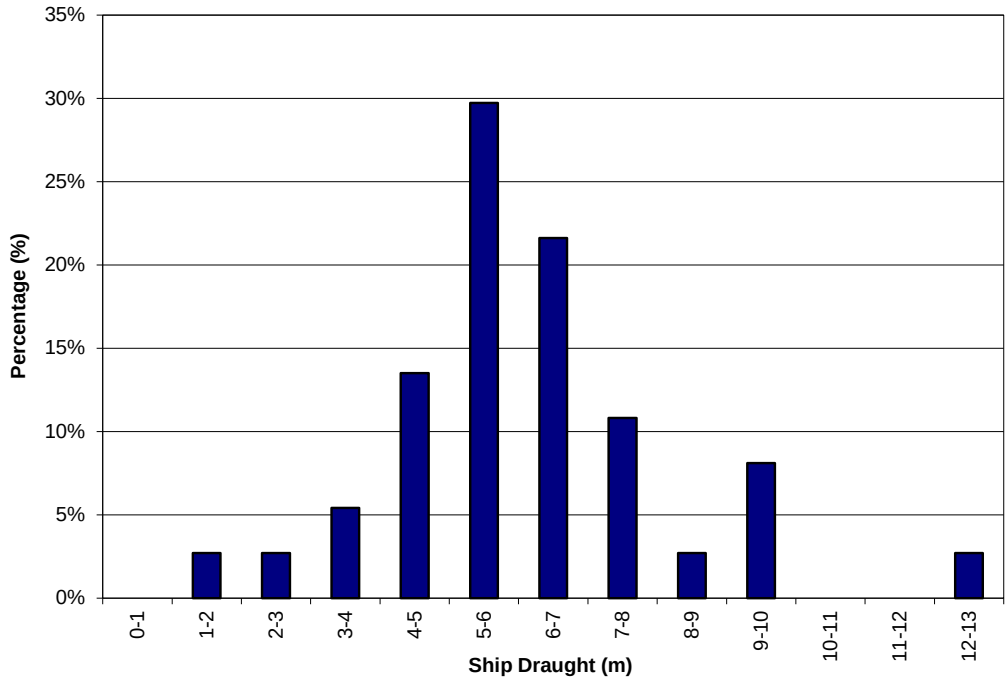

Figure 11.8 Route 2 Reported Ship Draught

The average ship length on Route 2 was 121m, with a draught of 5.8m.

The largest vessel recorded on this route during the 28 day survey period was the shuttle tanker *Navion Torinita* at 247m in length and draught of 13m bound for Mongstad, Norway.

A library image of this vessel is presented below.

Figure 11.9 Library Image of *Navion Torinita*

11.3.2 Ship Speed

The average speed of vessels recorded on Route 2 is presented in Figure 11.10.

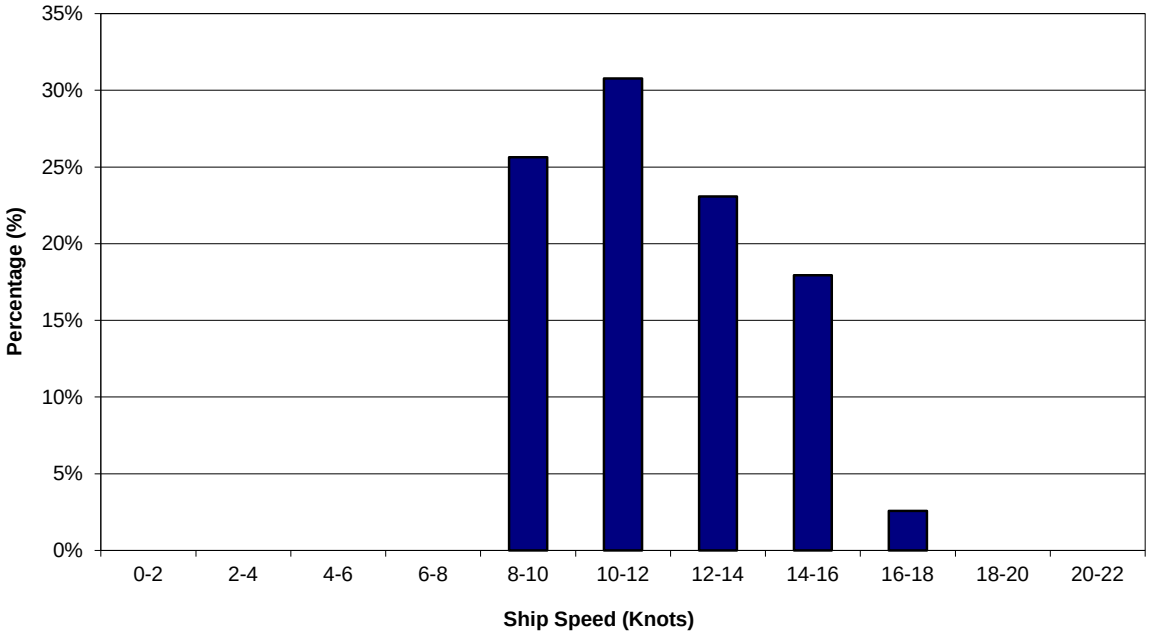

Figure 11.10 Route 2 Average Ship Speed

The average speed of vessels on this route was 11.9 Knots.

11.4 Route 3

A plot of the shipping on Route 3 is presented in Figure 11.11.

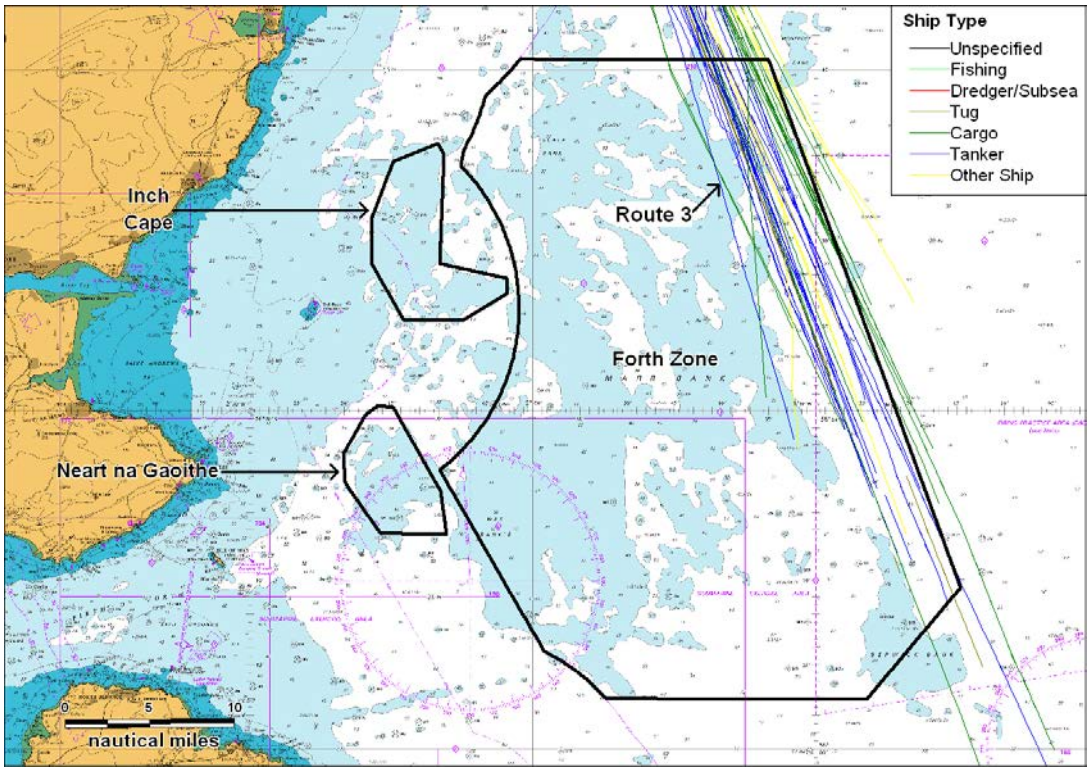

Figure 11.11 Route 3 Shipping Lane with extracted AIS Tracks by Type (28 Days)

Route 3 is used by an average of just under 2 vessels per day. A description of the traffic on this route is given below.

Ship Type:

Vessels are composed of tankers (39%), cargo vessels (33%) and offshore vessels (28%).

Destination:

Traffic is heading between Aberdeen and south eastern UK port, including those in the Humber.

11.4.1 Ship Size (Length & Draught)

The size of vessels (length and draught) recorded on Route 3 is presented in Figure 11.13 and Figure 11.14.

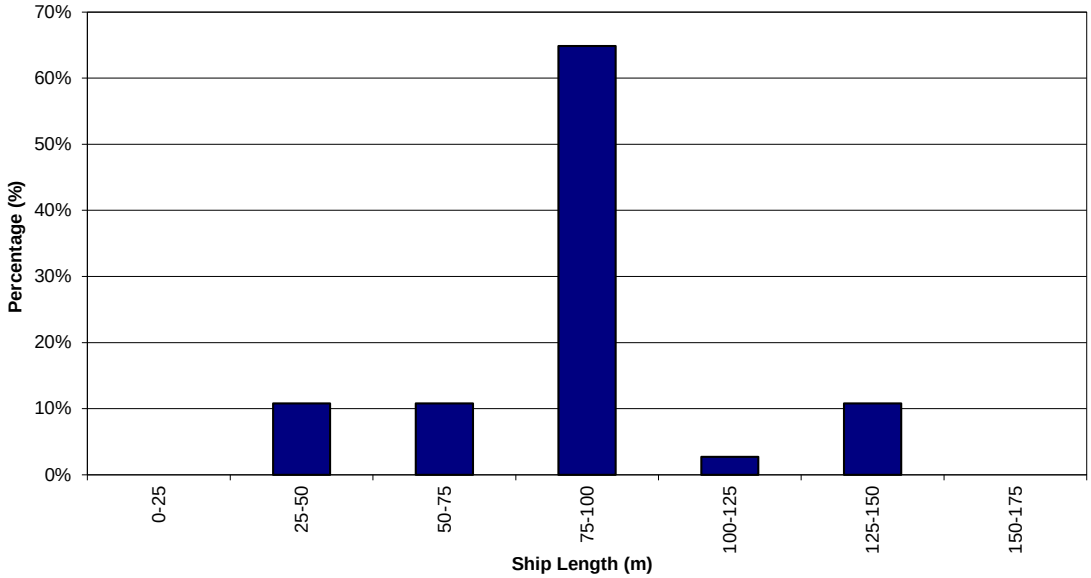

Figure 11.12 Route 3 Ship Length

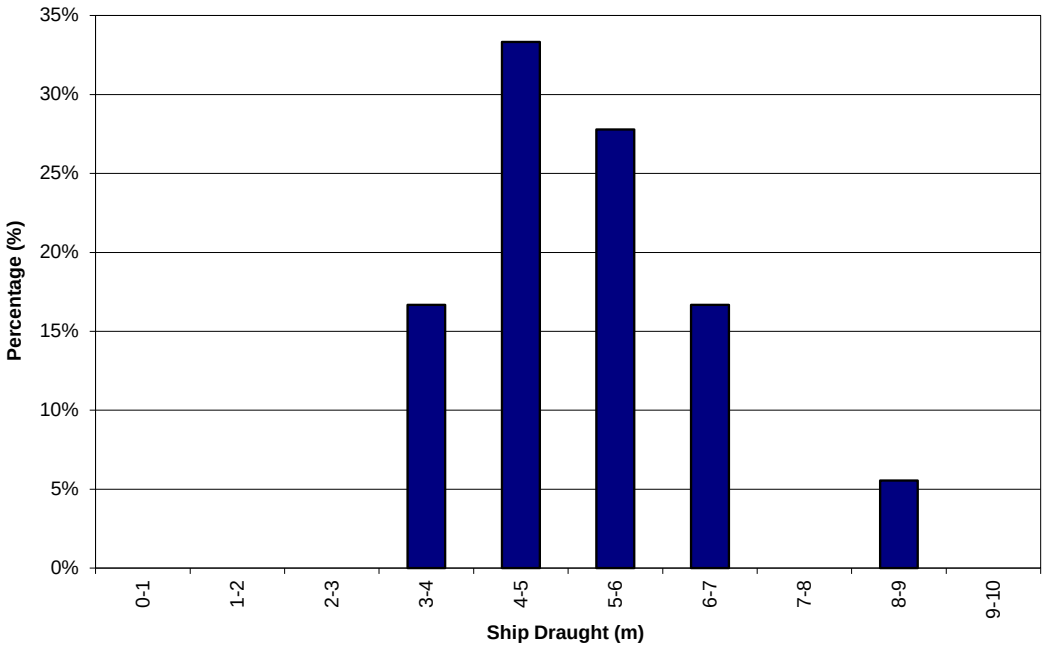

Figure 11.13 Route 3 Reported Ship Draught

The average ship length on Route 3 was 83m, with a draught of 5.1m.

The largest vessel recorded on this route during the 28 day survey period was the general cargo ship *Safmarine Anita* 140m in length and draught of 8.4m, recorded twice between Bilbao and Aberdeen.

A library image of this vessel is presented below.

Figure 11.14 Library Image of *Safmarine Anita*

11.4.2 Ship Speed

The average speed of vessels recorded on Route 3 is presented in Figure 11.15.

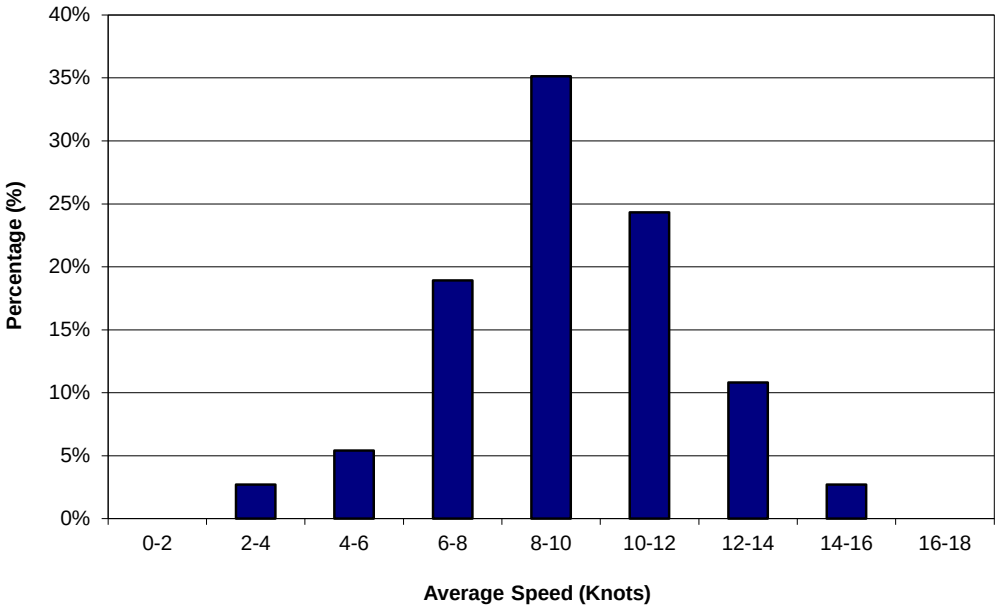

Figure 11.15 Route 3 Average Ship Speed

The average speed of vessels on this route was 8.7 Knots.

11.5 Route 4

A plot of the shipping on Route 4 is presented in Figure 11.16.

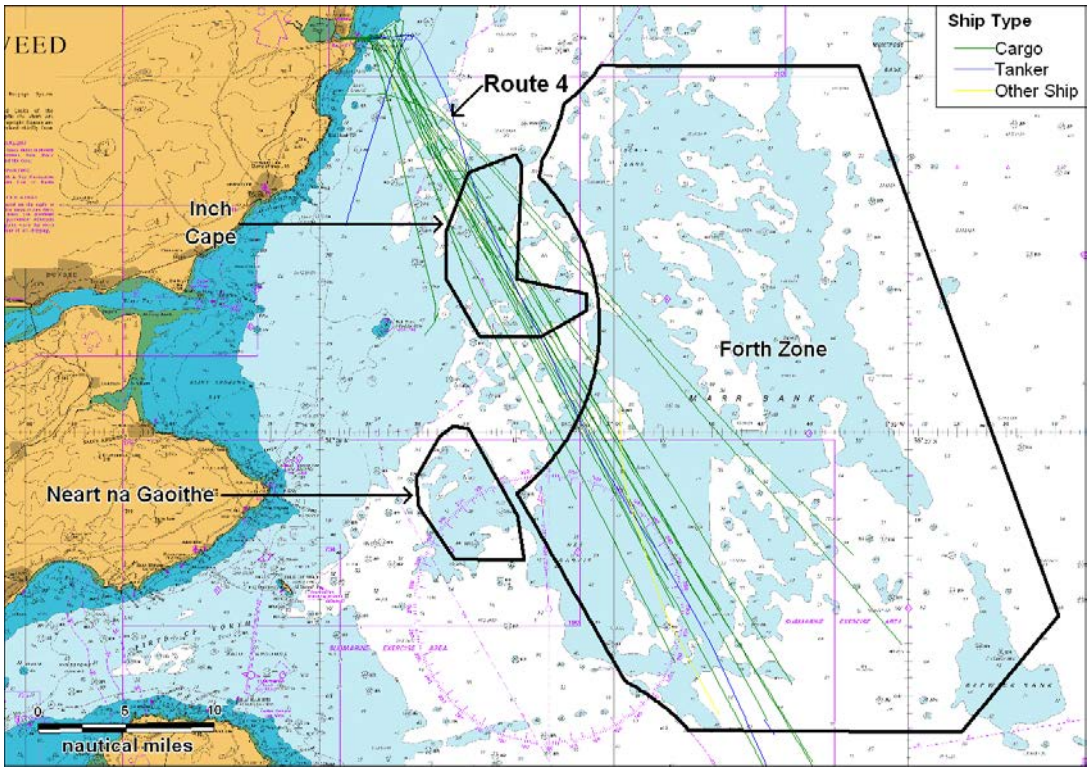

Figure 11.16 Route 4 Shipping Lane with extracted AIS Tracks by Type (28 Days)

Route 4 is used by an average of just under 1 vessel per day. A description of the traffic on this route is given below.

Ship Type:

Vessels are composed of cargo vessels (75%), tankers (15%) and offshore (research vessels/search and rescue (SAR)) (10%).

Destination:

Traffic is heading to Montrose or south to various ports such as Rotterdam and Amsterdam.

11.5.1 Ship Size (Length & Draught)

The size of vessels (length and draught) recorded on Route 4 is presented in Figure 11.17 and Figure 11.18.

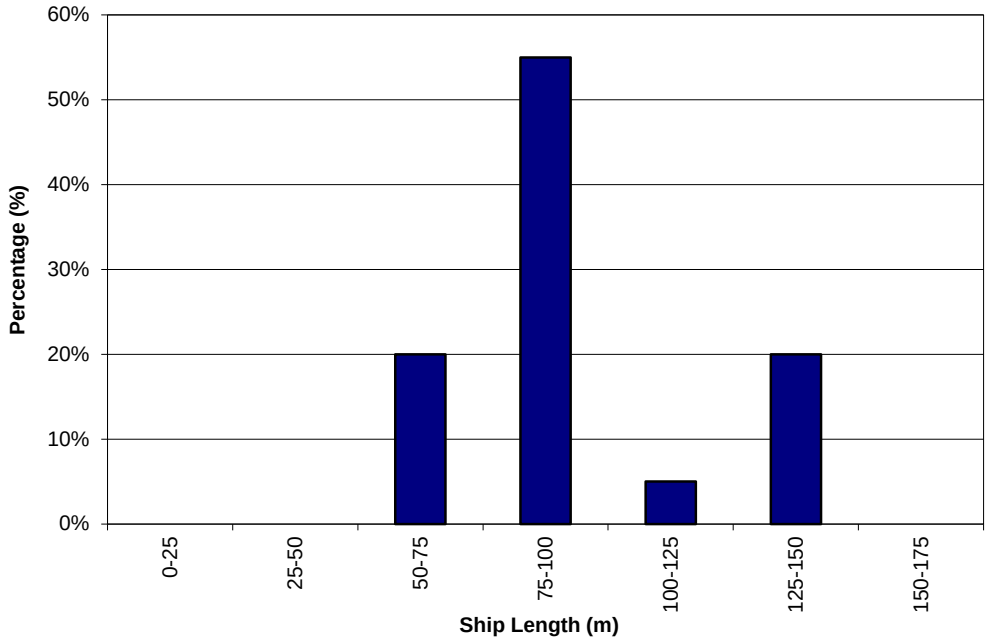

Figure 11.17 Route 4 Ship Length

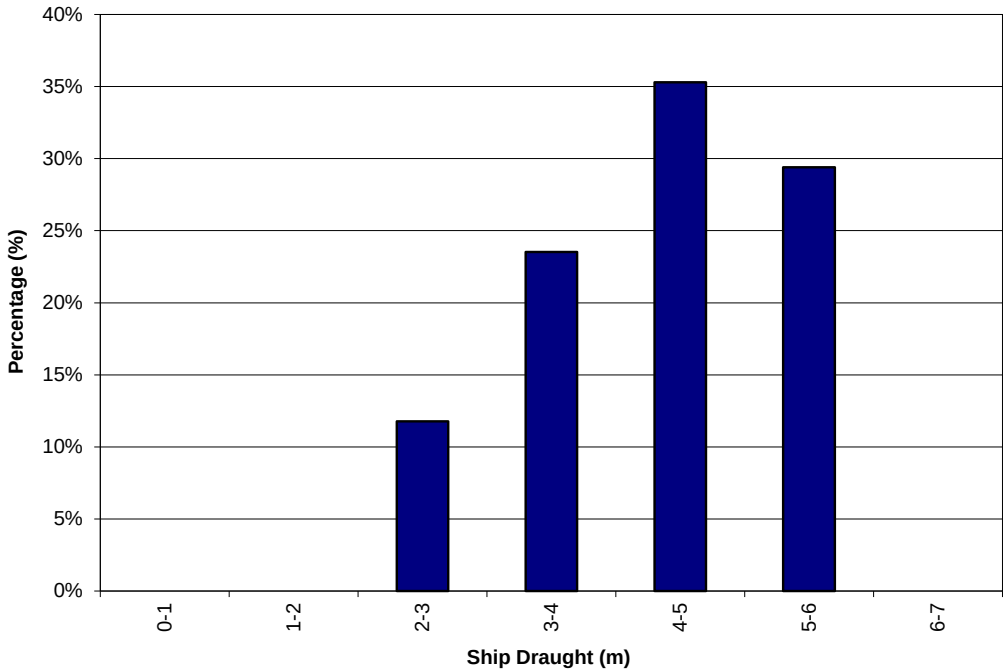

Figure 11.18 Route 4 Reported Ship Draught

The average ship length on Route 4 was 92m, with a draught of 3.8m.

The largest vessel recorded on this route during the 28 day survey period was the general cargo ship *Archangelgracht* 130m in length and draught of 5.6m, recorded heading to Montrose. A library image of this vessel is presented below.

Figure 11.19 Library Image of *Archangelgracht*

11.5.2 Ship Speed

The average speed of vessels recorded on Route 4 is presented in Figure 11.20.

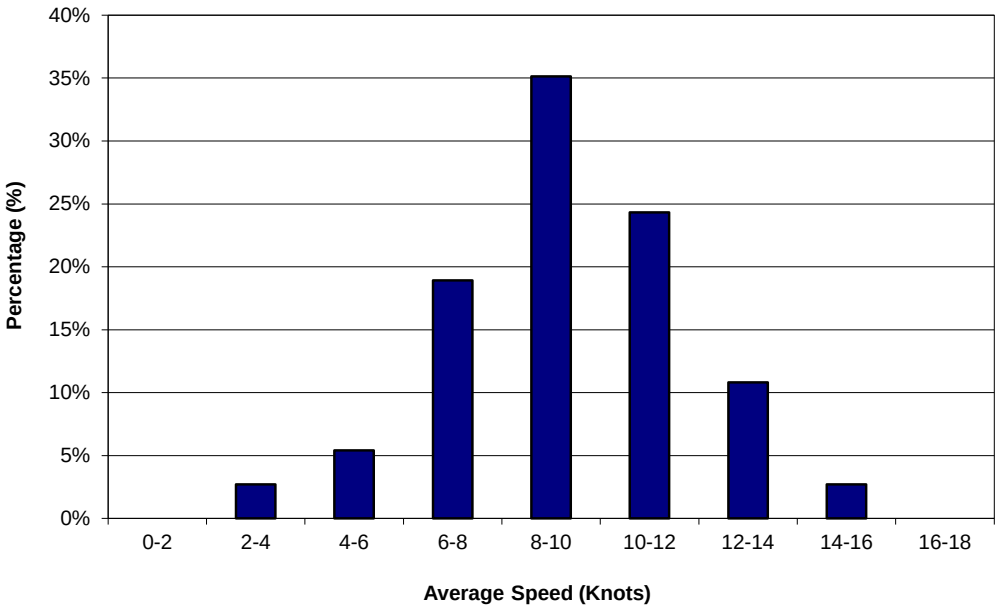

Figure 11.20 Route 4 Average Ship Speed

The average speed of vessels on this route was 8.7 Knots.

11.6 Route 5

A plot of the shipping on Route 5 is presented in Figure 11.21.

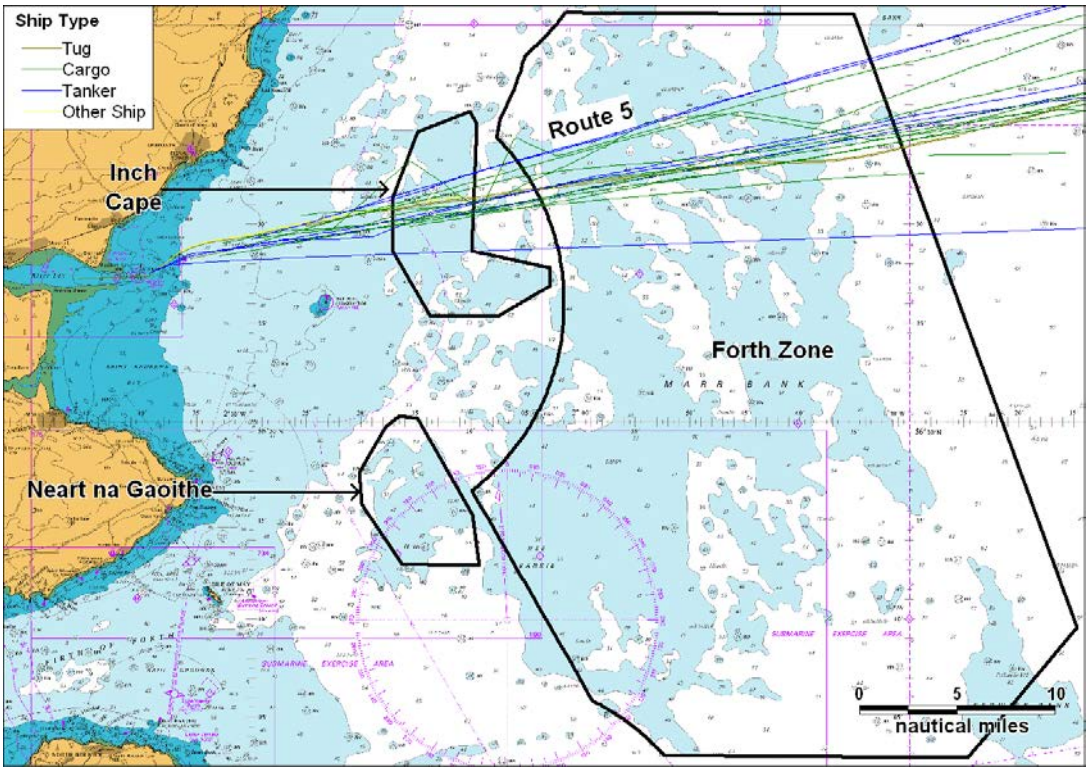

Figure 11.21 Route 5 Shipping Lane with extracted AIS Tracks by Type (28 Days)

Route 5 is used by an average of just under 1 vessel per day. A description of the traffic on this route is given below.

Ship Type:

Vessels are composed of cargo vessels (50%), tankers (30%) and offshore (search and rescue, tugs and drilling rigs) (20%).

Destination:

Heading to the Tay (mainly Dundee) and outbound to North Sea offshore platforms and northern European / Baltic Sea ports (i.e., Gothenburg and Skagen).

11.6.1 Ship Size (Length & Draught)

The size of vessels (length and draught) recorded on Route 5 is presented in Figure 11.22 and Figure 11.23.

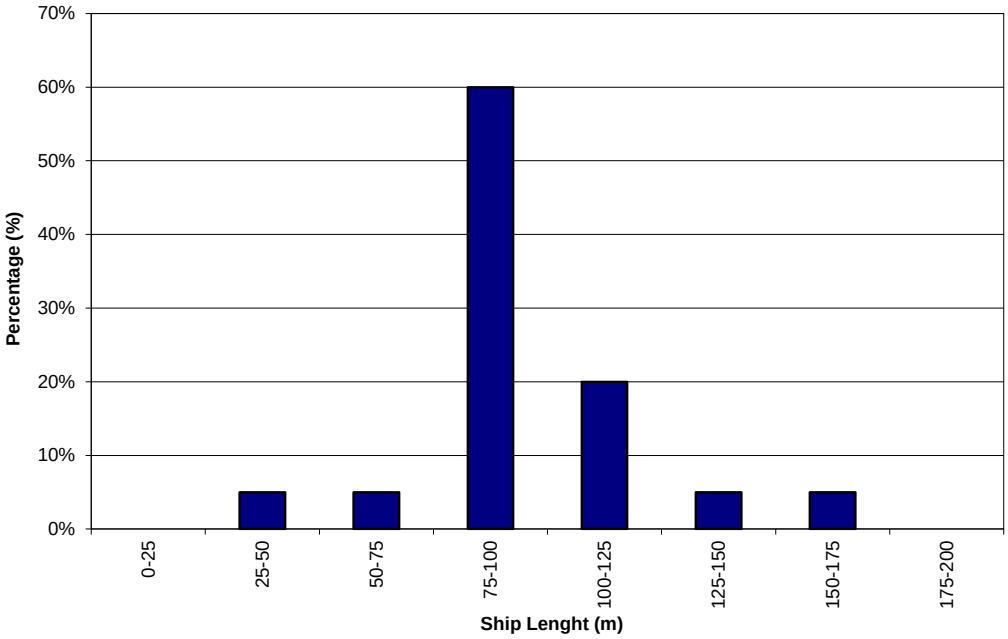

Figure 11.22 Route 5 Ship Length

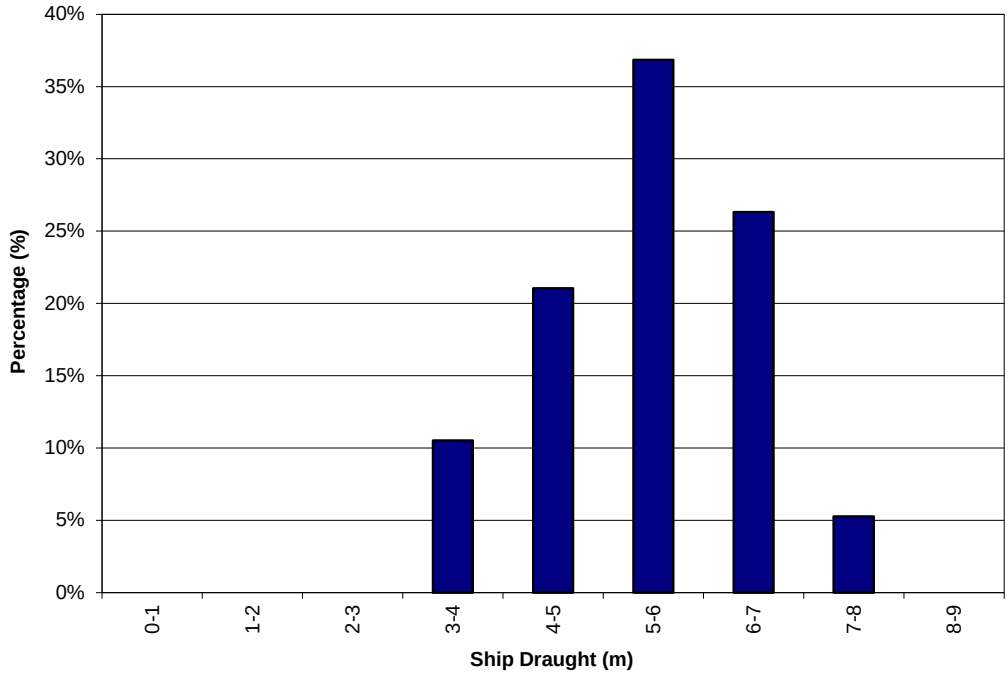

Figure 11.23 Route 5 Reported Ship Draught

The average ship length on Route 5 was 94m, with a draught of 5.2m.

The largest vessel recorded on this route during the 28 day survey period was the refrigerated cargo ship *Avila Star* 158m in length and draught of 7.5m, recorded heading to Dundee.A library image of this vessel is presented below.

Figure 11.24 Library Image of *Avila Star*

11.6.2 Ship Speed

The average speed of vessels recorded on Route 5 is presented in Figure 11.25.

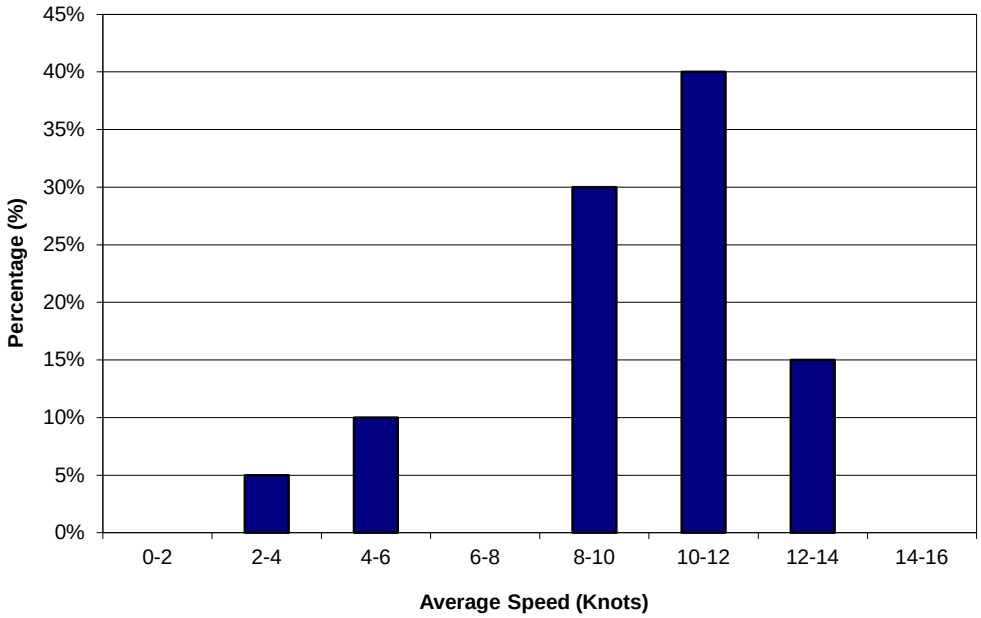

Figure 11.25 Route 5 Average Ship Speed

The average speed of vessels on this route was 9.5 Knots.

11.7 Route 6

A plot of the shipping on Route 6 is presented in Figure 11.26.

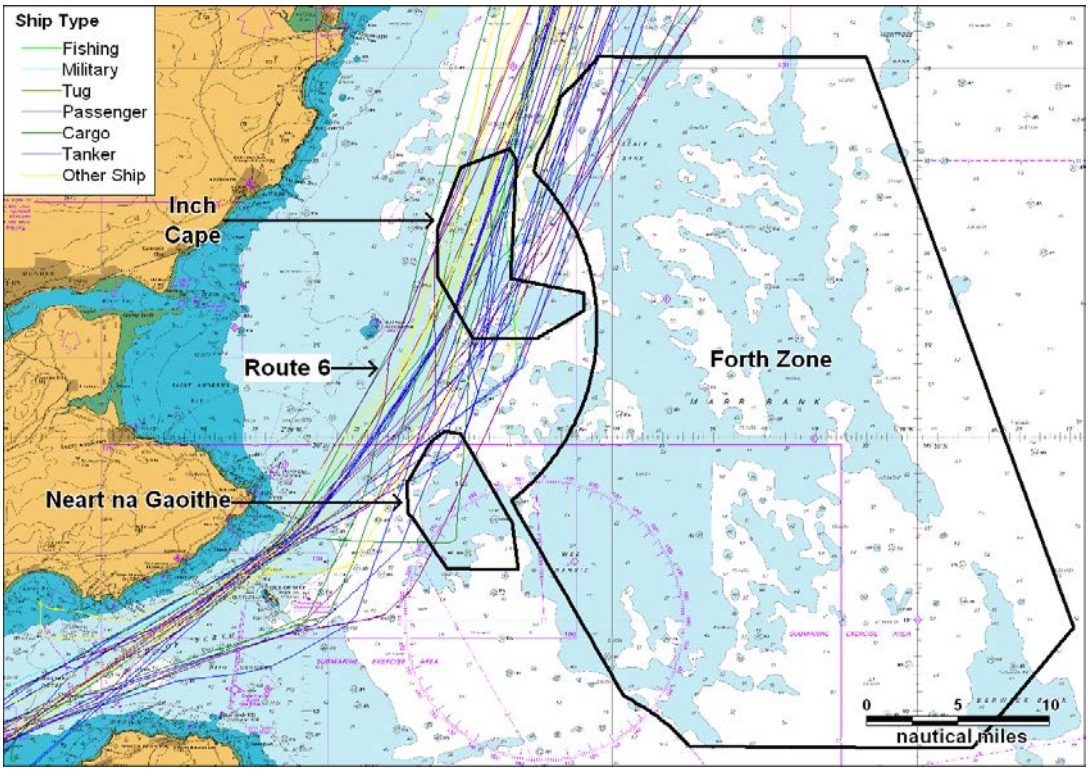

Figure 11.26 Route 6 Shipping Lane with extracted AIS Tracks by Type (28 Days)

Route 6 is used by an average of just under 2 vessels per day. A description of the traffic on this route is given below.

Ship Type:

Vessels are composed of tankers (31%) and other ships/tugs (mainly offshore support and fisheries protection) (30%), Cruise Liners (24%), cargo vessels (11%) and military/fishing (4%).

Destination:

Traffic is mainly heading between the Forth and ports to the north, including Aberdeen, Inverness, Kirkwall and Peterhead.

11.7.1 Ship Size (Length & Draught)

The size of vessels (length and draught) recorded on Route 6 is presented in Figure 11.27and Figure 11.28.

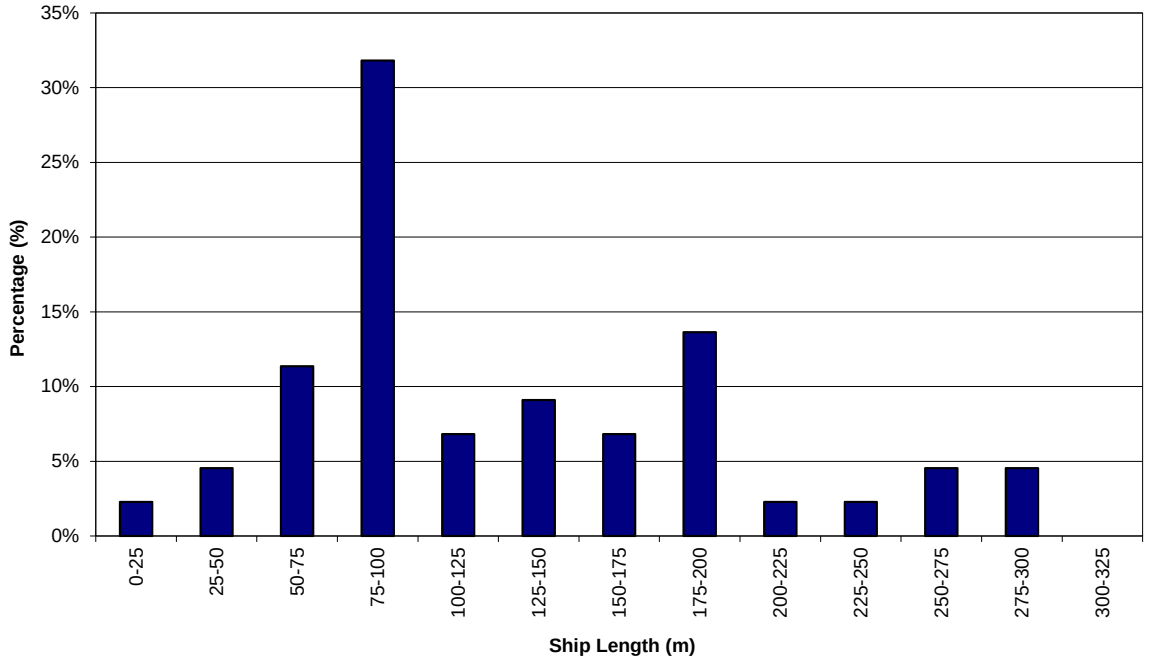

Figure 11.27 Route 6 Ship Length

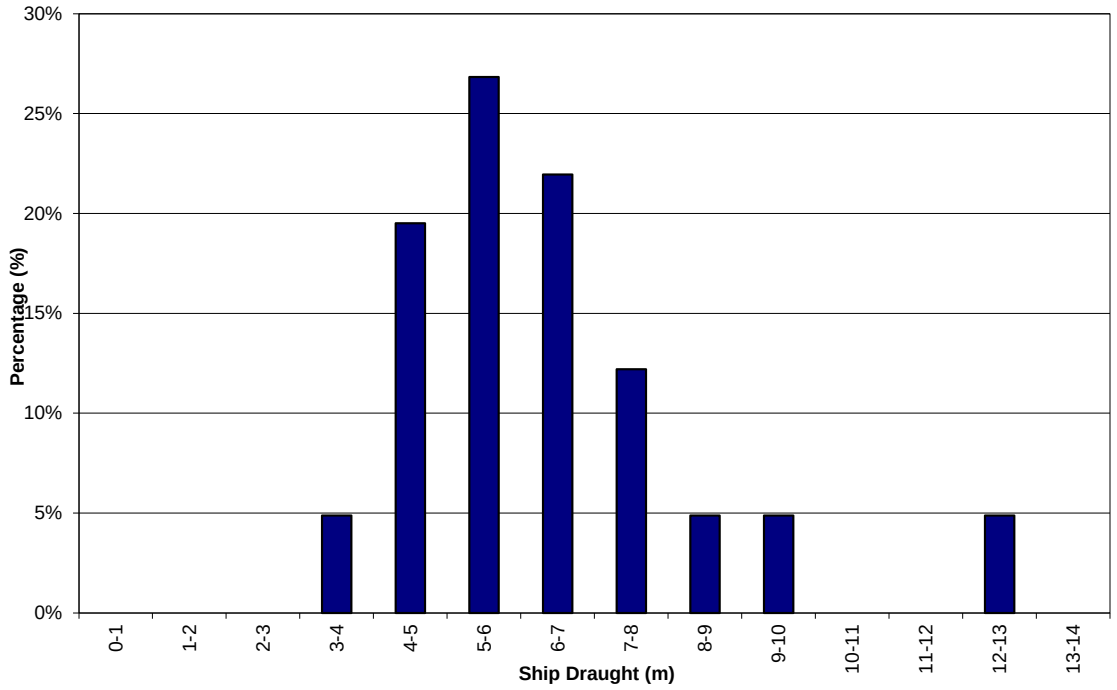

Figure 11.28 Route 6 Reported Ship Draught

The average ship length on Route 6 was 126m, with a draught of 5.9m.

The largest vessel recorded on this route during the 28 day survey period was the Cruise Liner *Westerdam* 285m in length and draught of 8m, recorded heading into the Forth, with a destination set to Newcastle. It is noted that *Westerdam* routed east of Isle of May (seaward), however there were a number of oil tankers with deeper draughts (>9m) which routed west of Isle of May. A library image of *Westerdam* is presented below.

Figure 11.29 Library Image of *Westerdam*

11.7.2 Ship Speed

The average speed of vessels recorded on Route 6 is presented in Figure 11.30.

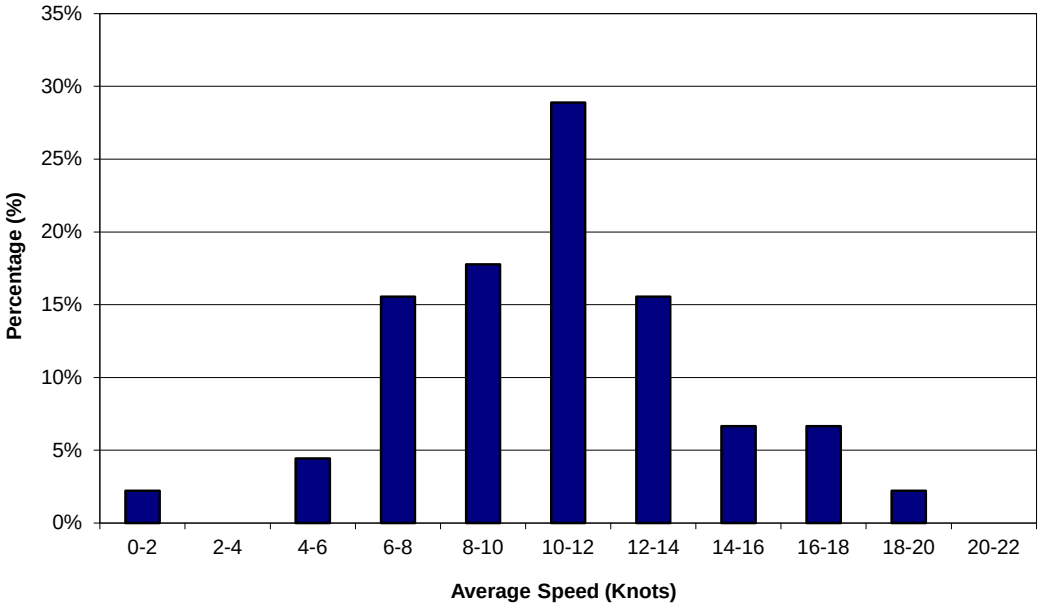

Figure 11.30 Route 6 Average Ship Speed

The average speed of vessels on this route was 10.9 Knots.

11.8 Route 7

A plot of the shipping on Route 7 is presented in Figure 11.31.

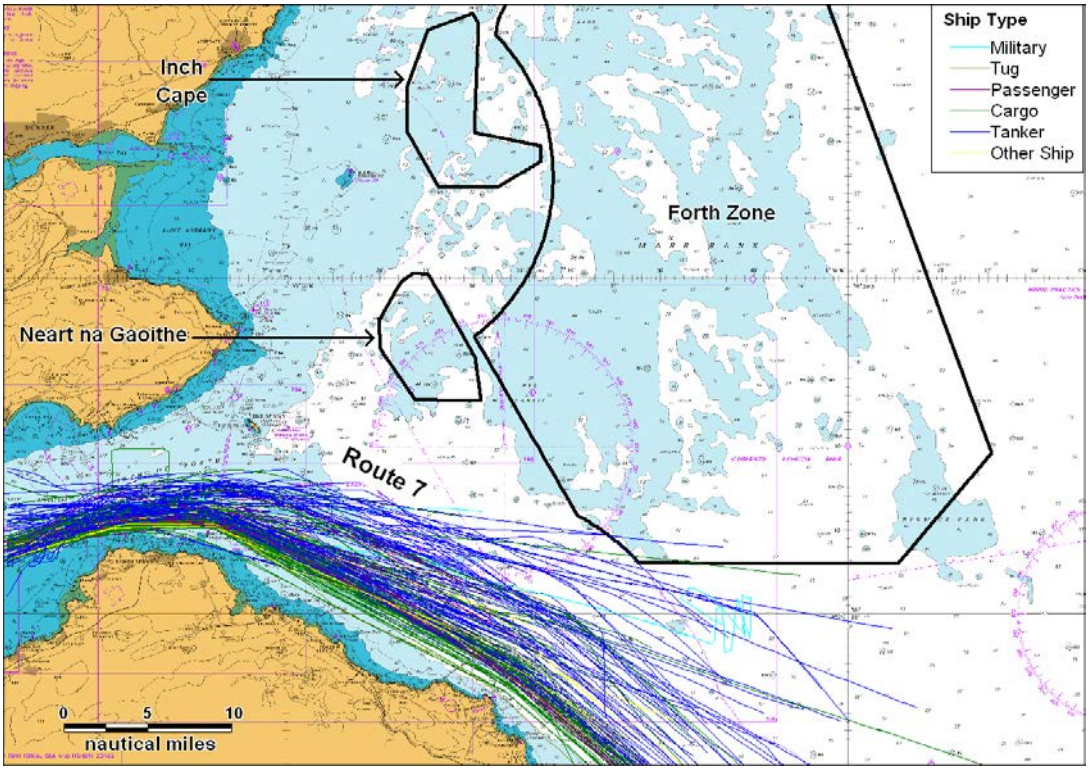

Figure 11.31 Route 7 Shipping Lane with extracted AIS Tracks by Type (28 Days)

Route 7 is used by an average of just over 7 vessels per day. A description of the traffic on this route is given below.

Ship Type:

Vessels are composed of tankers (47%), cargo vessels (35%), Ro-Ro ferries/cruise liners (11%) and other vessels (military/law enforcement and offshore) (7%).

Destination:

Traffic is mainly heading between (mainly Grangemouth and Leith) and ports to the south, such as Rotterdam, Antwerp, Zeebrugge and Amsterdam.

11.8.1 Ship Size (Length & Draught)

The size of vessels (length and draught) recorded on Route 7 is presented in Figure 11.32 and Figure 11.33.

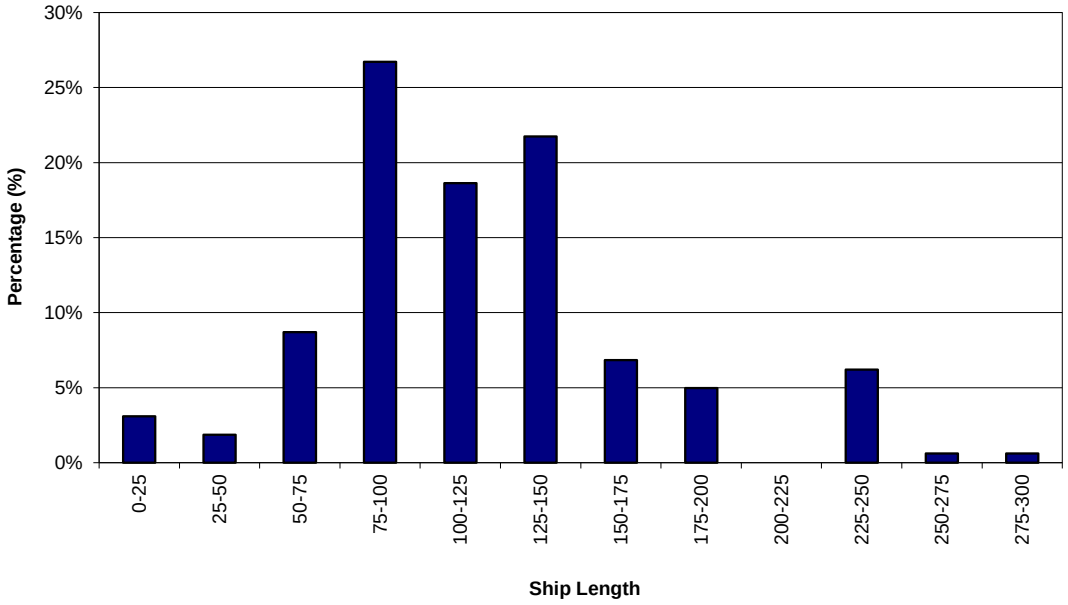

Figure 11.32 Route 7 Ship Length

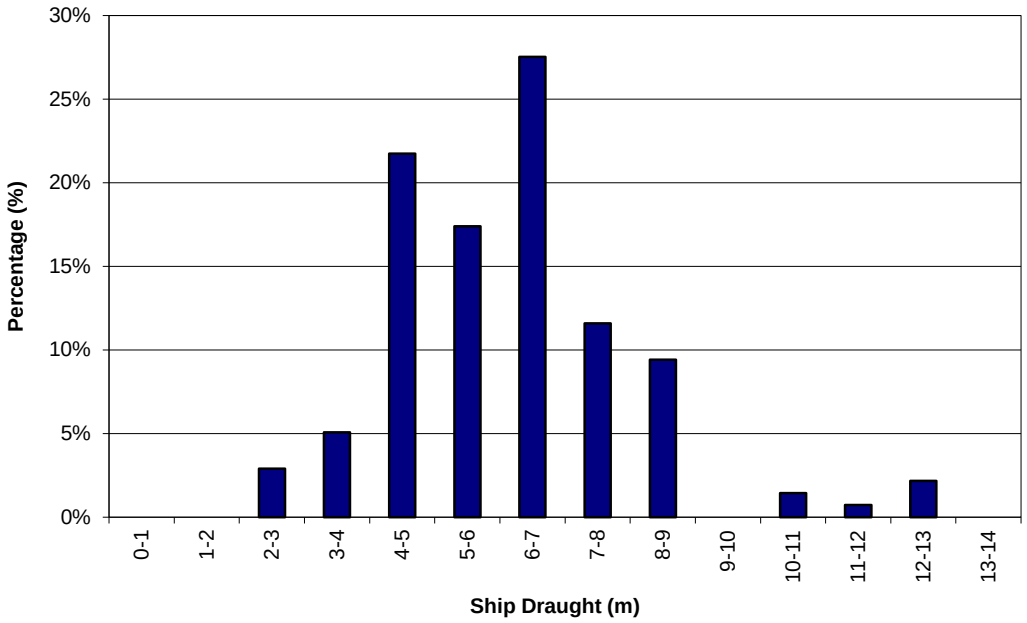

Figure 11.33 Route 7 Reported Ship Draught

The average ship length on Route 7 was 126m, with a draught of 6.2m.

The largest vessel recorded on this route during the 28 day survey period was the Cruise Liner *Westerdam* 285m in length and draught of 8m, recorded heading from the Forth to Newcastle. A library image of *Westerdam* is presented in Figure 11.29.

It is noted that a number of larger draughted vessels on this route (>12m) are crude oil products/shuttle tankers headed to Hound Point. The largest of these vessels recorded over the survey was *Tove Knutsen* at 12.9m, which headed from Hound Point to Fawley (oil refinery). A library image of this vessel is presented below.

Figure 11.34 Library Image of *Tove Knutsen*

11.8.2 Ship Speed

The average speed of vessels recorded on Route 7 is presented in Figure 11.35.

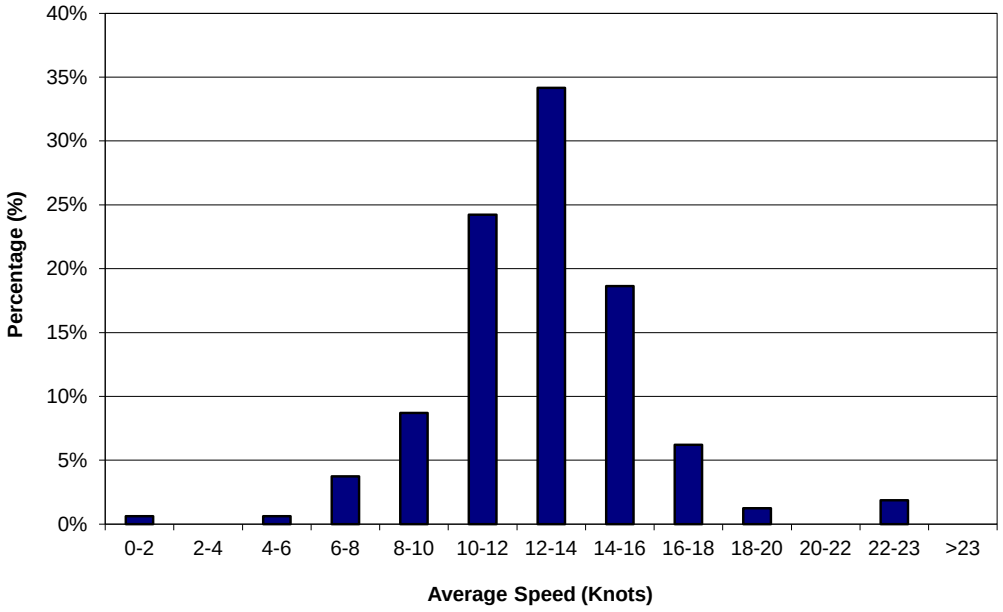

Figure 11.35 Route 7 Average Ship Speed

The average speed of vessels on this route was 12.7 Knots.

11.9 Route 8

A plot of the shipping on Route 8 is presented in Figure 11.36.

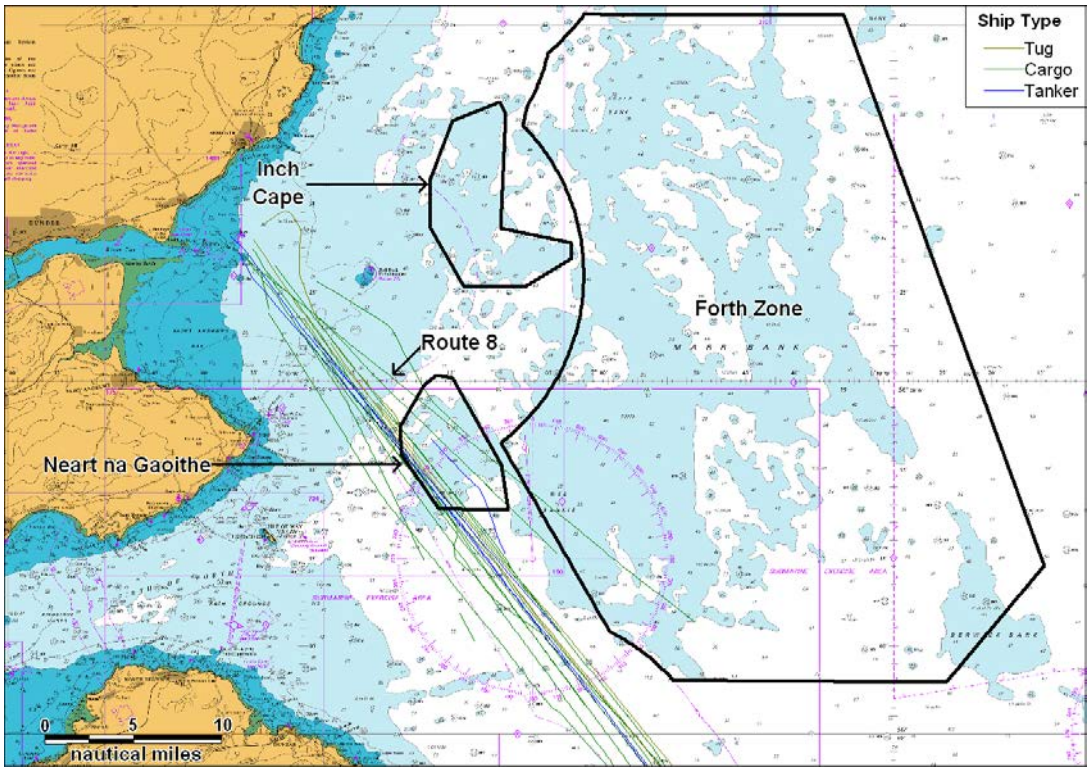

Figure 11.36 Route 8 Shipping Lane with extracted AIS Tracks by Type (28 Days)

Route 8 is used by an average of just under 1 vessel per day. A description of the traffic on this route is given below.

Ship Type:

Vessels are composed of cargo vessels (69%), tankers (17%) and other ships (offshore support/tugs) (14%).

Destination:

Traffic is heading between the Tay and ports to the south, such as Rotterdam, Immingham and Tees.

11.9.1 Ship Size (Length & Draught)

The size of vessels (length and draught) recorded on Route 8 is presented in Figure 11.37 and Figure 11.38.

Figure 11.37 Route 8 Ship Length

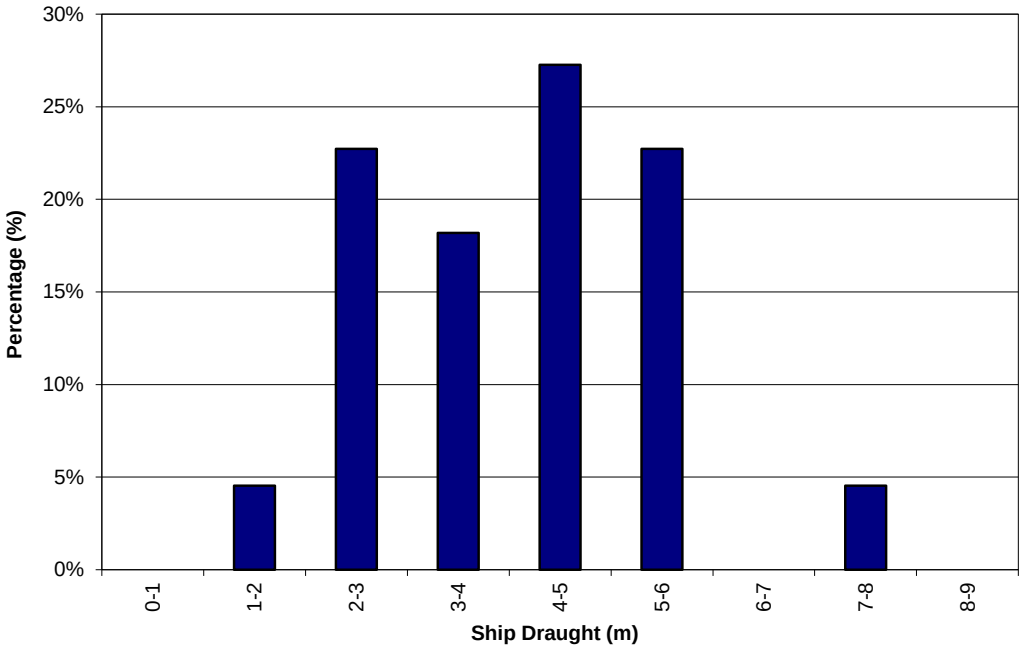

Figure 11.38 Route 8 Reported Ship Draught

The average ship length on Route 8 was 80m, with a draught of 3.8m.

The largest vessel recorded on this route during the 28 day survey period was the general cargo ship *Munteborg* 135m in length and draught of 7.3m, recorded heading to Dundee. A library image of *Munteborg* is presented below.

Figure 11.39 Library Image of *Munteborg*

11.9.2 Ship Speed

The average speed of vessels recorded on Route 8 is presented in Figure 11.40.

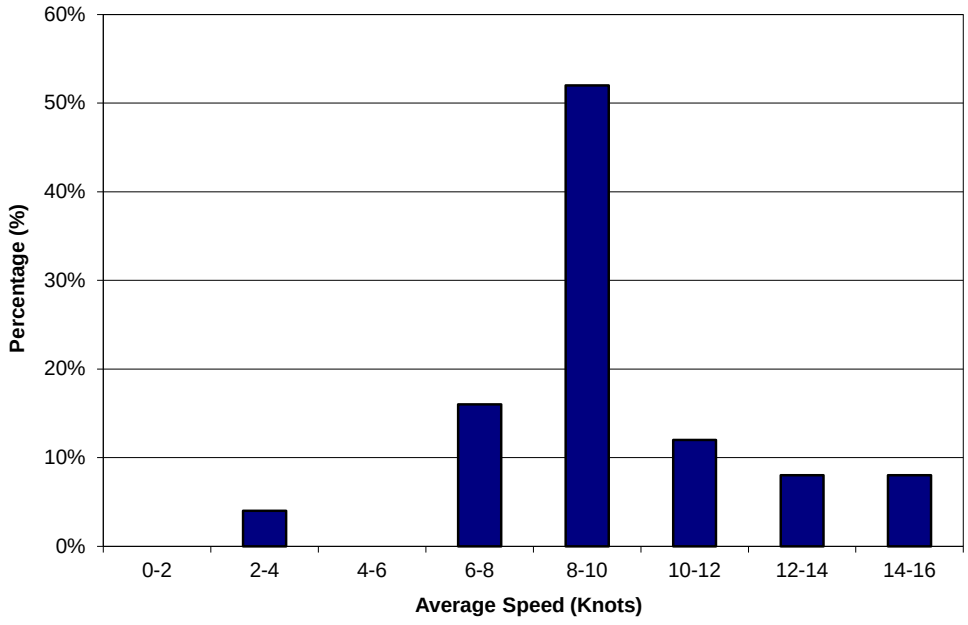

Figure 11.40 Route 8 Average Ship Speed

The average speed of vessels on this route was 9.5 Knots.

11.10 Route 9

A plot of the shipping on Route 9 is presented in Figure 11.41. It is noted that Route 9 is the coastal alternative to Route 6, with one vessel (*Thames Fisher*) recorded taking both routes during the 28 days of surveying.

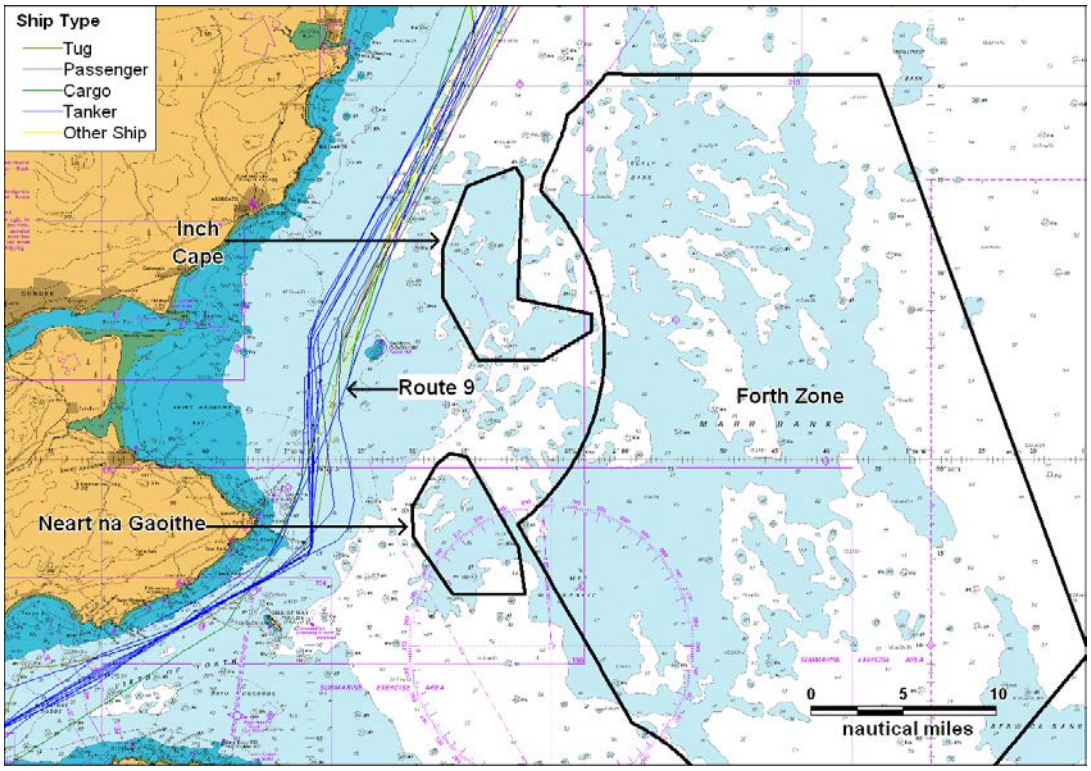

Figure 11.41 Route 9 Shipping Lane with extracted AIS Tracks by Type (28 Days)

Route 9 is used by an average of just over 1 vessel every two days. As noted three tankers operated by BP used this route during part of the data collection period and following March 2010, these vessels were sold.

James Whitaker now operates *Whitstar* which was identified from more recent survey data from 2011 routeing on Route 10 between the Humber and northern Scottish ports including Invergordon, Wick and Scrabster. In addition, James Fisher Everard vessels *Shannon Fisher* and *Thames Fisher* were also recorded using Route 9 on a small number of occasions.

A description of the traffic on this route is given below.

Ship Type:

Vessels are composed of tankers (59%), cargo vessels (18%) other ships/tugs (fisheries protection and offshore support) (17%) and cruise liners (6%).

Destination:

Traffic is mainly heading between the Forth and ports to the north, such as Inverness and Aberdeen.

11.10.1 Ship Size (Length & Draught)

The size of vessels (length and draught) recorded on Route 9 is presented in Figure 11.42 and Figure 11.43.

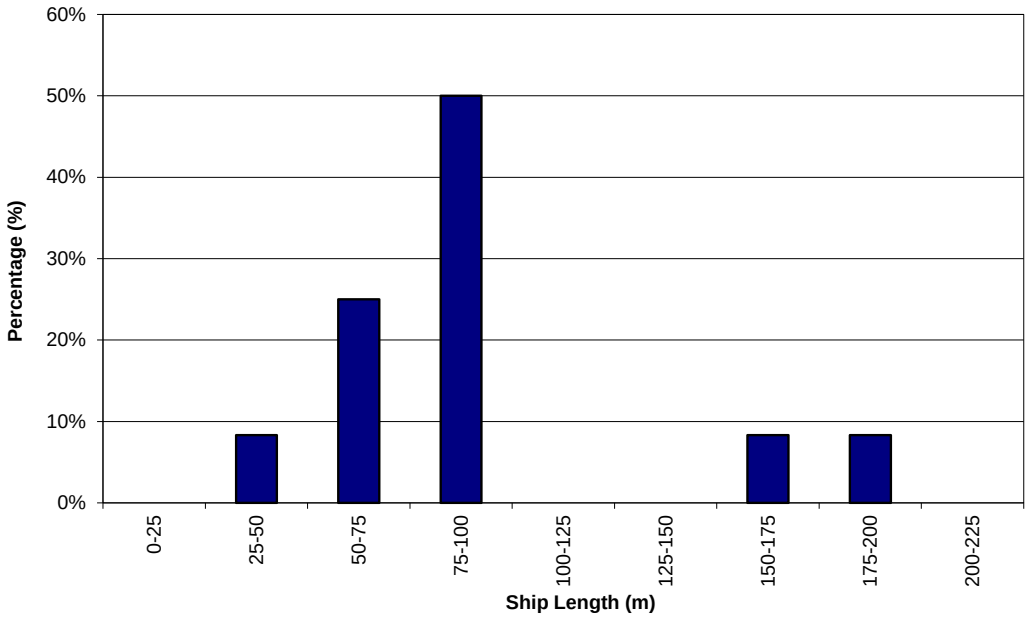

Figure 11.42 Route 9 Ship Length

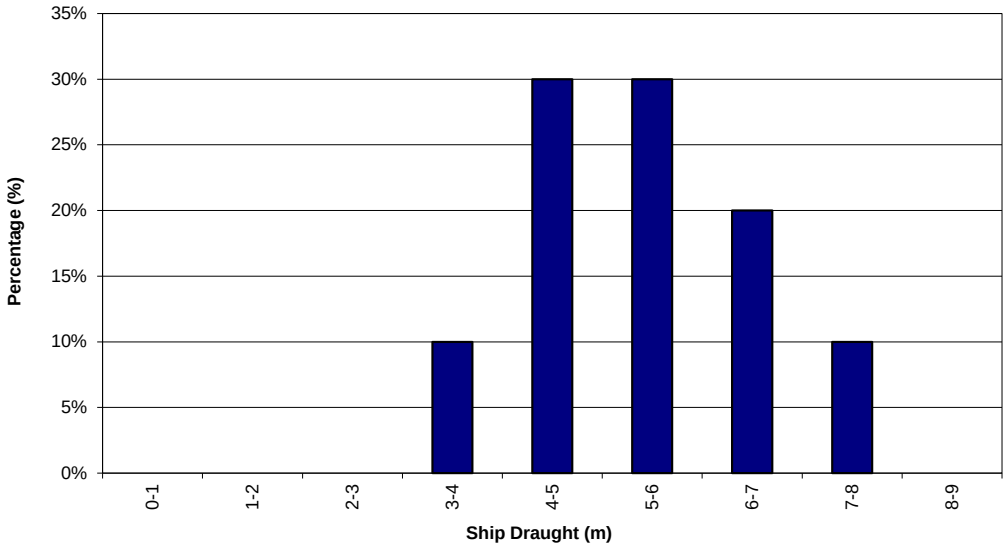

Figure 11.43 Route 9 Reported Ship Draught

The average ship length on Route 9 was 91m, with a draught of 4.5m.

The largest vessel recorded on this route during the 28 day survey period was the bulk carrier *Dmitriy Pozharskiy* 180m in length and draught of 7.1m, recorded heading to Murmansk. A library image of *Dmitriy Pozharskiy* is presented below.

Figure 11.44 Library Image of *Dmitriy Pozharskiy*

11.10.2 Ship Speed

The average speed of vessels recorded on Route 9 is presented in Figure 11.45.

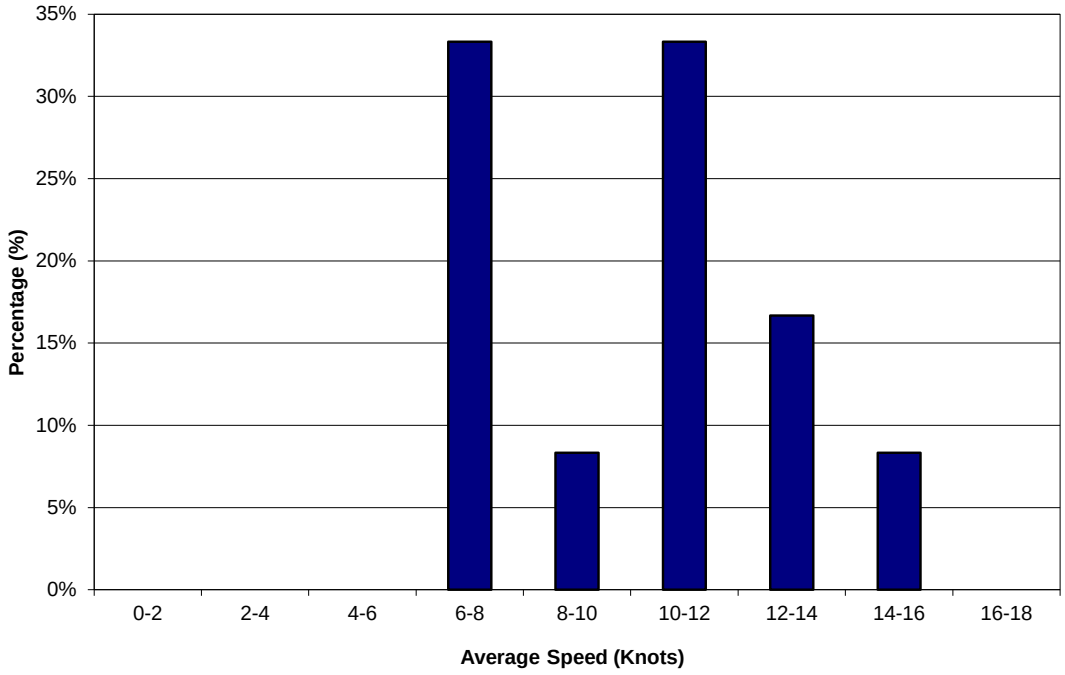

Figure 11.45 Route 9 Average Ship Speed

The average speed of vessels on this route was 10.2 Knots.

11.11 Route 10

A plot of the shipping on Route 10 is presented in Figure 11.46. It is noted that Route 10 is generally used by vessels by-passing Aberdeen; however in some cases northbound traffic may use Route 1 or 3 into Aberdeen and/or head north. Route 10 is also used by vessels travelling south to keep offshore of other routes heading to Aberdeen.

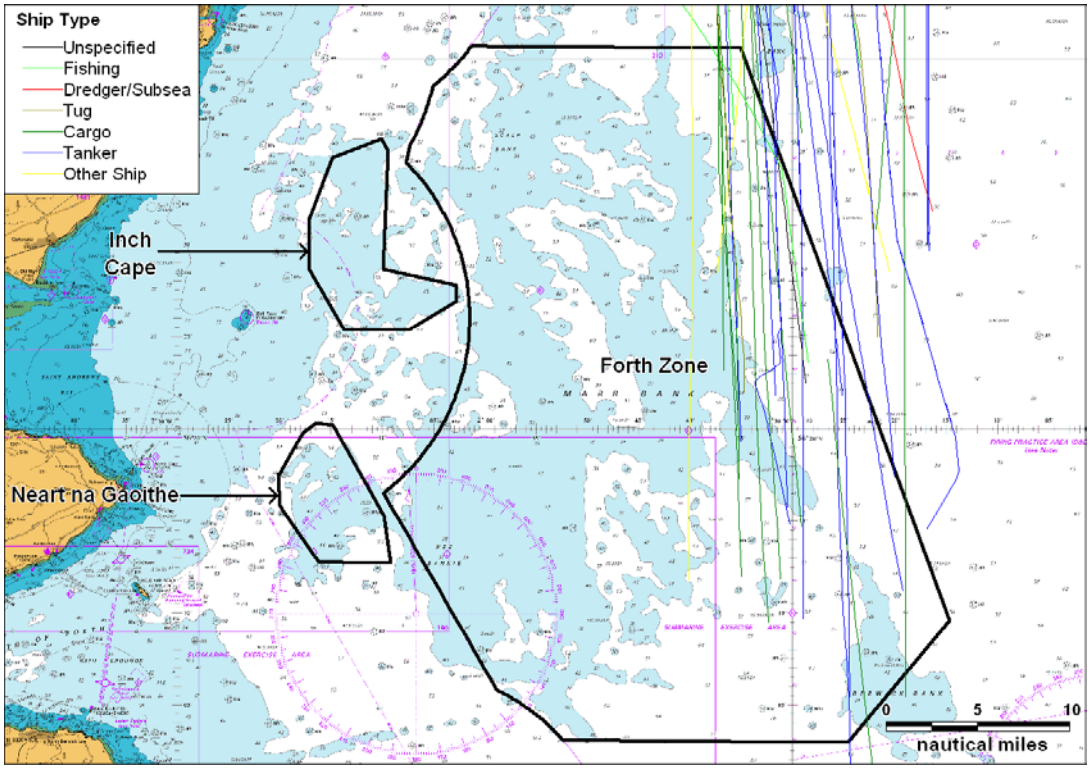

Figure 11.46 Route 10 Shipping Lane with extracted AIS Tracks by Type (28 Days)

Route 10 is used by an average of just over 1 vessel per day. A description of the traffic on this route is given below.

Ship Type

Vessels are composed of tankers (37%), cargo vessels (31%), other ships (research, offshore support and tugs) (17%) and fishing (9%).

Destination:

Ships are heading between northern Scottish ports (i.e. Lerwick, Buckie, Inverness, Kirkwall and Peterhead) and eastern English ports (i.e. Humber, Tyne and Tees).

11.11.1 Ship Size (Length & Draught)

The size of vessels (length and draught) recorded on Route 10 is presented in Figure 11.47and Figure 11.48.

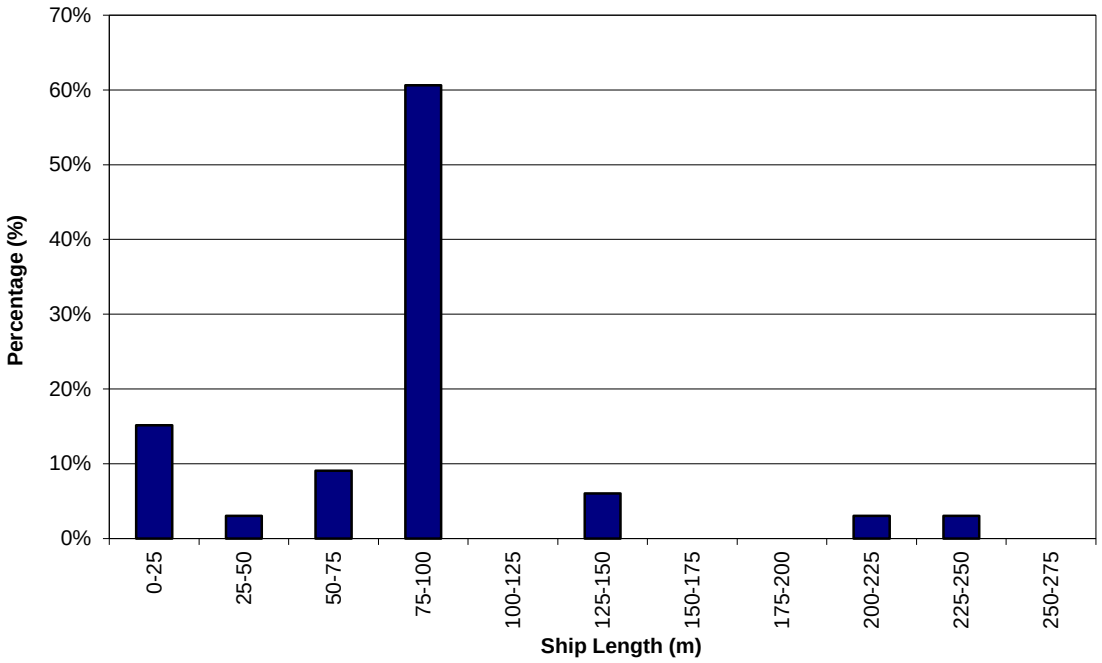

Figure 11.47 Route 10 Ship Length

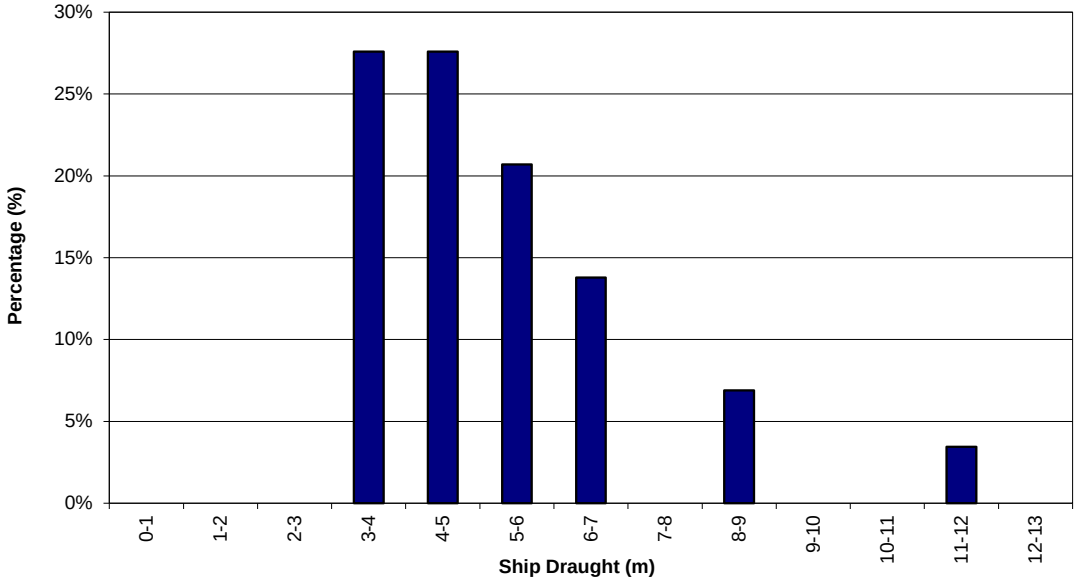

Figure 11.48 Route 10 Reported Ship Draught

The average ship length on Route 10 was 85m, with a draught of 4.6m.

The largest vessel recorded on this route during the 28 day survey period was the crude oil tanker *Thornby* 248m in length and draught of 11.8m, recorded heading to Tranmere. A library image of *Thornby* is presented below.

Figure 11.49 Library Image of *Thornby*

11.11.2 Ship Speed

The average speed of vessels recorded on Route 10 is presented in Figure 11.50.

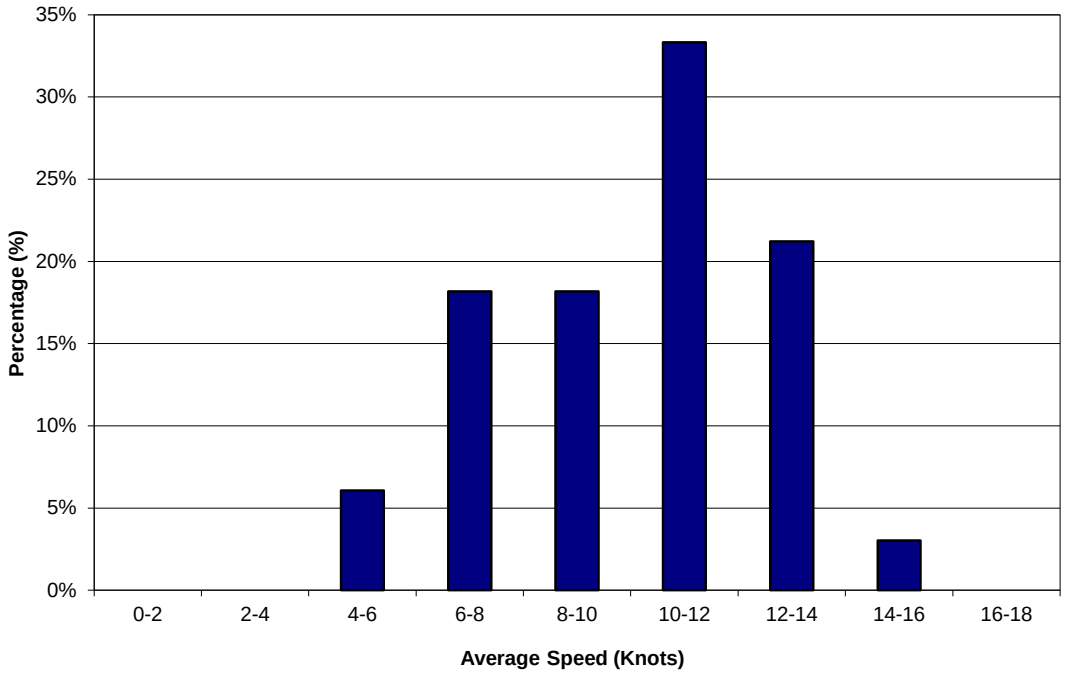

Figure 11.50 Route 10 Average Ship Speed

The average speed of vessels on this route was 10 Knots.

12 ALTERNATIVE ROUTEING

12.1 Introduction

The following section presents an analysis of alternative routeing options for the main shipping lanes identified relative to the outer Forth and Tay developments. The main shipping lanes have been re-routed based on available sea room and Master Mariner experience (Ref. **iv**) and the lowest impact to the route.

12.2 Route 1 and Route 3

These routes are formed by traffic from Aberdeen to Tyne, Tees and the Humber.

12.2.1 Aberdeen to Tyne

The predicted routeing for Aberdeen – Tyne traffic (Route 1) is presented in Figure 12.1 and a detailed plot in Figure 12.2.

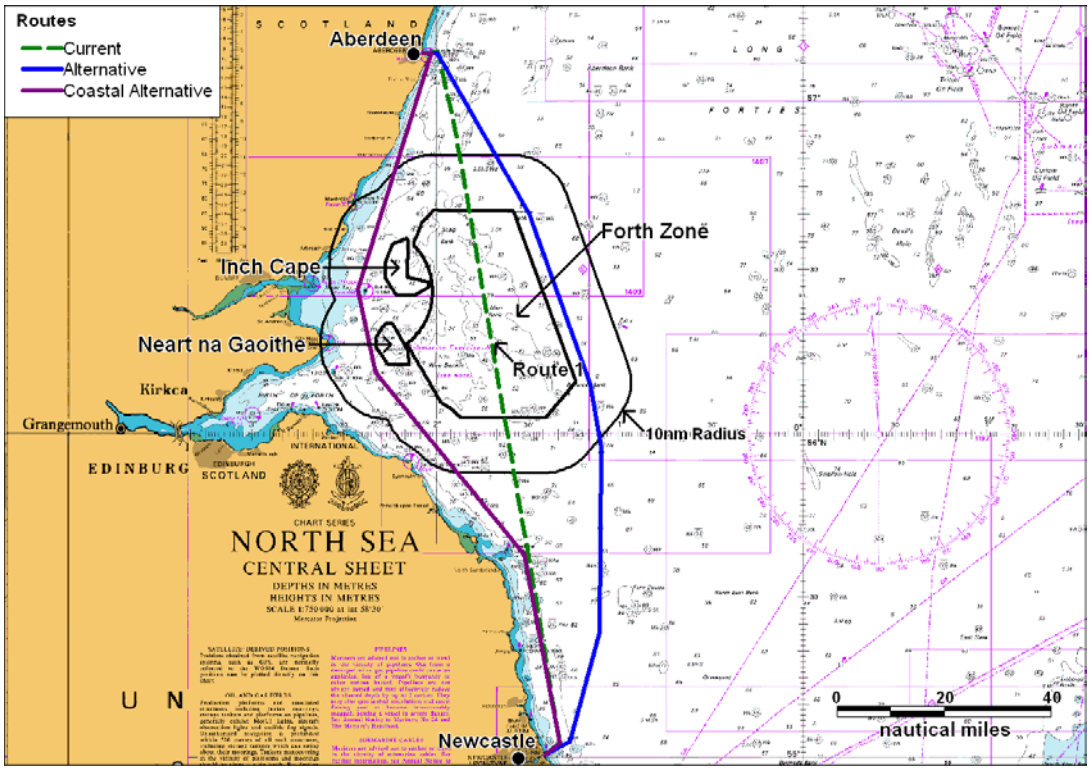

Figure 12.1 Overview Route 1 and Alternatives (Aberdeen – Tyne)

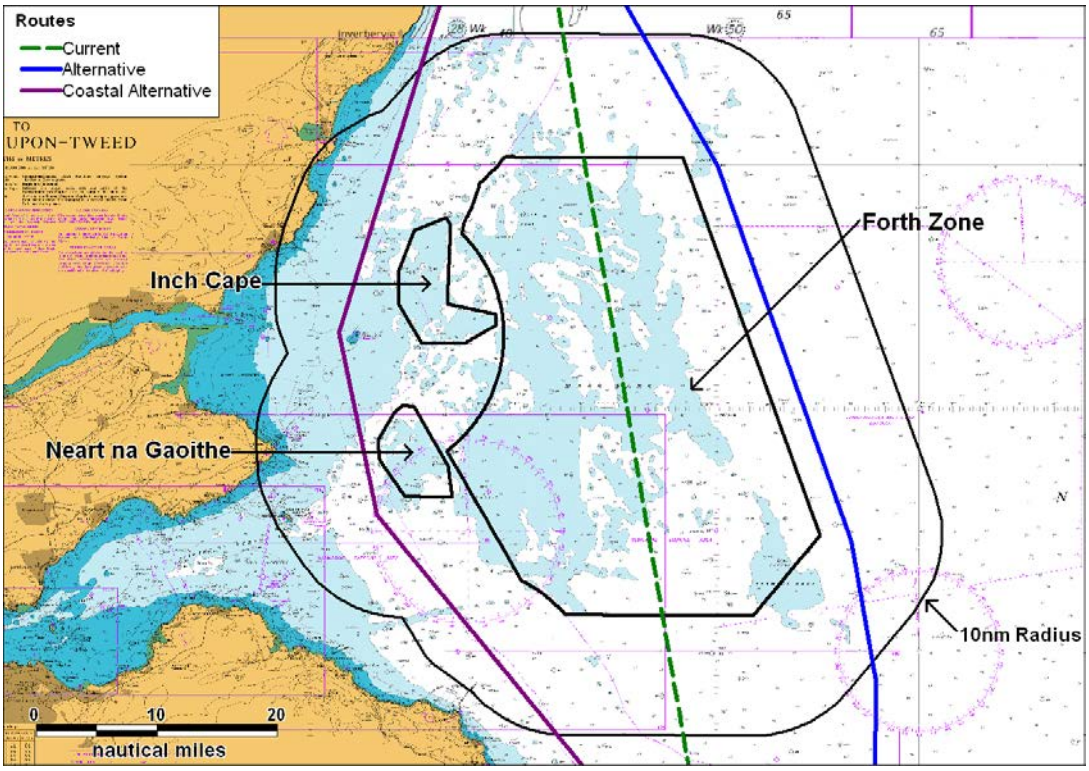

Figure 12.2 Detailed Route 1 Alternatives (Aberdeen – Tyne)

12.2.2 Aberdeen to Tees and Humber

The predicted routeing for Aberdeen – Tees and Humber is presented in Figure 12.3 and Figure 12.4.

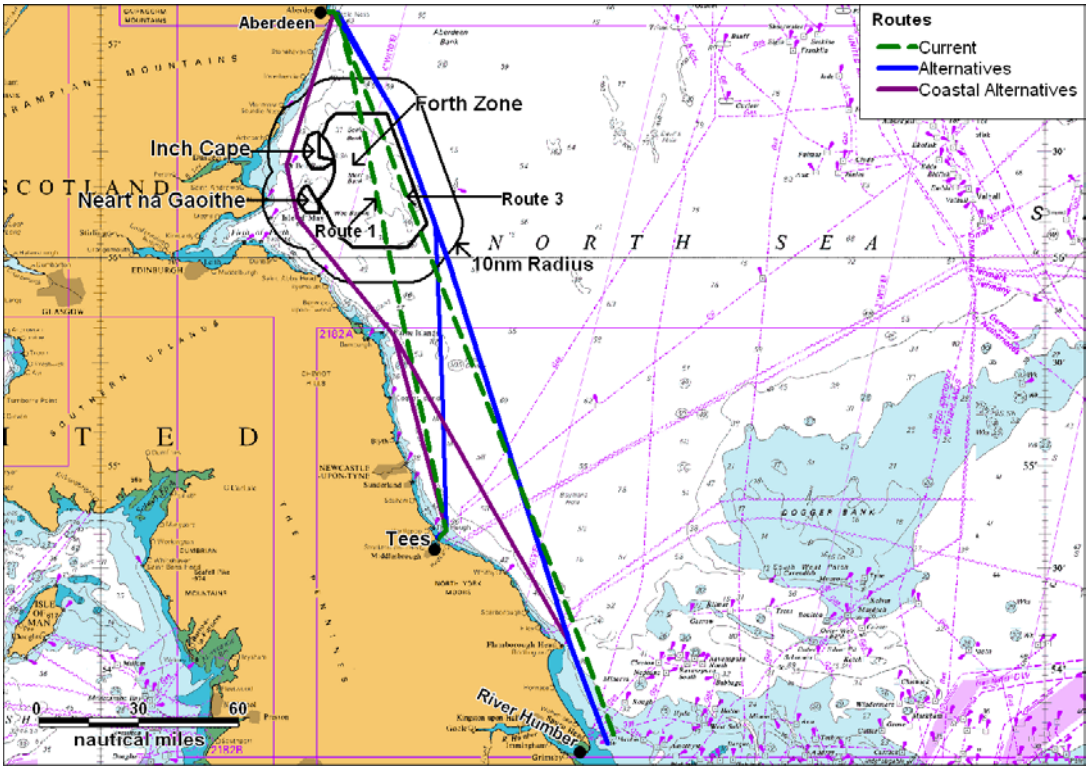

Figure 12.3 Overview Route 1 and Alternatives (Aberdeen – Tyne and Humber)

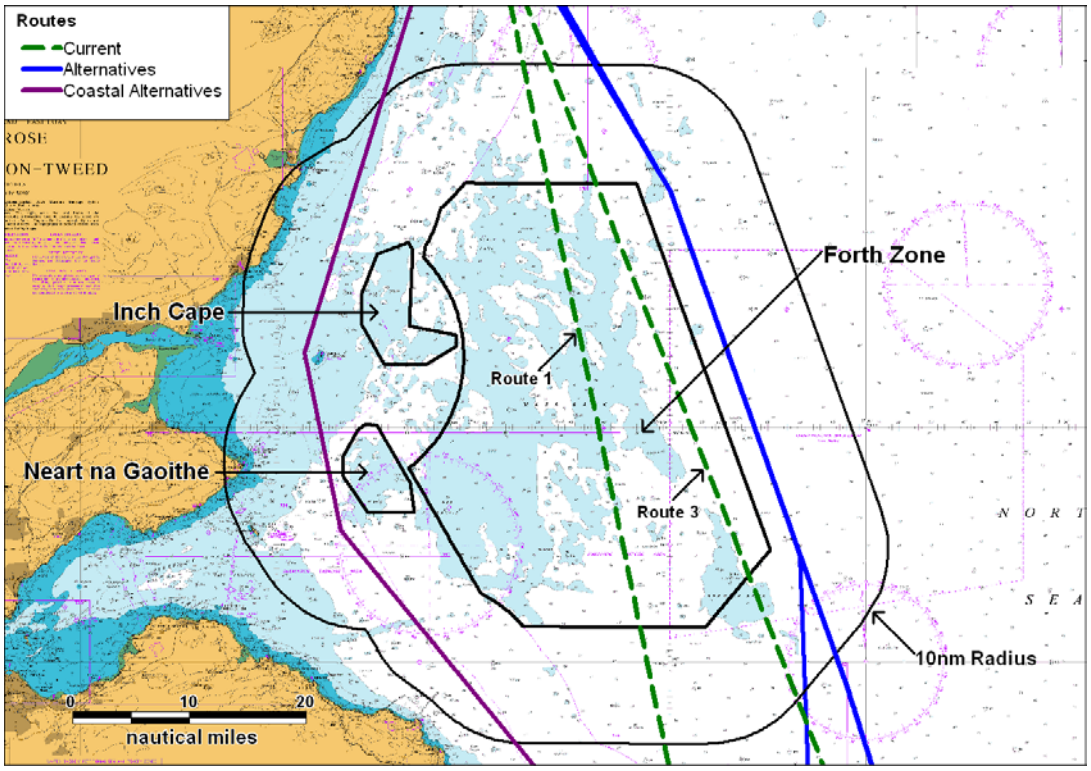

Figure 12.4 Detailed Route 1 Alternatives (Aberdeen – Tyne and Humber)

Table 12.1provides a summary of the predicted future routeing options compared to the current mean routes. For reference the current route lengths are as follows:

Aberdeen / Tyne 134.7nm)
Aberdeen / Tees 156.9nm
Aberdeen / Humber 228.6nm

Table 12.1 Summary of Routeing Options

	Overall Distance (nm)	**Difference in (nm)**	**Difference (%)**	**Change in Time for Average Speed Vessel (8.5knots)**
Aberdeen / Tyne (East of sites)	141.1	+6.4	+4.8%	+45mins
Aberdeen / Tyne (Coastal)	144	+9.3	+6.9%	+1Hr 5mins
Aberdeen / Tees (East of sites)	160.3	+0.4	+0.3%	+3mins
Aberdeen / Tees (Coastal)	167	+10.1	+6.0%	+1Hr 11mins
Aberdeen / Humber (East of sites)	228.8	+0.2	+0.09%	+1 to 2mins
Aberdeen / Humber (Coastal)	241.1	+12.5	+5.5%	+1Hr 28mins

Key points for Alternatives:

Traffic passing to the East of the developments en route between Aberdeen and Tees/Humber will be relatively unaffected by the proposed developments. Smaller craft wishing to use the inshore routes can continue to do so; however the coastal Route options may require larger deviations.

Similar conclusions are drawn for the Aberdeen/Tyne route, although shipping will experience a more significant increase in voyage distance and time. It is noted that this is a very low use route compared to the Aberdeen Tees/Humber routes.

12.3 Route 2

The current routeing for Route 2 is presented as an overview in Figure 12.5 and detailed plot in Figure 12.6.

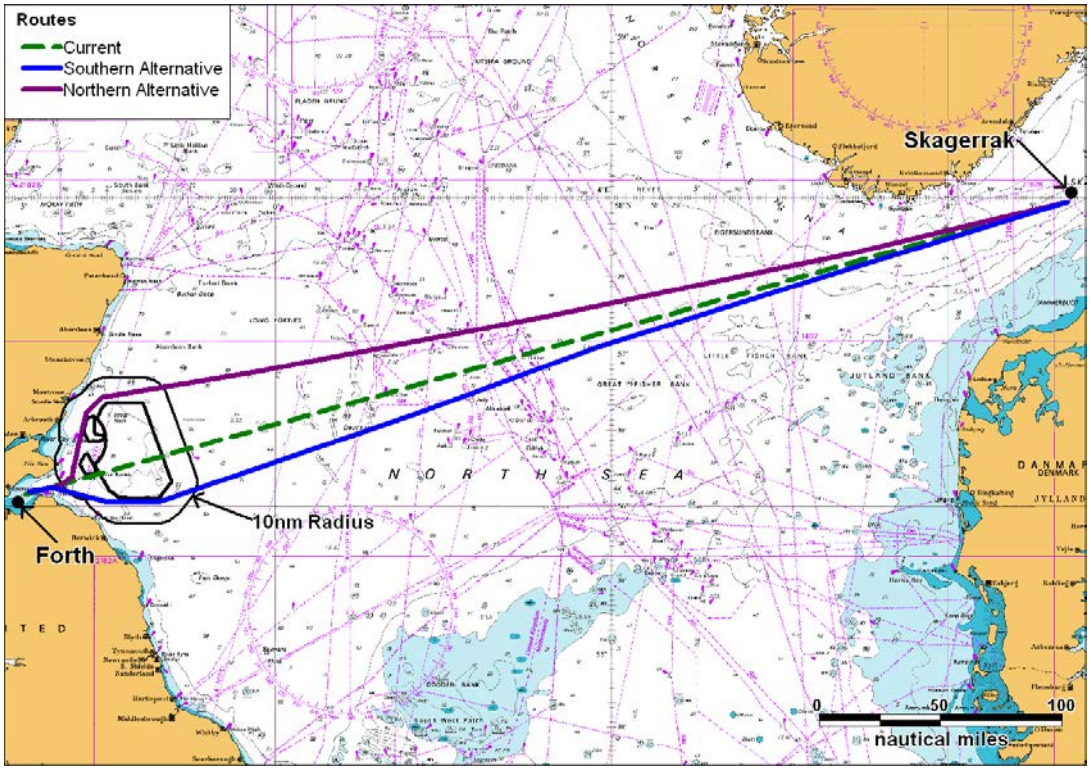

Figure 12.5 Overview Route 2 and Alternatives (Forth – Skagerrak)

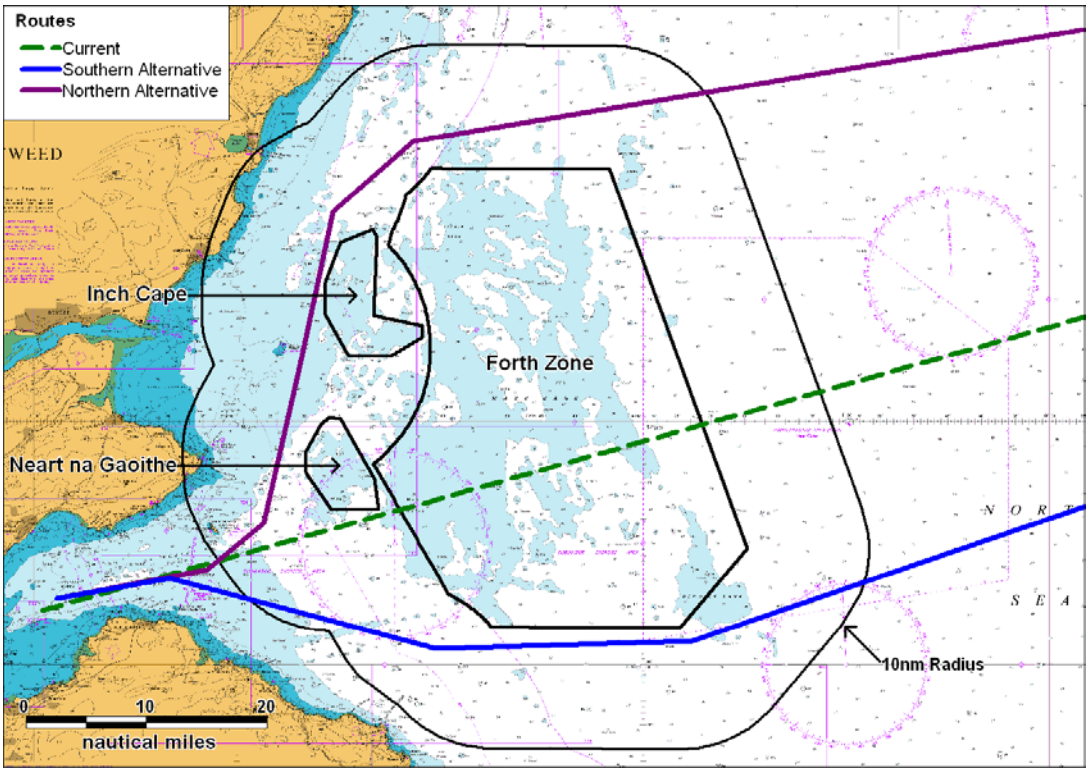

Figure 12.6 Detailed Route 2 Alternatives (Forth – Skagerrak)

At present this route is 421nm in length. Table 12.2provides a summary of the predicted future routeing options compared to the current mean routes.

Table 12.2 Summary of Routeing Options

	Overall Distance (nm)	Difference in (nm)	Difference (%)	Change in Time for Average Speed Vessel (11.9knots)
Forth / Skagerrak (South)	425	+4.1	+1%	+21mins
Forth / Skagerrak (North)	433.7	+12.8	+3%	+1Hr 5mins

Key points for Route 2 Options:

The southern route is shorter and is therefore likely to have lower commercial impact on vessels in terms of time and fuel costs. The northern route requires a slightly larger deviation and takes the vessels inshore of the sites, passing Bell Rock.

12.4 Route 4

The current mean route and predicted routeing for Route 4 is presented as an overview in Figure 12.7 and detailed plot in Figure 12.8. It is noted that two alternative routes are presented for Montrose – Holland traffic.

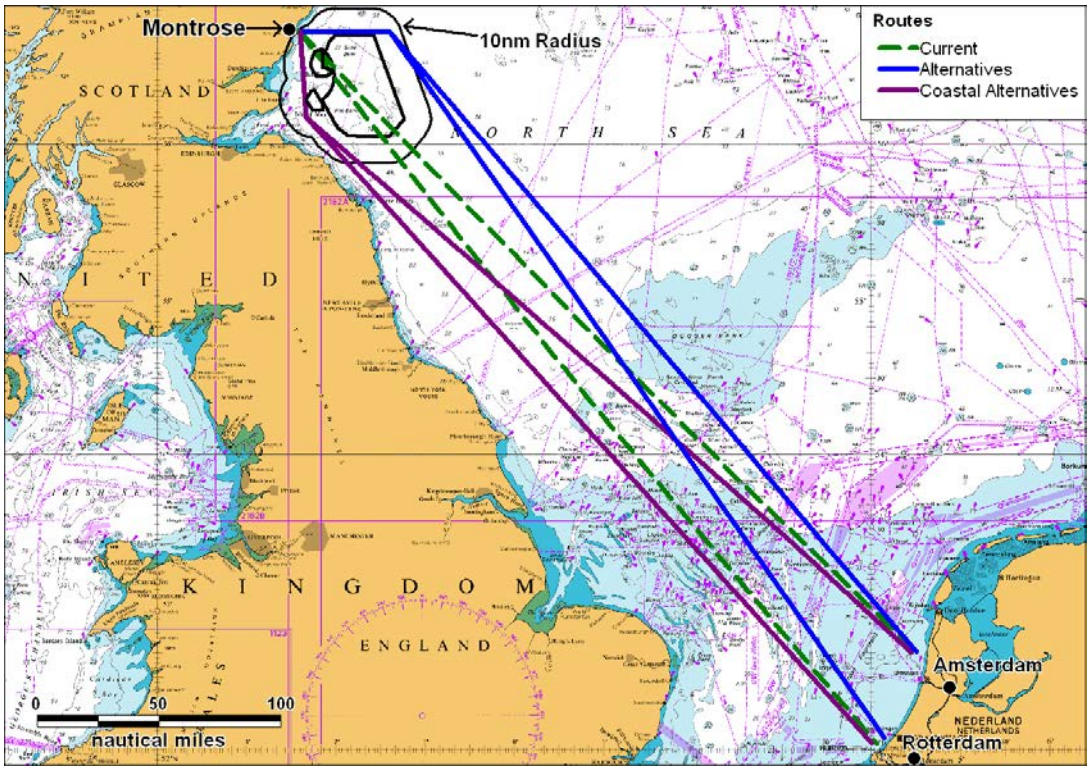

Figure 12.7 Overview Route 4 and Alternatives (Montrose – Amsterdam/Rotterdam)

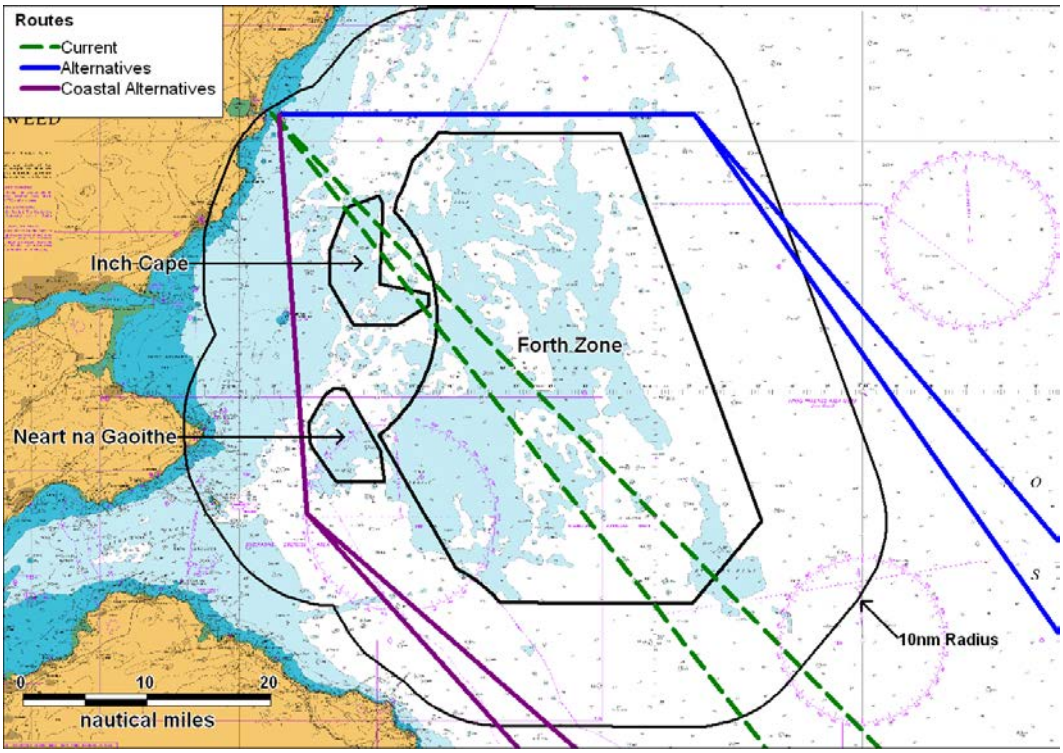

Figure 12.8 Detailed Route 4 Alternatives (Montrose – Amsterdam/Rotterdam)

The current distance of the route between Montrose and Amsterdam is 341nm and for vessels headed to Rotterdam is 360nm. The following table provides a summary of the predicted future routeing options compared to the current mean routes.

Table 12.3 Summary of Routeing Options

	Overall Distance (nm)	**Difference in (nm)**	**Difference (%)**	**Change in Time for Average Speed Vessel (8.7knots)**
Montrose / Amsterdam eastern option	349.9	+8.9	+2.6%	+1Hr 1mins
Montrose / Amsterdam (Coastal)	348.7	+7.7	+2.3%	+53mins
Montrose / Rotterdam Eastern option	371.5	+11.2	+3.1%	+1Hr 17mins
Montrose / Rotterdam (Coastal)	365.1	+4.8	+1.3%	+33mins

Key points for Route 4 Options:

Both alternative routes are very comparable, with the main factor influencing the choice being whether the Master has a preference for inshore routeing. It is noted that other offshore developments such as Hornsea and East Anglia and mainland European developments are likely to impact these routes.

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12.5 Route 5

The current mean route and predicted routeing for Route(s) 5 is presented in Figure 12.9 to Figure 12.11.

12.5.1 Tay to Skagerrak

The first route presented is for vessels travelling from the Tay to the Skagerrak.

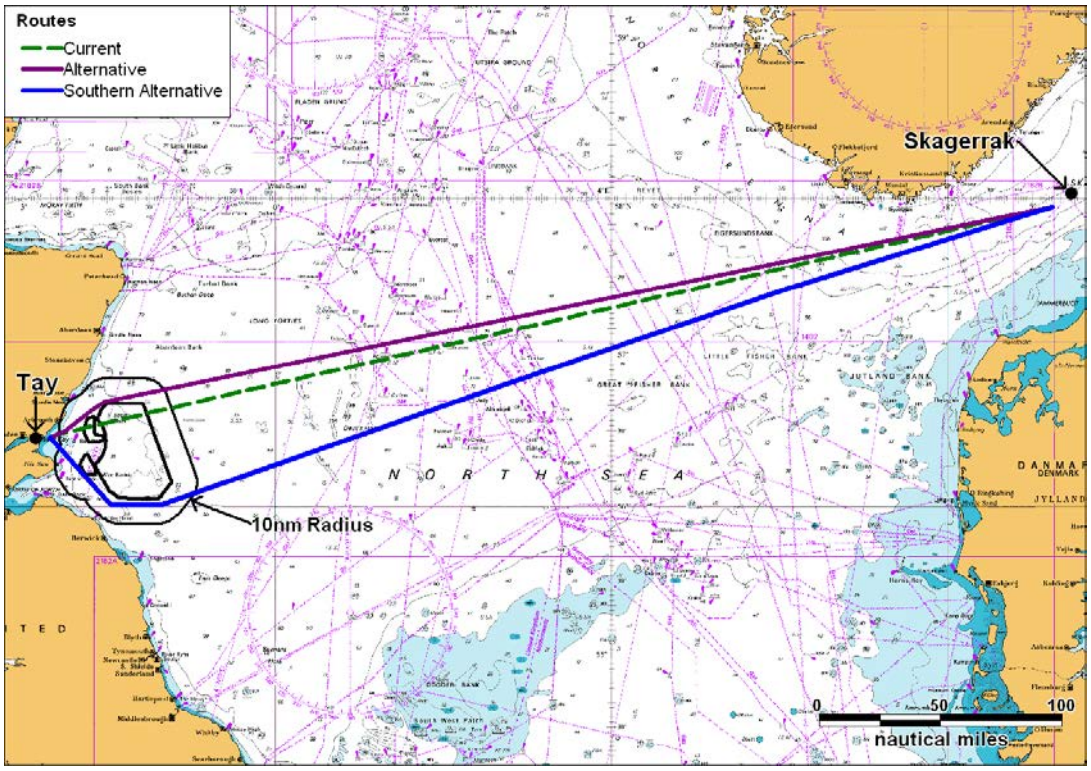

Figure 12.9 Overview Route 5 and Alternatives (Tay – Skagerrak)

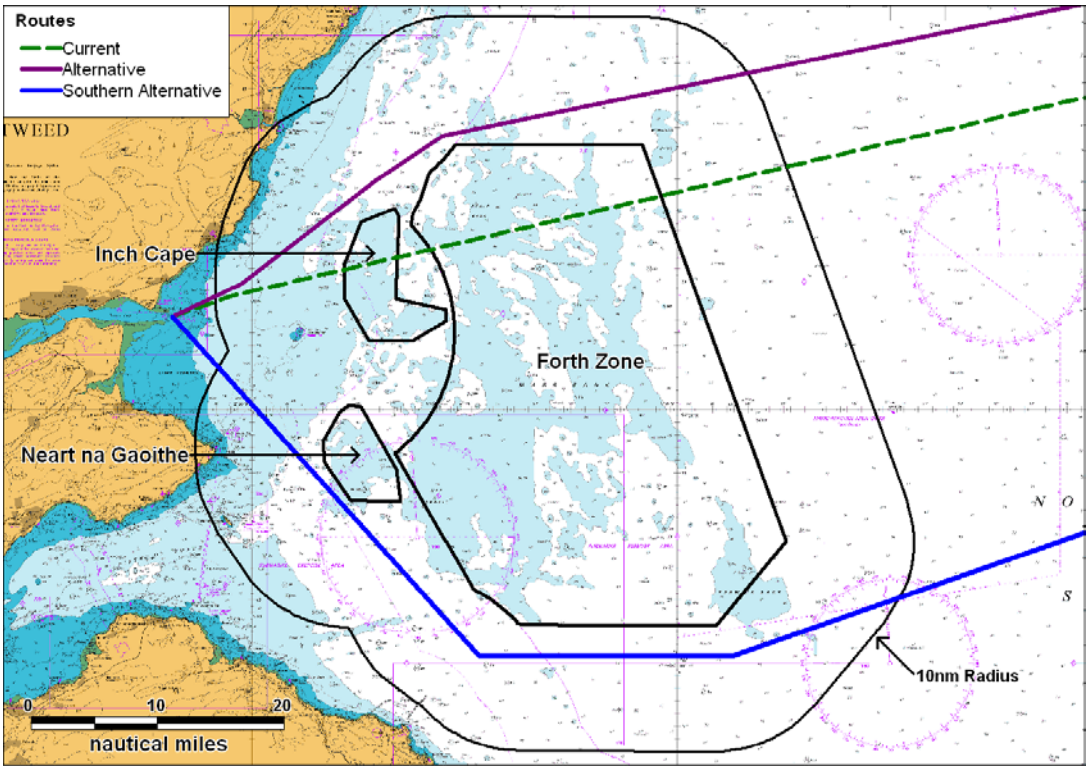

Figure 12.10 Detailed Route 5 Alternatives (Tay – Skagerrak)

12.5.2 Tay to Offshore Field (Franklin)

Vessels using Route 5 were also recorded heading to North Sea offshore platforms. Franklin Oil Field was used as the main destination for this study.

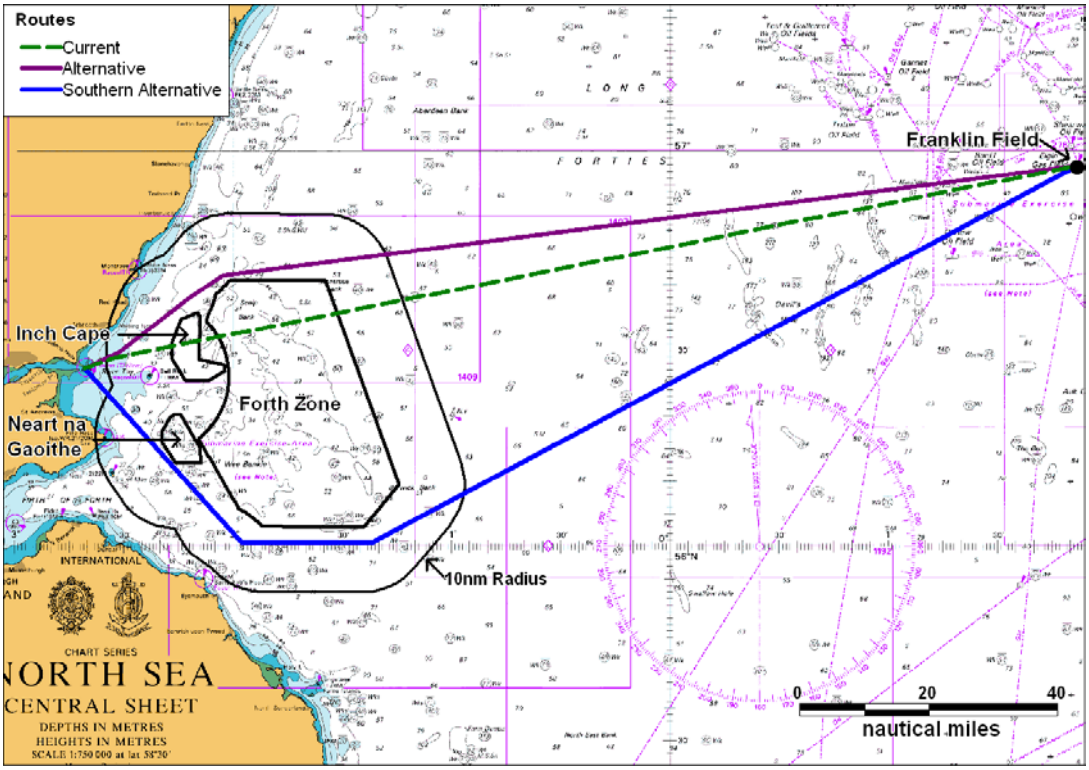

Figure 12.11 Route 5 and Alternatives (Tay – Franklin Field)

Table 12.4 provides a summary of the predicted future routeing options compared to the current mean route. For reference the current route lengths are as follows:

Tay / Skagerrak 398 nm
Tay / Franklin Field 153 nm

Table 12.4 Summary of Routeing Options

	Overall Distance (nm)	**Difference in (nm)**	**Difference (%)**	**Change in Time for Average Speed Vessel (9.5knots)**
Tay / Skagerrak (northern option)	398.8	+0.7	+0.2%	+4mins
Tay / Skagerrak southern option	421.9	+23.8	+6%	+2Hrs 30mins
Tay / Franklin Field (northern option)	155.3	+2	+1.3%	+13mins
Tay / Franklin Field southern option	177.8	+24.5	+16%	+2Hrs 34mins

Key points for Route 5 Options:

For both routes from the Tay to Skagerrak and Franklin field the northern alternative requires less deviation from the original route. It is considered very unlikely that the southern route would be adopted following development of the three sites.

12.6 Route 6 and Route 9

The current mean route and predicted routeing for Route 6 and the coastal alternative (Route 9) is presented as an overview in Figure 12.12 and detailed plot in Figure 12.13.

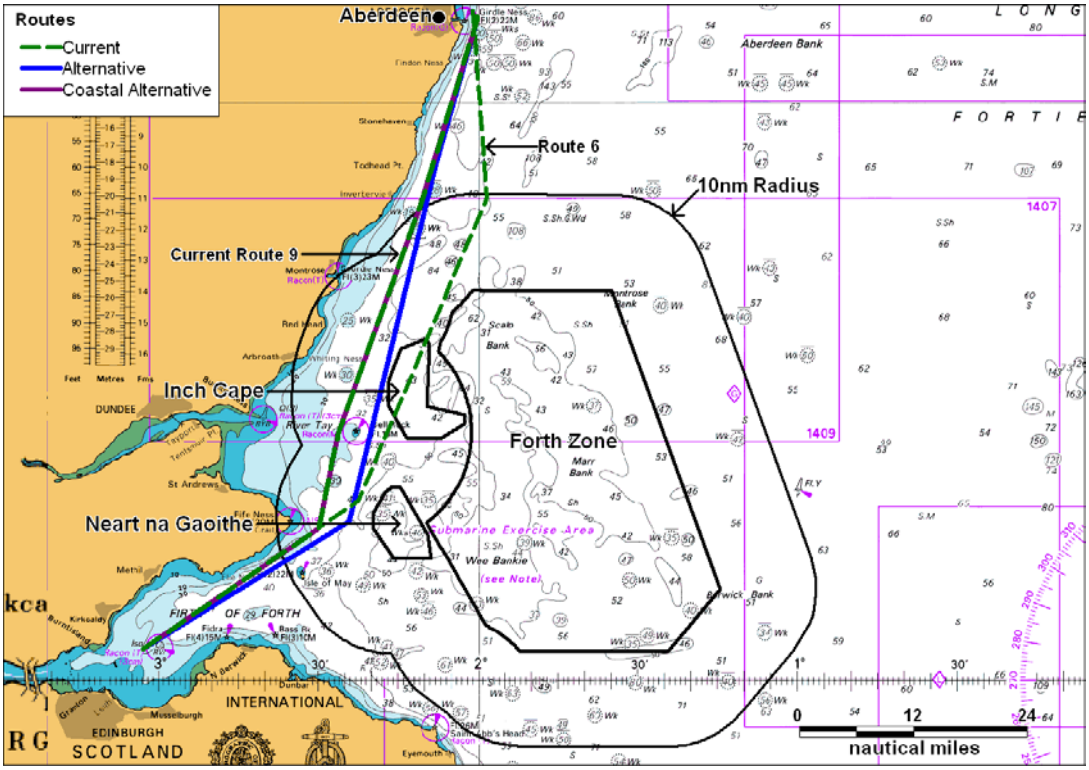

Figure 12.12 Overview Route 6 and 9 and Alternatives (Aberdeen – Forth)

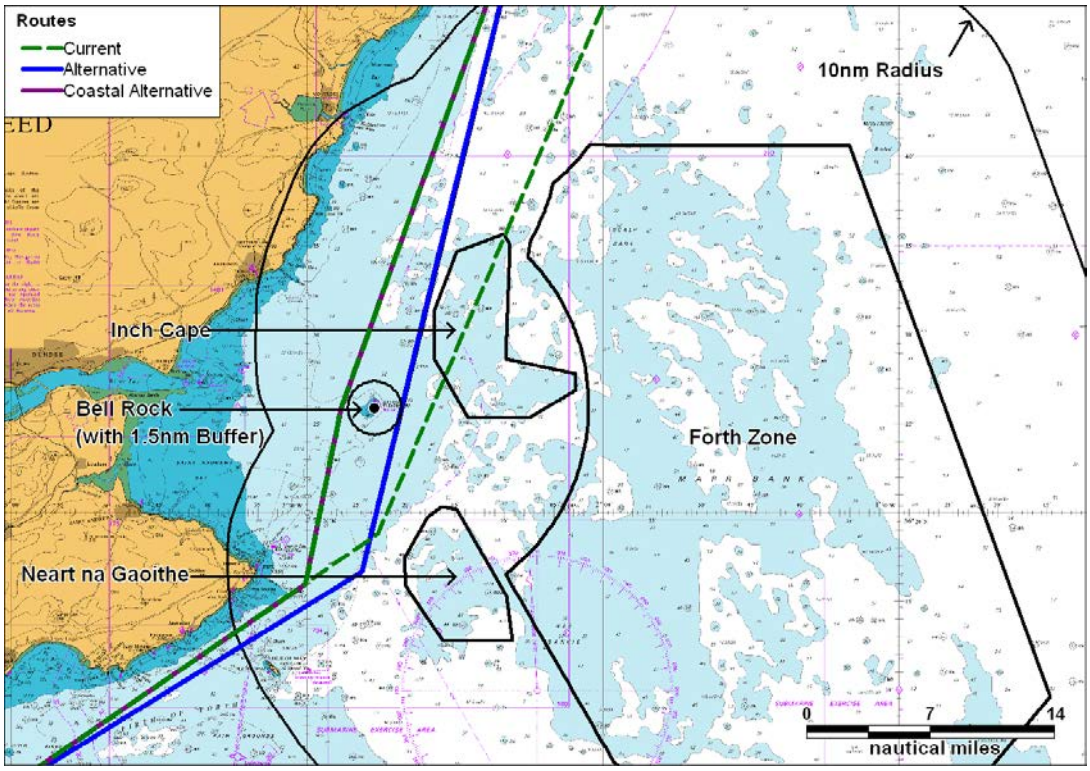

Figure 12.13 Detailed Route 6 (9) Alternatives (Aberdeen – Forth)

The current length of this route is 81.3 nm. Table 12.5provides a summary of the predicted future routeing options compared to the current mean route.

Table 12.5 Summary of Routeing Options

	Overall Distance (nm)	**Difference in (nm)**	**Difference (%)**	**Change in Time for Average Speed Vessel (10.9knots)**
Aberdeen / Forth east of Bell Rock (Route 6)	79.3	-2	-2.5%	-11mins
Aberdeen / Forth west of Bell Rock (Route 9)	No Change	No Change	- No Change	No Change

Key points for Route Options:

The routeing taken by vessels using Route 9 will be unaffected by the regional proposals. Vessels using Route 6 will migrate to the west taking vessels closer to Bell Rock. However, it should be noted that overall there could be a reduction in mileage for vessels using Route 6.

12.7 Route 7

The current mean route for Route 7 is not anticipated to change following development of the region. Figure 12.14 presents an overview of the route based on the most common destination (Ports in Holland including Amsterdam and Rotterdam).

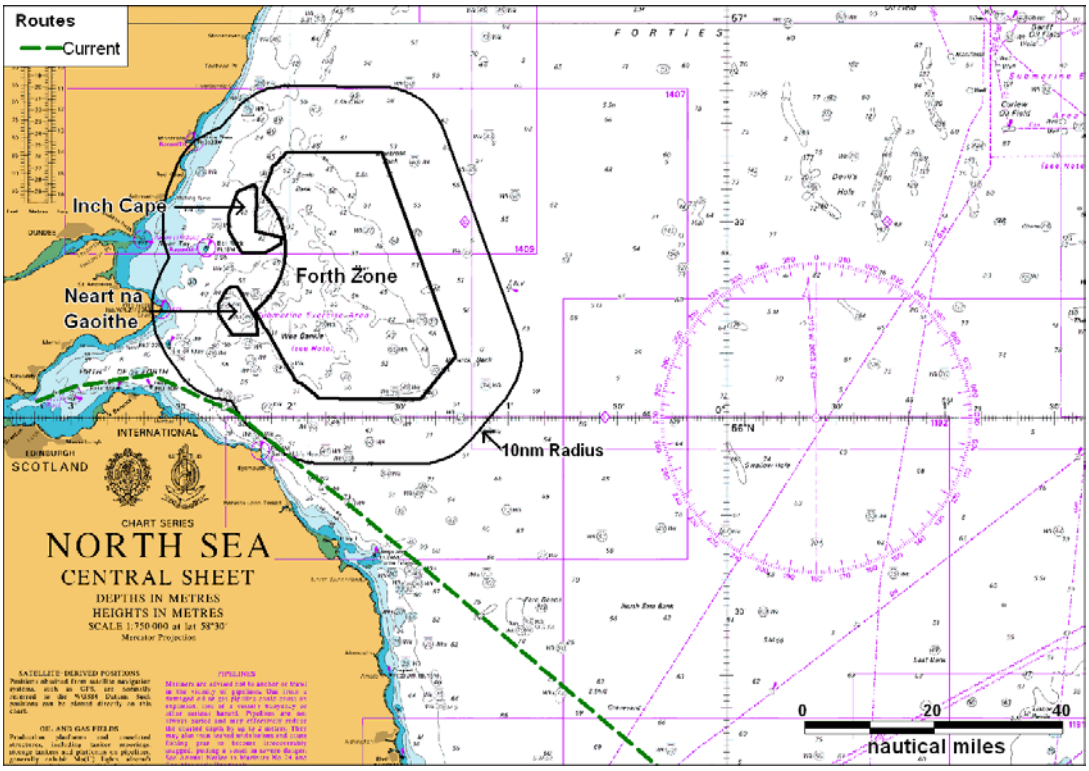

Figure 12.14 Overview Route 7 (Forth – Holland)

It can be observed that vessels will continue to route approximately 10nm from the Neart na Gaoithe and Forth sites and therefore are likely to be unaffected by the regional proposals in the outer Forth.

As noted for Route 4 the other Round 3 offshore developments such as Hornsea and East Anglia and mainland European developments are likely to impact these routes.

12.8 Route 8

The current mean route and predicted routeing for Route 8 is presented as an overview in Figure 12.15 and detailed plot in Figure 12.16.

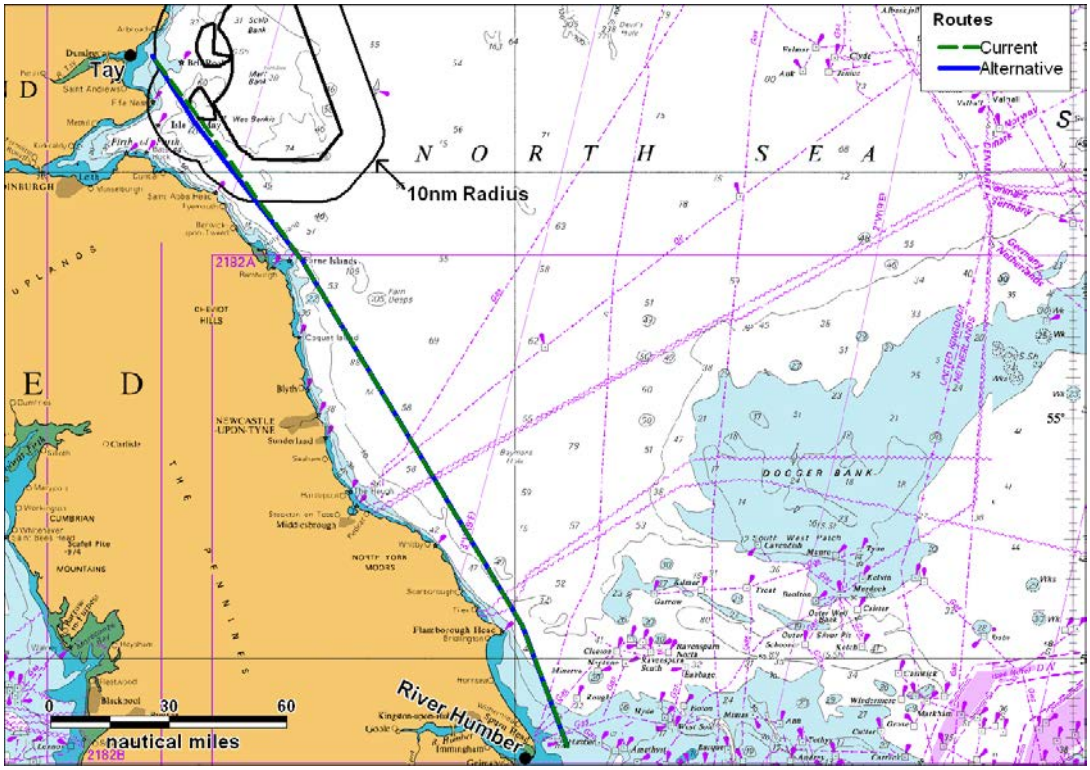

Figure 12.15 Overview Route 8 and Alternatives (Tay – Humber)

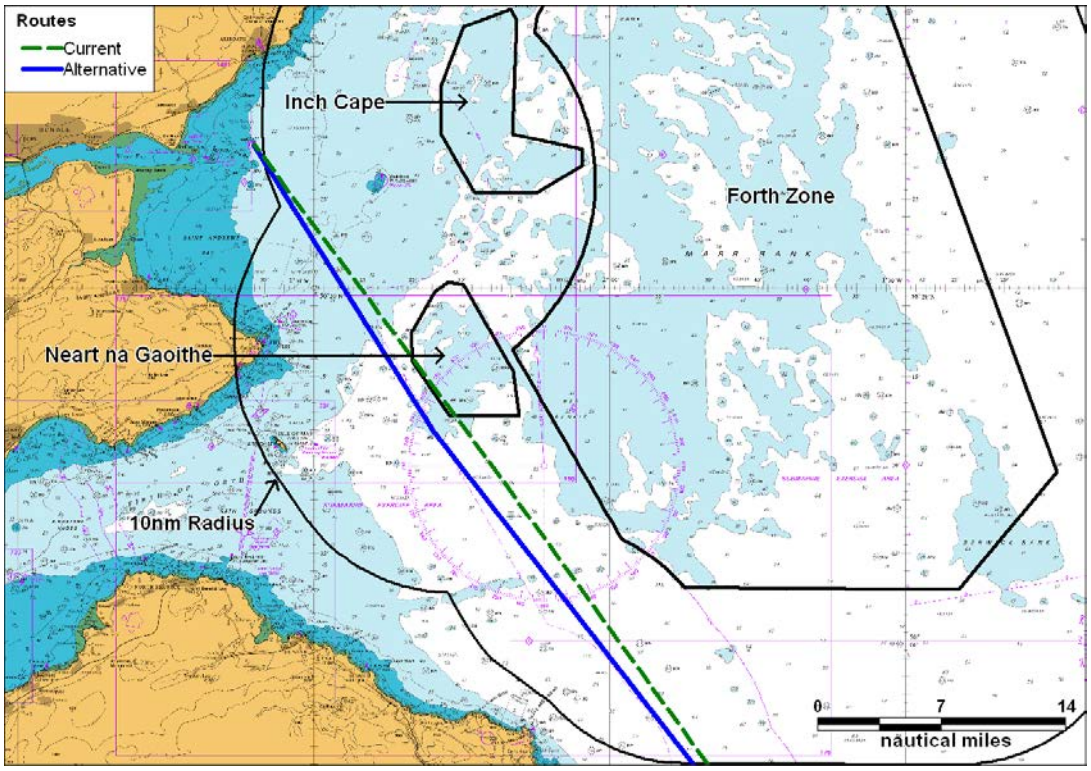

Figure 12.16 Detailed Route 8 Alternatives (Tay – Humber)

The current length of this route is 199.6 nm. Table 12.6provides a summary of the predicted future routeing options compared to the current mean route.

Table 12.6 Summary of Routeing Options

	Overall Distance (nm)	**Difference in (nm)**	**Difference (%)**	**Change in Time for Average Speed Vessel (9.5knots)**
Tay / Humber west of Inch Cape	199.7	~0.1	~0.05%	+/-1min

Key points for Route 8 Options:

Vessels heading between the Tay and Humber are likely to route west of Neart na Gaoithe, with a negligible deviation from the original route.

12.9 Route 10

The current mean route and predicted routeing for Route 10 is presented as an overview in Figure 12.17 and detailed plot in Figure 12.18.

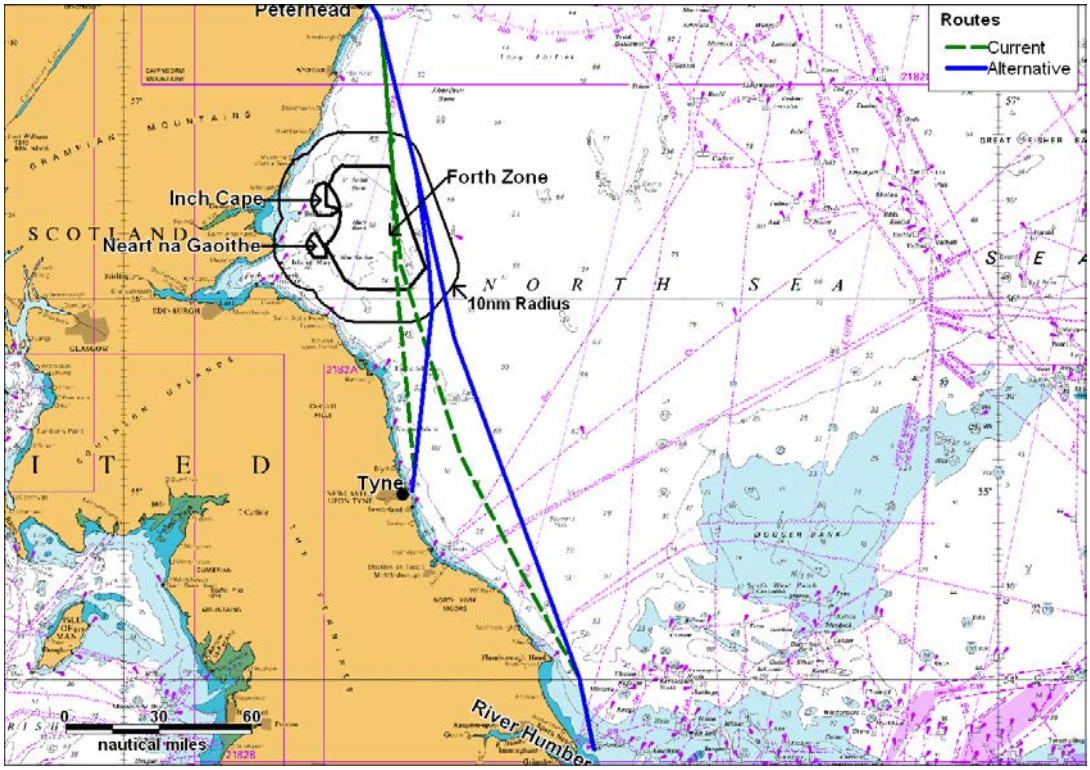

Figure 12.17 Overview Route 10 and Alternatives (Peterhead – Tyne/Humber)

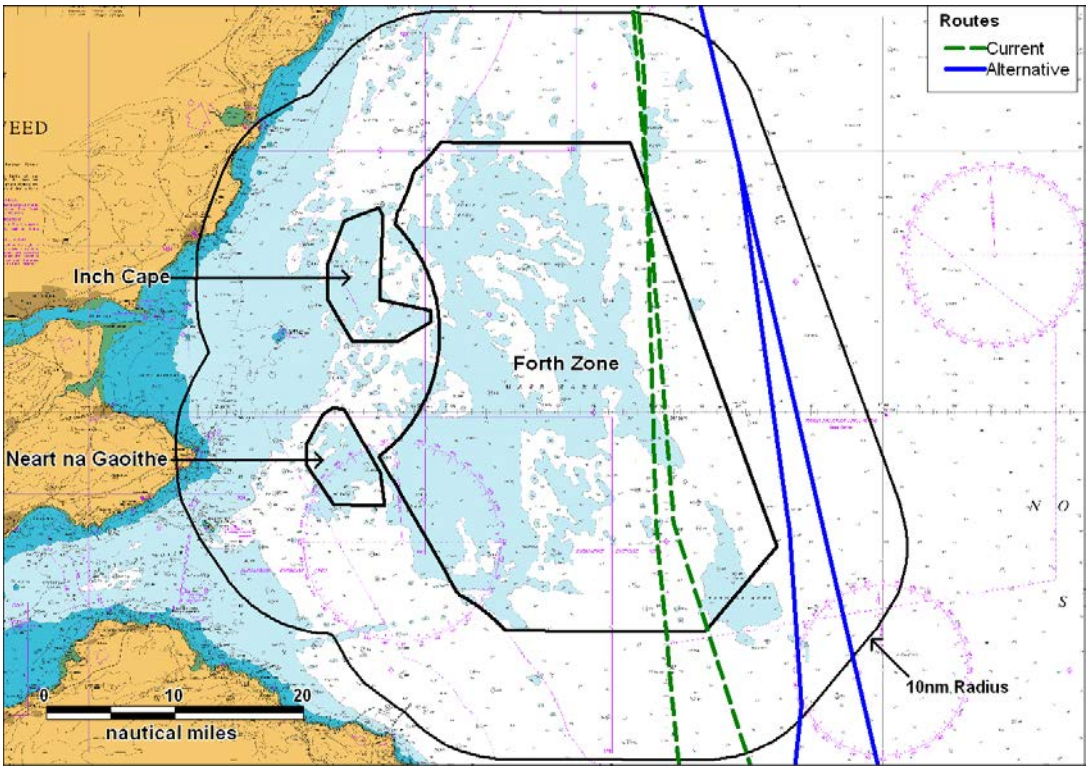

Figure 12.18 Detailed Route 10 Alternatives (Peterhead – Tyne/Humber)

Table 12.7provides a summary of the predicted future routeing options compared to the current mean route. For reference the current route lengths are as follows:

Peterhead / Humber 246.6 nm
Peterhead / Tyne 153 nm

Table 12.7 Summary of Routeing Options

	Overall Distance (nm)	**Difference in (nm)**	**Difference (%)**	**Change in Time for Average Speed Vessel (10knots)**
Peterhead / Humber	243.2	-3.4	-1.4%	-20min
Peterhead / Tyne	152.2	+15	+0.7%	+7mins

Key points for Route Options:

Vessels heading between the Peterhead and Humber could marginally reduce voyage distance. Vessels heading between the Peterhead and Tyne require a small deviation when routeing east of the developments.

12.10 Summary

12.10.1 Routes 1/3 and 10

It is likely that shipping using Route 1, 3 and 10 will navigate east of the Round 3 Zone boundary on a combined route. The average ships per day on the combined route would be approximately 3 to 4. The impact on vessels using the eastern route would be low for the majority of vessels (i.e. < +7 minutes); however the small number of ships routeing between Aberdeen and Tyne could require an average 45 minute deviation. It is noted that the levels of shipping on this route are very low and that they were not tracked within the 28 days of survey data.

12.10.2 Route 2

It is likely that shipping using Route 2 will navigate south of Neart na Gaoithe and the Round 3 Zone, requiring an approximate 20 minute deviation from normal routeing.

12.10.3 Route 4

There are two alternative options to this route, coastal and east of the developments. Routes taken will be decided by the Master and will probably be most influenced by familiarity, ship size and weather conditions. Overall, approximately 1 hour will be added to voyage time.

12.10.4 Route 5

Shipping using Route 5 is likely to navigate north of Inch Cape and the Round 3 Zone. This would require a minor deviation from the current route with traffic bound for offshore platforms and the Skagerrak incurring approximately 15 minutes to the average voyage.

12.10.5 Route 6 and Route 9

Shipping using Route 6 will navigate west of Inch Cape and Neart na Gaoithe. As a portion of vessels on this route are over 100m in length and have deeper draughts (~6m), larger ships are likely to navigate east of Bell Rock and Isle of May. Smaller vessels are more likely to take the coastal route combining with traffic on Route 9. Where Routes 6 & 9 overlap, there will be an increase in the number of vessels on the route with just over 2 ships per day. The change in voyage time is negligible.

12.10.6 Route 7

Shipping using Route 7 is likely to unaffected by developments within the region as shipping currently passes the developments at a safe distance of approximately 10nm.

12.10.7 Route 8

Shipping using Route 8 is likely to navigate south of Neart na Gaoithe, requiring a minor deviation from the current route.

12.10.8 Revised Routeing Summary

Figure 12.19 presents a summary of the predicted 90 percentile routeing following development of the projects.

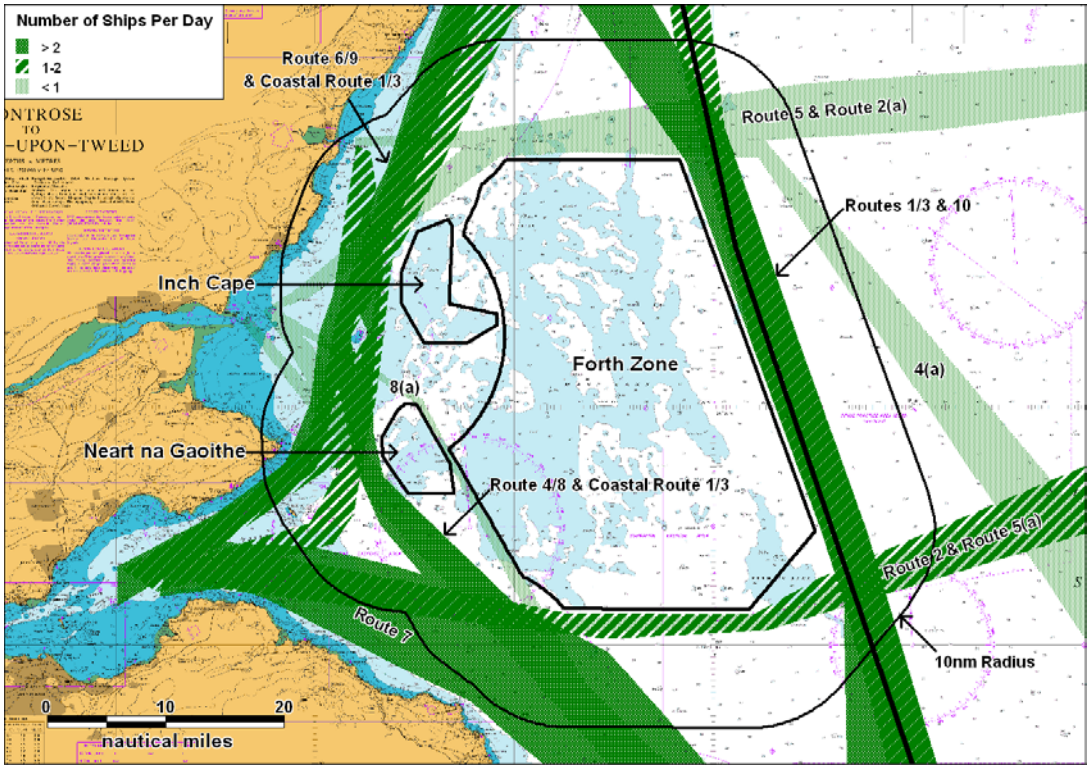

Figure 12.19 Overview of Anticipated Lanes following Development of the Region

13 SIMULATED CHANGE IN SHIPPING

13.1 Introduction

This section presents an analysis ship track prediction results. Ship tracks were predicted based on the revised routeing presented in Section12).

In general it is considered that vessels passing 2nm outside the three developments will not be directly impacted in terms of re-routeing. There is potential for an increase in ship-to-ship encounters in the areas where shipping has been displaced, however daily plots are presented to show that shipping levels are relatively low and the likelihood of a close encounter is considered to be small.

13.2 Pre-Development

Figure 13.1 presents a plot of the existing shipping tracks based on 28 days of AIS survey data covering seasonal fluctuation.

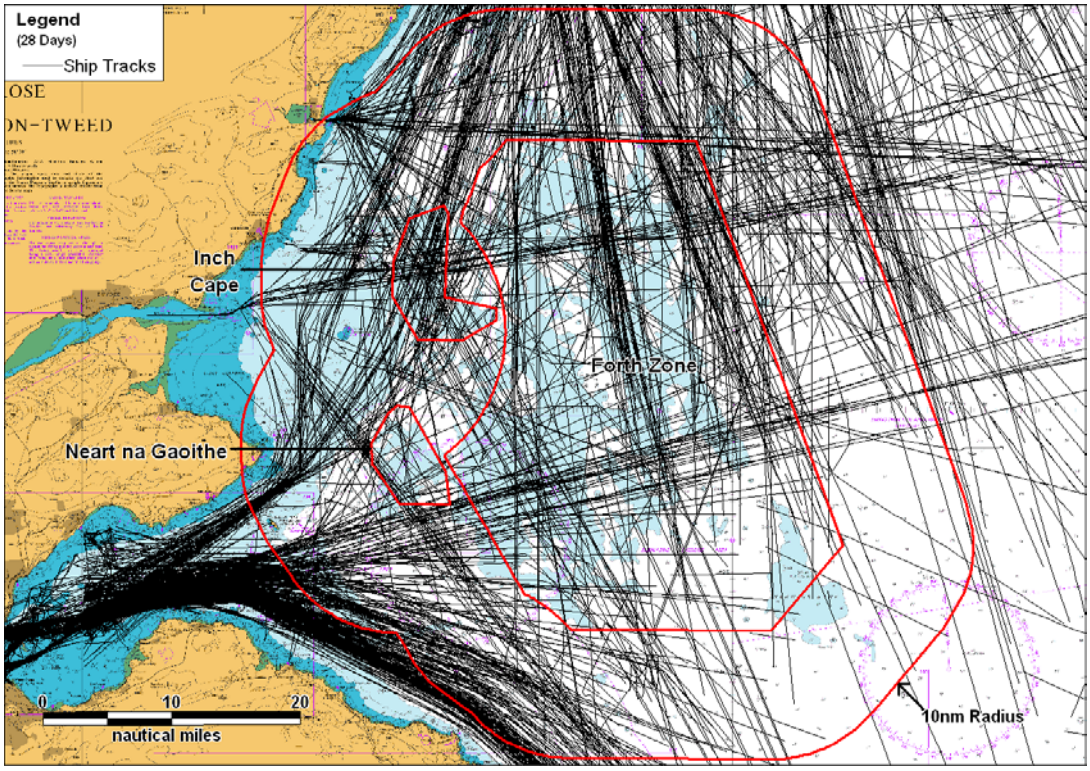

Figure 13.1 Overview of Current AIS Tracks by Ship Type (28 Days)

13.3 Post-Development

Figure 13.2 presents a plot of the existing shipping tracks (28 days AIS outside 2nm) along with the predicted ship tracks based on 28 days of mean routeing.

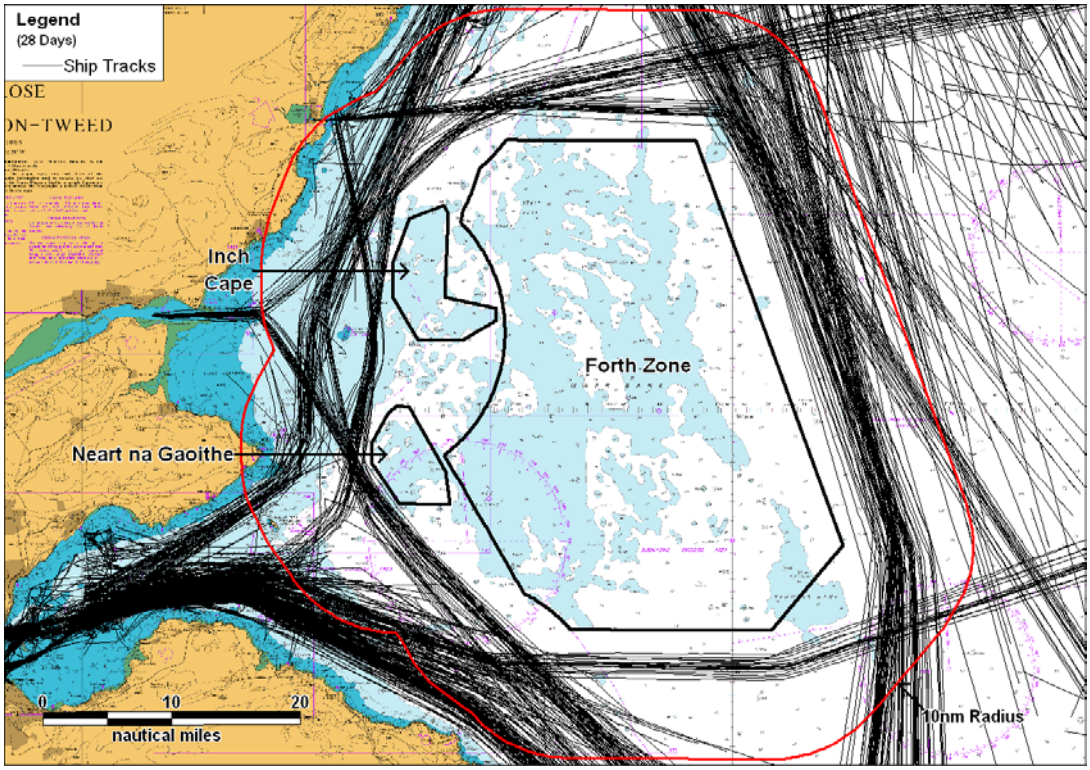

Figure 13.2 Overview of Anticipated Lanes following Development of the Region (28 Days of Tracks)

Figure 13.3 to Figure 13.5 present three mean daily plots of the predicated ship tracks passing through the region to consider the likelihood of vessels encountering one another.

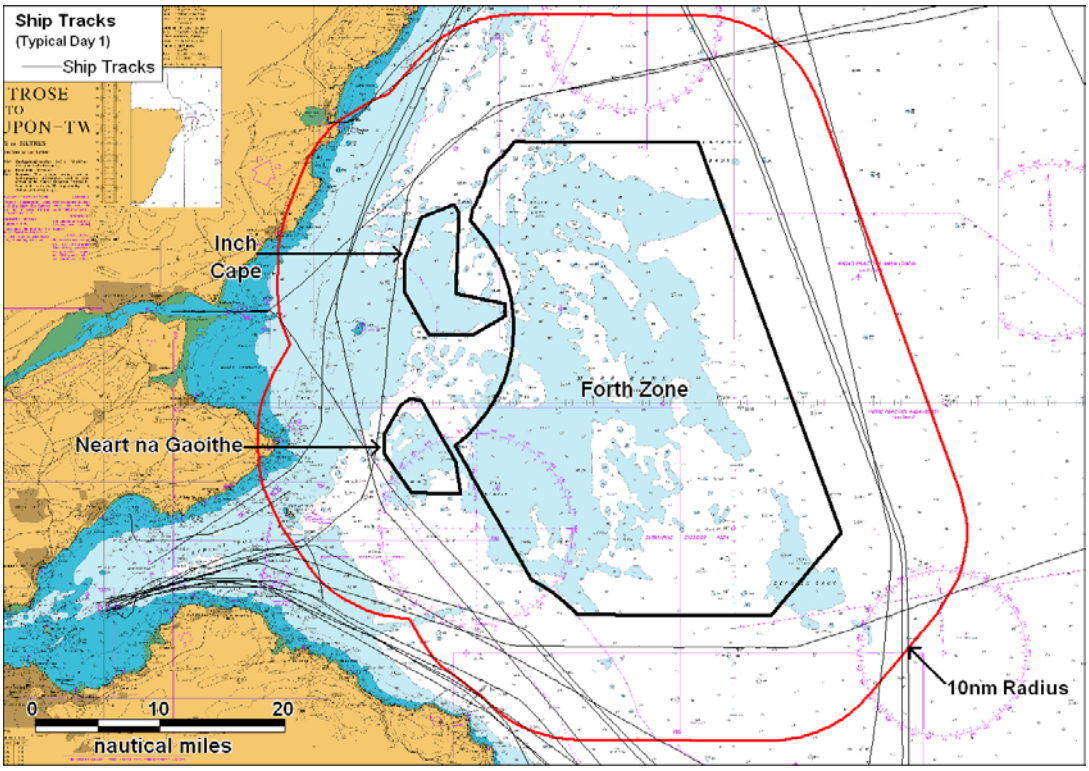

Figure 13.3 Day 1 – Predicted Ship Track Routeing

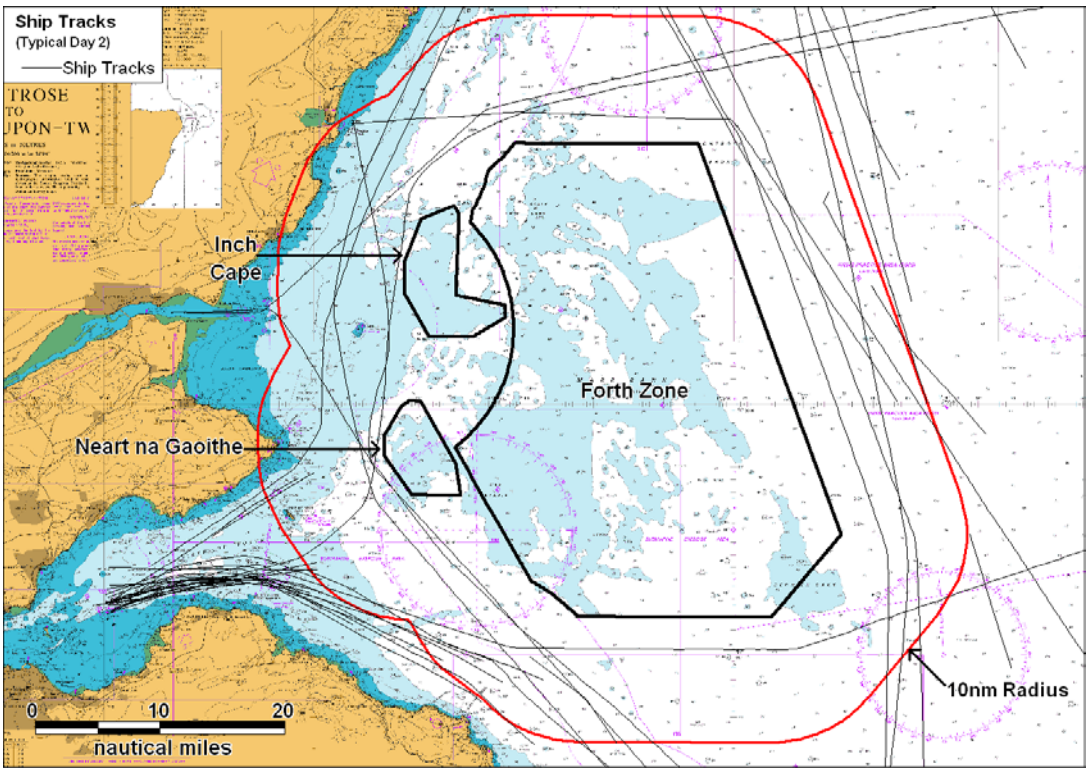

Figure 13.4 Day 2 – Predicted Ship Track Routeing

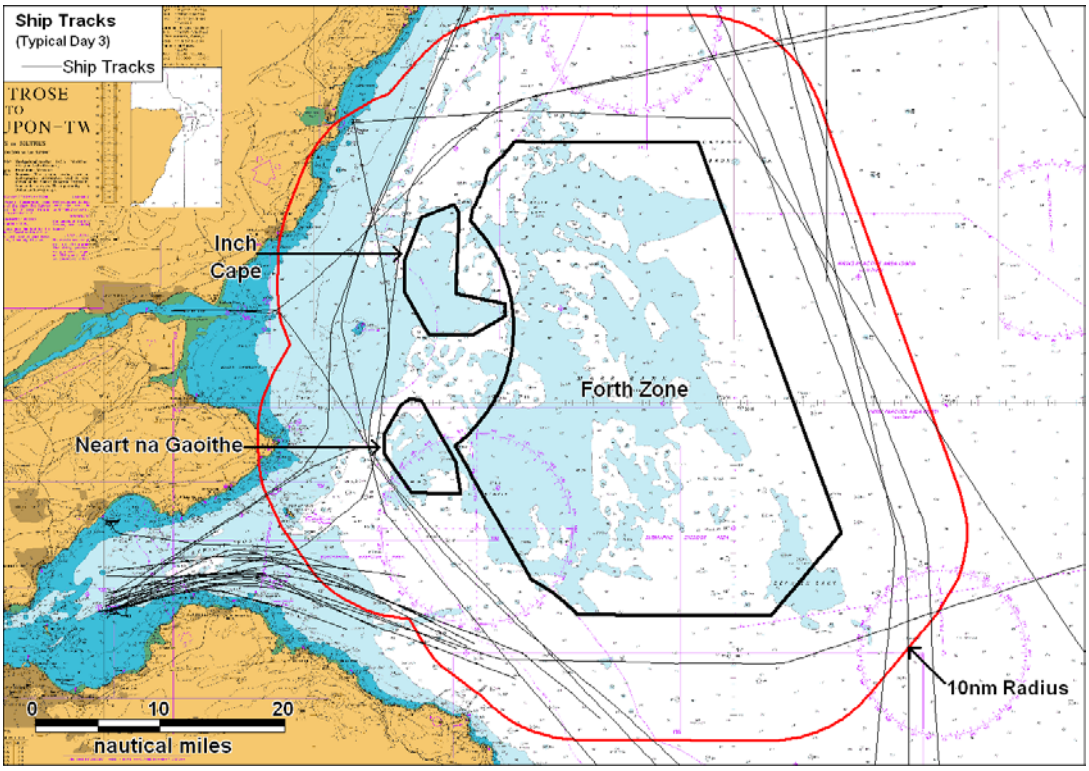

Figure 13.5 Day 3 – Predicted Ship Track Routeing

It can be observed that in terms of daily vessel routeing the increase in shipping levels on each route is relatively low and therefore the likelihood of a close encounter on any particular day is considered to be small.

14 CUMULATIVE IMPACTS

14.1 Offshore Renewables

By carrying out a regional study encompassing the three wind farm developments in the outer Firth of Forth and Tay a number of navigational cumulative issues have been encompassed within this shipping review.

However further review is required to assess whether there is potential for any other wind farm developments to impact navigation in the area considered as part of this assessment.

Figure 14.1 presents a review of all Round 1 and 2 offshore wind farms, Round 3 Zones and Scottish Territorial Water sites.

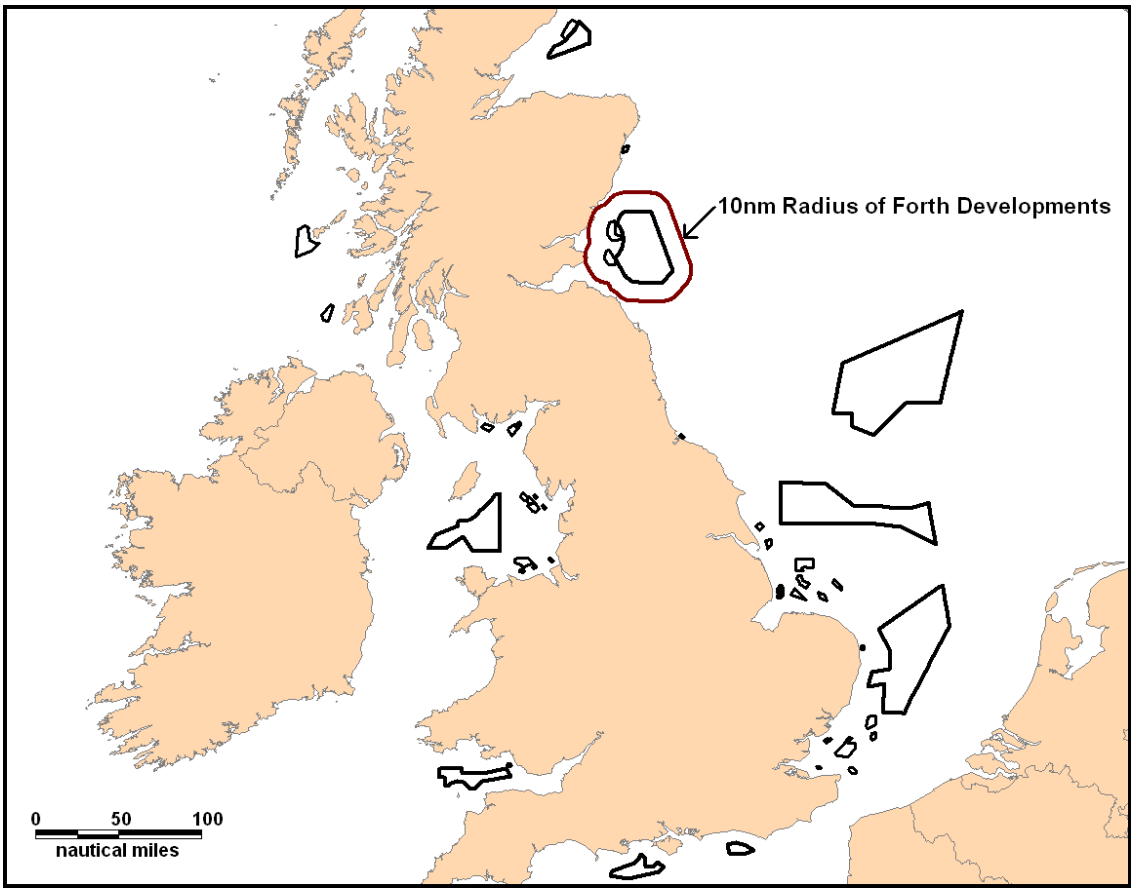

Figure 14.1 Overview of Wind Farm Sites in UK

It can be seen from the figure that the proposed developments within the outer Firth of Forth and Tay are not in close proximity to any other developments. The nearest is the European Offshore Wind Farm Deployment Centre (EOWDC) located over 30nm to the north, and no cumulative issues are expected.

In terms of Round 3 development zones, vessels heading to/from the Forth area and north eastern ports may be cumulatively impacted by zonal wind farm development within Dogger, Hornsea and East Anglian zones.

The exact impact of these developments is uncertain at this time as the individual zonal development plans are unknown.

14.2 Other

As mentioned in Section 6.1 there are military practice and submarine exercise areas in the wider region, but these should not lead to any cumulative navigational impacts.

Consultation with Forth Ports (Section 5.3) identified that there are possible proposals for 3-4 biomass plants within the Firth of Forth region, which if constructed could bring in an increased number of large bulk carriers. It is not known at the time of writing (June 2011) where vessels will be routeing from so further consideration of this is not possible.

15 MITIGATION MEASURES

Each site will be subject to a Navigational Risk Assessment as part of the consenting process. Integral to this is a hazard identification workshop which is carried out to review the risks associated with a development and to identify the appropriate mitigation measures.

On a regional level, feedback from the consultation carried out to date does not indicate the sites pose significant concern.

However, it is highlighted that continued co-operation between the projects will be required to ensure that mitigation measures are consistent, do not contradict one another, and that overall a strategic approach adopted for the development of the entire region.

16 RESULTS DISCUSSION

This report has reviewed the regional navigational impact of the Firth of Forth and Tay offshore developments. The main conclusions of this work are summarised below.

16.1 Recreational Craft

- In general there is limited recreational vessel activity outside the Firth of Tay / Forth and off coastal areas. Vessels using cruising routes further offshore may impacted by structures, however with an assumed maximum blade clearance, vessels could pass between structures.

- The navigational impacts on recreational craft are likely to be low, with the main concern being small vessels exiting the site into shipping. Turbine alignment may also be an issue.

16.2 Fishing vessels

- Fishing activity was more apparent from the satellite data, with demersal trawling recorded off Dunbar and scallop dredging occurring off Arbroath to the north of the region. Vessels heading to/from fishing grounds and home ports may require small deviations on route, however smaller vessels could pass between structures.

- The navigational impacts on fishing vessels are likely to be low, with the main concern being small vessels exiting the site into shipping. Turbine alignment may also be an issue.

16.3 Commercial Vessels

- Each shipping route was assessed and where shipping could be impacted a best alternative route was identified through consultation and Mariner information.

- Based on Anatec's experience, the levels of shipping in this area are generally low and as a result any changes in risk are also likely to be low. Attention is placed around Bell Rock; however vessel numbers appear to be acceptable which is in line with feedback received from the main users in this area.

- Based on stakeholder feedback received to date the overall impact of the proposals on navigational safety are expected to be low provided a full NRA is carried out for each site to identify the main risks and associated mitigation measures. The MCA and Chamber of Shipping raised some concerns over the area around Bass Rock; however this was not evident from the feedback from the shipping companies.

- The requirement for re-routeing of vessels will often result in increased mileage to the users. The feedback did not raise this as a serious concern overall, but some did highlight this fact stating that this would require some extra time, costs and fuel to be used.

- Assessment of additional mileage was not found to be excessive for the majority of routes, with the only significant impact on voyage distance/time for vessels using Route 4.

- When identifying mitigation measures for each project they should be considered on a regional basis to ensure that there is a sound strategy for the management of risk through the reason and that approaches are consistent and supportive of one another.

- Continued consultation is required throughout this process to ensure the views of stakeholders are fully considered within any work carried out.

16.4 Ports

- General concerns were expressed regarding smaller vessels being pushed further offshore and the impact on them being further east and hence out in heavier weather. However, the feedback from the other stakeholders did not highlight this.

- Forth ports felt the impact could be reduced by having a route through the middle between Neart na Gaoithe and Inch Cape for the deviated route from both Forth and Dundee. This point was also raised by the Chamber of Shipping.

- In general it was thought it best vessels went to the East as opposed to having a North/South channel through the Forth Zone.

16.5 Cumulative Issues

- As more information becomes available on the proposals for the Dogger Bank, Hornsea and to an extent East Anglia round 3 zone, developments plans should be considered as part of the wider cumulative issues.

- Other than the Round 3 developments off the UK no significant cumulative issues were identified.

17 References

i DECC, U.K. Government, Methodology for Assessing the Marine Navigational Safety Risks of Offshore Windfarms, Version Date: 7th September 2005.

ii MCA, MGN 371 Annex 3, "SHIPPING ROUTE" TEMPLATE, August 2008.

iii MCA Marine Guidance Notice 372 (M+F), Guidance to Mariners Operating in the Vicinity of UK OREIs, August 2008.

iv Regional Navigational Review of the proposed Windfarms in Scottish Territorial Waters and off the Firth of Forth – a Mariner's View. Richard May - May 2011.doc

v RYA, Sharing the Wind, 2004.

vi UK Coastal Atlas of Recreational Boating; Recreational Cruising Routes, Sailing and Racing Areas around the UK Coast; Second Edition by RYA; Supported by Trinity House, 2008.