

CHAPTER 21: SHIPPING AND NAVIGATION

21. SHIPPING AND NAVIGATION

21.1 Introduction

This chapter assesses the potential impacts on shipping and navigation from the construction and operation of the proposed Aberdeen Harbour Expansion Project at Nigg Bay (hereafter referred to as “the development”). In addition, it also proposes mitigation measures which can be applied to further reduce the significance or likelihood of significant effects.

For the purposes of assessment, the following elements of the project have been considered in this chapter as having the potential to cause an effect on shipping and navigation: collision, allision, pollution resulting from collision/allision, and fishing gear interactions.

This chapter is supported by, and should be read in conjunction with Appendix 21-A: Nigg Bay Development Baseline Assessment for Shipping and Navigation, Chapter 3: Description of the Development, which describes the vessels which will be utilised during the construction process; Chapter 22: Commercial Fisheries; and Chapter 23: Other Users.

This chapter will describe current shipping and navigational usage and incidents within Nigg Bay and the surrounding area, together with potential collision and pollution risks which may be indirectly affected by the development. Consultation with relevant navigational stakeholders have also been considered as part of the assessment.

This chapter does not assess commercial fishing and other marine users other than where there is an obvious interaction (e.g. the presence of a specific activity vessel whilst they are navigating and subsequent navigational tracking). For further information regarding the potential impacts of the project on these receptors please refer to Chapter 22: Commercial Fisheries, and Chapter 23: Other Users.

21.2 Policy, Legislation and Guidance

This section provides an overview of legislation and guidance documents that are relevant to the assessment of potential effects and application of mitigation measures on shipping and navigation associated with the development. Further advice in relation to perceived effects and the scope of issues to be addressed has been sought through consultation with both statutory and non-statutory authorities (see Section 21.6).

21.2.1 International Legislation

21.2.1.1 International Convention for the Safety of Life at Sea, 1974 (SOLAS), as amended

Chapter V - Safety of Navigation

The main objective of the SOLAS Convention is to specify minimum standards for the construction, equipment and operation of ships, compatible with their safety. Chapter V identifies certain navigation safety services which should be provided by Contracting Governments (e.g. promulgate all dangers to navigation, establish vessel traffic service (VTS), ship routing systems, search and rescue services and appropriate aids to navigation) and sets forth provisions of an operational nature applicable in

general to all ships on all voyages. The chapter makes mandatory the carriage of voyage data recorders (VDRs) and automatic ship International Legislation

Regulation 19 of SOLAS Chapter V (carriage requirements for shipborne navigational systems and equipment) sets out the navigational equipment to be carried on board ships, according to ship type. Regulation 19 requires AIS to be fitted aboard all ships of 300 gross tonnage and upwards engaged on international voyages, cargo ships of 500 gross tonnage and upwards not engaged on international voyages and passenger ships irrespective of size, built on or after 1 July 2002. It also applies to ships engaged on international voyages constructed before 1 July 2002, according to the following timetable:

- Passenger ships, not later than 1 July 2003;
- Tankers, not later than the first survey for safety equipment on or after 1 July 2003; and
- Ships, other than passenger ships and tankers, of 50,000 gross tonnage and upwards, not later than 1 July 2004.

An amendment adopted by the Diplomatic Conference on Maritime Security in December 2002 stated that ships, other than passenger ships and tankers, of 300 gross tonnage and upwards but less than 50,000 gross tonnage, would be required to fit AIS not later than the first safety equipment survey after 1 July 2004 or by 31 December 2004, whichever occurred earlier. Ships fitted with AIS shall maintain AIS in operation at all times except where international agreements, rules or standards provide for the protection of navigational information.

As of the 31 May 2014, all EU fishing vessels of length above 15 m are required to carry AIS equipment. Prior to this, from the 31 May 2013, all fishing vessels of length above 18 m were obliged to carry AIS.

Chapter IX – Management for the Safe Operation of Ships

International Safety Management (ISM) Code for the safe Operation of Ships and for Pollution Prevention (The ISM Code) was adopted by the International Maritime Organization (IMO) as Resolution A.741 (18), in 1993. It came into force through SOLAS Chapter IX. The ISM Code provides an international standard for the safe management and operation of ships and for pollution prevention.

Chapter IX applies to passenger ships including passenger high-speed craft, not later than 1 July 2003; oil tankers, chemical tankers, gas carriers, bulk carriers and cargo high-speed craft of 500 gross tonnage and upwards, not later than 1 July 1998; and other cargo ships and mobile offshore drilling units of 500 gross tonnage and upwards, not later than 1 July 2002. Chapter IX does not apply to government-operated ships used for non-commercial purposes.

The SOLAS convention implements measures which can mitigate the impact of the project on shipping and navigation.

21.2.1.2 International Convention for the Prevention of Pollution from Ships 1973 (MARPOL)

The International Convention for the Prevention of Pollution from Ships (MARPOL) is the main international convention covering prevention of pollution of the marine environment by ships from

operational or accidental causes. MARPOL applies to all vessels which operate under the authority of a Flag State. The impact of pollution resulting from a maritime incident as a result of the Aberdeen Harbour Expansion Project can be mitigated through the compliance to the MARPOL convention.

21.2.1.3 International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978 (STCW)

The Convention prescribes minimum standards relating to training, certification and watchkeeping for seafarers which countries are obliged to meet or exceed. All professional mariner certifications must be STCW Compliant. The convention implements measures which can mitigate the impact of the project on shipping and navigation.

21.2.1.4 International Convention on Maritime Search and Rescue 1979 (SAR)

The Convention was aimed at developing an international SAR plan, so that, no matter where an accident occurs, the rescue of persons in distress at sea will be co-ordinated by a SAR organisation and, when necessary, by cooperation between neighbouring SAR organisations. This included operating procedures and ship reporting systems. The convention implements measures which can mitigate the impact of the project on shipping and navigation.

21.2.1.5 Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREG)

The 1972 Convention was designed to update and replace the Collision Regulations of 1960. One of the most important innovations of the convention was the recognition given to traffic separation schemes. Guidance is given in determining safe speed, the risk of collision and the conduct of vessels operating in or near traffic separation schemes. The technical provisions of this convention include rules regarding steering and sailing, lights and shapes and sound and light signals. The convention is applicable to all vessels, with the exception of vessels which comply with the 1960 Collision Regulations and were built or already under construction when the 1972 Collision Regulations entered into force. These may be exempted from some requirements for light and sound signals for specified periods. The convention implements measures which can mitigate the impact of the project on shipping and navigation.

21.2.2 National Legislation

21.2.2.1 Marine Navigation Act 2013

This Act amends legislation relating to pilotage, harbour authorities, the general lighthouse authorities and the manning of ships, as well as extending the powers of port police.

21.2.2.2 The Marine Navigation Act 2013 (Commencement) (Scotland) Order 2013

This Order brings section 1 to section 6 of the Marine Navigation Act 2013 into force in Scotland. These sections concern pilotage matters, harbour directions and harbour closure orders.

21.2.2.3 The Merchant Shipping (Safety of Navigation) (Amendment) Regulations 2011

These regulations amend the Merchant Shipping (Safety of Navigation) Regulations 2000, which apply to most UK ships and to non-UK ships that operate in UK waters and which give effect to Chapter V of the International Convention for the Safety of Life at Sea 1974 (SOLAS V), its 1988 Protocol and subsequent amendments

21.2.2.4 The Merchant Shipping (ISM Code) Regulations 2014

This regulation brings the International Safety Management Code into force in the UK on all vessels to which the SOLAS Convention applies.

21.2.3 Guidance

- Port Marine Safety Code 2015, Department for Transport;
- A Guide to Good Practice on Port Marine Operations Prepared in Conjunction with the Port Marine Safety Code March 2015, Department for Transport;
- IALA Guideline No. 1111 on Preparation of Operational and Technical Performance Requirements for VTS systems, May 2015;
- Maritime and Coastguard Agency (MCA) Marine Guidance Notices (MGNs);
- MCA International Management Code for the Safe Operation of Ships and for Pollution Prevention (ISM Code), Instructions for the Guidance of Surveyors, March 2015; and
- IMO (2013) Revised Guidelines for Formal Safety Assessment (FSA) for Use in the IMO Rule-Making Process (MSC-MEPC.2/Circ.12).

21.2.4 Consultation

As part of the Navigation Risk Assessment (NRA) baseline, a consultation on the shipping and navigation issues surrounding the development was undertaken with both national stakeholders, local and regional stakeholders. For more information on the consultation and consultees involved please refer to Appendix 21-A: Nigg Bay Development Baseline Assessment for Shipping and Navigation. Table 21.1 presents the consultation responses that are relevant to shipping and navigation.

Table 21.1: Summary of consultation undertaken

Consultee	Summary of Consultation	Where addressed in ES	
Marine Safety Forum	No concerns	No action	
Aberdeen Fish Producers Organisation (AFPO)	The AFPO has one vessel member based in Aberdeen and historically we have used the harbour facilities on a regular basis.	No action	
	We currently have 14 member vessels from Aberdeen to Buckie and focus predominantly on whitefish species with some <i>Nephrops</i> landings as well as smaller vessels prosecuting shellfish species.	Chapter 22: Commercial Fisheries	
	The main grounds our vessels fish are in the North Sea with some activity on the seas to the west of Scotland.	Chapter 22: Commercial Fisheries	
	The vessels in membership are mainly of the pair seine and twin rig type. These vessels range in size from 9 m to 45 m.	N/A	
	The Nigg Bay area is a well-known shellfish area and one where some of our members operate in and around.	Chapter 22: Commercial Fisheries	
	I would firstly like to note that their vessels are not fitted with VMS and as such their movements will not be recorded in any official way and their data is included in your analysis of movements within Nigg Bay.	Section 21.5.5	
	They do, however, move from the Portlethen area up to the Nigg bay area where they have gear set. The Bay is well known for being a relatively shallow area being in the order of 2 /3 fathoms in parts.	N/A	
	Your report shows the vessels which berth within Aberdeen Harbour, but it must be noted that other vessels operate in the Nigg Bay area but berth elsewhere and their activity is also not included in your report.	Section 21.5.5	
	The vessels operating in that area have a number of concerns relating to the direct impact on their ability to continue to operate in that area which would have a direct impact on the viability of their business.	Section 21.6.2 and Section 21.6.3	
	Increased marine traffic would have a risk of interaction with fishing gear causing a hazard as well as a possible financial loss to the gears owner.	Section 21.6.2 and Section 21.6.3	
The development itself will also change the benthic habitat and this is also of concern to those operating in that area not least because there is a lack of scientific data in that area. A baseline is required at the very least.	Benthic Ecology Chapter 12		
<i>Other concerns specific to commercial fishing are detailed within Appendix 22-A: Commercial Fisheries Technical Report and ES Chapter 22.)</i>	Chapter 22: Commercial Fisheries		
Royal Yachting Association (RYA) Scotland	Comments from Scoping request	RYA Scotland recognises the need for the development of Aberdeen harbour and that Nigg Bay is the obvious location for it.	No action
		Nigg Bay is only occasionally used by recreational craft as an anchorage.	Section 21.5.6
		Most visiting boats use Stonehaven or Peterhead.	No action
		As far as we are aware, no RYA affiliated clubs make use of Nigg Bay; The Aberdeen and Stonehaven Yacht Club is based at Stonehaven.	Section 21.14.7

Table 21.1: Summary of consultation undertaken continued

Consultee	Summary of Consultation	Where addressed in ES
RYA Scotland (continued)	RYA are not aware of any use being made of Nigg Bay for recreational sailing although there may be some informal windsurfing. Unfortunately, the update to the UK Atlas of Recreational Boating, the cruising routes atlas, has been delayed. The existing atlas shows routes into and out of Aberdeen although rather few recreational craft actually go there, for obvious reasons. Those that do are mainly the type of vessel that would transmit an AIS signal. The atlas predates the development of the Peterhead marina, which is a popular stopping off point, much more so than Stonehaven. The distance of the route offshore at Aberdeen marked on the atlas is about right. Recreational craft on passage, particularly at night, will tend to be far enough offshore to avoid getting mixed up in shipping traffic from Aberdeen or vessels at anchor outside.	Section 21.5.6
	The Sailing Directions for the east Coast are being re-edited by combining two of the existing books, and the revised pilot is scheduled for publication by Imray in time for Christmas 2016. Depending on the status of the project it may be appropriate to include a note about the development of Nigg Bay.	Section 21.14.7
	As mentioned in our scoping response, if some harbour activities are relocated to Nigg Bay the existing Aberdeen Harbour would make an excellent place for a small marina as there is good access to local facilities as well as the railway station and the airport, which could be important for crew changes. Work is ongoing into making the east coast more of a destination for cruising sailors rather than just a coast to be transited rapidly on the way to somewhere else.	No action
Scottish Fishermen's Federation	We have no concerns that the planned development at Nigg Bay will affect our members during the construction phase.	No action
	Many of our members would be transiting in the vicinity. We would recommend regular updates to the Kingfisher Fortnightly Bulletin on planned in-field vessels which would keep the local fishermen updated.	Section 21.7.1 and Section 21.8.2
	We have no concerns with additional construction vessels expected on site as an increased risk to navigation, given the current levels of vessel activity around Aberdeen Harbour entrance.	Section 21.6.2
Greenhowe Marine Services	I fish Nigg Bay with the fishing vessel Skua A17. The fishing for Lobsters is seasonal and I have fished here for 20 years. The coast from Aberdeen to Stonehaven is heavily fished with creels with boats from various ports i.e. Cove, Portlethen, Newtonhill and Stonehaven. Due to the high volume of creels worked in the summer months all down the coast - chosen to work Nigg Bay (full time basis for 8 Years/200 creels).	Chapter 22: Commercial Fisheries
	The fishing grounds also run parallel north and south off the lighthouse and out to 1.5 miles running SE off the lighthouse. The navigation channel will also run ENE on the heading into the new port and there will be no way the fishing grounds between the existing port and the new harbour will be fishable any more due to traffic and safety for all users.	Section 21.5.5
	<i>Other concerns specific to commercial fishing are detailed within Technical Appendix 22-A: Commercial Fisheries Technical Report and ES Chapter 22.)</i>	Chapter 22: Commercial Fisheries

Table 21.1: Summary of consultation undertaken continued

Consultee	Summary of Consultation	Where addressed in ES
F/V Boy Gordon	Both the Boy Gordon and Jonny II fish (potting) within Nigg Bay.	N/A
	No AIS carried (no carriage requirement).	Section 21.5.5
	Buoyed pots were currently laid in Nigg Bay and surrounding waters (snagging hazard if unseen).	Section 21.6.2 and station 21.6.3
	<i>Other concerns specific to commercial fishing are detailed within Technical Appendix 22-A: Commercial Fisheries Technical Report and ES Chapter 22.)</i>	Chapter 22: Commercial Fisheries
Cruising Association (CA)	We can confirm that very little yachting takes place in the area during winter periods. Aberdeen is not a yachting port although a few yachts, including CA boats, are kept there. The main nearby yachting port is Peterhead.	Section 21.5.6
	Little or no day-sailing takes place with almost all yachts undertaking long distance coastal passages.	Section 21.5.6
	Yachts on passage between places further south, in England, will be out of sight of land when going north and will traditionally make their landfall near Aberdeen with the intention of stopping at Peterhead.	No action
	Coasting yachts will normally make passage directly from headland to headland. They will thus be closest to land at Buchan Ness and Girdle Ness while keeping outside of the Fairway buoy.	No action
	Anchorage (commercial shipping) are invariably avoided by a reasonable distance.	No action
	Yachts could anchor safely, in offshore winds, anywhere along this coast but normally have no reason to do so, usually preferring to go directly to Peterhead.	No action
	We are slightly surprised that the survey revealed some yachts coasting closer in than 1 nautical mile (nm) but can confirm that most will be within 5 nm of the coast.	Section 21.5.6
	We are not able to comment authoritatively on carriage of AIS by yachts in this area but believe it is about 25 per cent (many do not switch AIS on when coasting in good visibility).	Section 21.5.6
	The tracks of yachts as surveyed however should be indicative of the tracks followed by most other yachts without AIS.	Section 21.17.7
	The whole area can be a difficult one for yachts in any winds with an easterly component since these can produce extremely uncomfortable seas and swells inshore.	N/A
The existing Aberdeen harbour has no modern facilities for yachts and they are rightly not encouraged due to its small size and great activity. It is regarded as a difficult, even dangerous, harbour in strong onshore winds with a notorious scend (push or surge caused by waves) in its entrance.	No action	

Table 21.1: Summary of consultation undertaken continued

Consultee	Summary of Consultation	Where addressed in ES
Cruising Association (CA) Continued	CA has been asked if facilities for yachts could be provided at Aberdeen and we take the opportunity to suggest that a corner of the Nigg Bay proposal may serve this purpose. Similarly, there is no harbour of refuge for small craft along this coast or safe places for use in emergency except perhaps Peterhead which is a considerable distance away. Incorporation of an all-weather entrance to Nigg Bay and some berths for small craft for use in emergency only could therefore serve a very useful purpose.	No action
	Very little day-sailing takes place. The majority of yachts near the proposed development are likely to be on long distance passages (more than 100 nm). They will normally be well-equipped and crewed by very experienced people.	Section 21.14.7
	The increase in shipping which can be expected from the development will be on well-defined passages and apart from the harbour approaches not constrained in any way. Yachting is increasing in the area but we conclude that recreational craft will not be strongly affected by the proposal.	Section 21.14.7
HM Coastguard Aberdeen MRCC	From a coastguard point of view, we see no major issues. We will respond to any Search & Rescue as we already do within the area. (This note is from the local Maritime Rescue Coordination Centres (MRCC) and further consultation comments may be received from the MCA)	No action
Chamber of Shipping	No Comments from the UK Chamber of Shipping.	No action

21.3 Methodology

21.3.1 Study Area

The study area comprises the footprint of the Aberdeen Harbour Expansion Project and a 12 nautical mile (nm) zone across the wider area, which includes the current Aberdeen Harbour limits.

21.3.2 Data Sources

The following data sources and technical studies have been used in the preparation of this chapter:

- Anatec Limited (2015) Nigg Bay Development Baseline Assessment for Shipping and Navigation. This report provides a site specific assessment of shipping and navigation for the area surrounding the planned Aberdeen Harbour Expansion Project at Nigg Bay (Appendix 21-A: Nigg Bay Development Baseline Assessment for Shipping and Navigation);
- Automatic Identification System (AIS) data provided the shipping activity in the vicinity of Nigg Bay. It is a regulatory requirement (Section 21.2.1.1) that AIS is fitted onboard all passenger ships, tankers, ships of 300 Gross Tonnage (GT) and upwards engaged on international voyages, cargo ships of 500 gross tonnage and upwards and all EU fishing vessels of length above 15 m;
- Fishing Vessel Monitoring Service (VMS) satellite data from 2012: presented fishing vessel sightings and satellite vessel monitoring data in density grids to validate the data presented in the baseline assessment;
- Royal Yachting Association (RYA) UK Coastal Atlas of Recreational Boating, 2009: identified recreational cruising routes, general sailing and racing areas for UK waters;
- UKHO UK Admiralty Charts: include data on water depths (relative to chart datum), coastline, aids to navigation, land and underwater contour lines, seabed composition (for anchoring), hazards, tidal information, IMO Routing Measures and anything which could assist navigation in an area. The following charts were used in this study: 1438 Harbours on the East Coast of Scotland and 2182B North Sea - Central; and
- Aberdeen Harbour Incident Assessment, Royal National Lifeboat Institution (RNLI) Maritime Incident Data 2001 - 2010 and Maritime Accident Investigation Branch (MAIB) 2002 - 2011, Maritime Incident Data: provided information on the locations of accidents, injuries and hazardous incidents reported to the MAIB, attended by the RNLI and assessed through specially commissioned studies.

21.3.3 Impact Assessment Methodology

This section describes the methodology of the Navigational Risk Assessment (NRA). The methodology and terminology of this section follows that used in the supporting technical study, provided in Appendix 21-A: Nigg Bay Development Baseline Assessment for Shipping and Navigation.

The NRA and this associated impact assessment differ from many of the ES chapters in approach and terminology. The baseline for the NRA comprises existing traffic levels, behaviours and associated risk. The risk is a function of the frequency, or likelihood, of an incident occurring (Table 21.3) and the severity of the consequence, or the outcome, should a potential incident occur (Table 21.4). Risk is classified into three categories:

- Broadly Acceptable (low risk);
- Tolerable (intermediate risk); and
- Unacceptable (high risk).

The impacts associated with the project are defined as the change to baseline conditions, so therefore the change in traffic levels, behaviours and associated risk. Table 21.2 shows how these alternative definitions relate to the standard EIA terms defined in Chapter 5: The Environmental Impact Assessment Process.

Table 21.2: Comparative terminology

Fugro EIA Term	Anatec NRA Definition	Anatec NRA Categories
Baseline	1. Existing Traffic Levels 2. Existing Traffic Behaviours: <ul style="list-style-type: none"> • Where vessels anchor • Where fishing occurs • Routing of passing traffic compared to vessels entering the current harbour or heading for the anchorage 3. Existing Risk of Accidental Events	Frequency (Likelihood): <ol style="list-style-type: none"> 1. Negligible 2. Extremely Unlikely 3. Remote 4. Reasonably Probable 5. Frequent Risk Tolerability: <ol style="list-style-type: none"> 1. Broadly Acceptable (low risk) 2. Tolerable (intermediate risk) 3. Unacceptable (high risk)
Source (of Impact)	New Harbour	N/A
Impact	Construction phase: <ul style="list-style-type: none"> • Increase in construction traffic • Presence of safety zones • Rerouting of traffic as a result of the safety zones which then influences the accident rate Operational phase: Increased Traffic (assumed to be 50%) Corresponding Increase of Risk of Accidental Events	Frequency (Likelihood): <ol style="list-style-type: none"> 1. Negligible 2. Extremely Unlikely 3. Remote 4. Reasonably Probable 5. Frequent Risk Tolerability: <ol style="list-style-type: none"> 1. Broadly Acceptable (low risk) 2. Tolerable (intermediate risk) 3. Unacceptable (high risk)
Consequence	Construction phase: The consequences (outcome of an accidental event) may differ from baseline conditions as different and more risky activities are taking place.	Consequences: <ol style="list-style-type: none"> 1. Negligible 2. Minor 3. Moderate 4. Serious 5. Major
	Operational phase: The consequences (outcome of an accidental event) are the same as for baseline conditions, but with a greater likelihood of occurring.	
Environmental Risk	A shipping accident could lead to marine pollution. This is one of the consequences considered in the impact assessment	

21.3.4 Identification Process

A workshop attended by maritime stakeholders was held to identify the key navigational safety concerns relative to the project. This allowed the identification and discussion of potential impacts

created by the Aberdeen Harbour Expansion Project. The results of the workshop were used for the impact assessment/NRA and selection of mitigation measures.

During the workshop, the associated risks were ranked based on the discussions held and mitigation measures were identified. The overall risk ranking (frequency vs. consequence) determined the hazard position within the risk matrix shown Table 21.4.

The consequence bands used during the workshop are noted in the risk matrix in Table 21.4, while the details of the frequency bands are noted in Table 21.3.

Table 21.3: Frequency bands

Rank	Description	Definition
1	Negligible	Less than once every 10,000 years
2	Extremely Unlikely	once every 100 to 10,000
3	Remote	Once every 10 to 100 years
4	Reasonably Probable	Once every 1 to 10 years
5	Frequent	Annually

The hazards identified formed the basis for the impacts presented within Section 21.6, Assessment of Impacts. For details of the workshop see Appendix 21-A: Nigg Bay Development Baseline Assessment for Shipping and Navigation, which also includes the detailed hazard logs produced from the workshop.

Table 21.4: NRA Risk Matrix

Consequences					Frequency				
Severity Rating	People	Property	Environment	Business	1	2	3	4	5
					Negligible	Extremely Unlikely	Remote	Reasonably Probable	Frequent
1 Negligible	No injury	No damage	No effect	No impact					
2 Minor	Minor injury	Minor damage	Minor effect	Minor impact					
3 Moderate	Major injury	Moderate damage	Moderate effect	Considerable impact					
4 Serious	Single fatality	Major damage	Major effect	Major national impact					
5 Major	Multiple fatalities	Extensive damage	Extensive effect	Major international impact					

	Broadly Acceptable (low risk)
	Tolerable (intermediate risk)
	Unacceptable (high risk)

21.3.5 Risk Regions

The three risk regions have been identified (Table 21.4) and are described below:

- Unacceptable Region (high risk) - generally regarded as unacceptable whatever the level of benefit associated with the activity;
- Tolerable Region (moderate risk) - typical of the risks from activities which people are prepared to tolerate to secure benefits. There is however an expectation that such risks are properly assessed, appropriate control measures are in place, residual risks are As Low As Is Reasonably Practicable (ALARP) and that risks are periodically reviewed to see if further controls are appropriate; and
- Broadly Acceptable Region (low risk) - generally regarded as acceptable and adequately controlled. None the less the law still requires further risk reductions if it is reasonably practicable. However, at these levels the opportunity for further risk reduction is much more limited.

The hazards identified form the basis for the impacts reviewed within Section 21.6, Assessment of Impacts. For details of the workshop see Appendix 21-A: Nigg Bay Development Baseline Assessment for Shipping and Navigation.

21.4 Baseline Description

21.4.1 Introduction

This section presents a description of the baseline conditions in the study area with regards to shipping and navigation.

21.4.2 General Overview of the Study Area

Aberdeen Harbour is Europe's principal marine support centre for the energy sector in the North Sea and Atlantic Margin, and is the main commercial harbour serving north-east Scotland with shipping links to around 45 countries worldwide. Aberdeen Harbour handles around 8,000 vessel arrivals annually and approximately five million tonnes of cargo from a wide range of industries.

In addition to supporting the energy sector, Aberdeen Harbour is an international port for general cargo, roll-on/roll-off and container traffic. It also provides the principal mainland harbour for freight, passenger, vehicle and livestock services to Orkney and Shetland and is a port call for cruise ships.

All shipping movements within Aberdeen Harbour limits are controlled and monitored from the state-of-the-art Vessel Traffic Service (VTS) Centre situated at the inner end of the North Pier, in the Marine Operations Centre. All vessel movements within Aberdeen Harbour must be agreed with VTS, with set pilotage procedures in place. Aberdeen has compulsory pilotage for vessels with a length of 60 m and over. However, for vessels with an operational bow thruster this limit is increased to 75 m. A fairway buoy equipped with Radar and Beacon (RACON) is located approximately 1.4 nm north-east of the harbour. Vessels are obliged to request permission to enter the harbour limits when 3 nm from the buoy. A designated anchorage is available 2 nm north of the entrance to the harbour.

21.4.3 Site Specific Data

Anatec UK Limited was commissioned to undertake a baseline assessment of shipping and navigation for the area surrounding the Aberdeen Harbour Expansion Project at Nigg Bay. The assessment provides a general overview of all shipping activity (cargo vessels, tankers, passenger vessels, offshore support vessels, recreational vessels and fishing vessels) together with the behaviour of anchored vessels outside the current harbour. In addition, the current collision risk and encounter rate between vessels, and the change in risk that the project could cause were also estimated.

To account for any seasonal variations in vessel activity around the project site, the assessment used four months (January/February and July/August) of seasonally weighted Automatic Identification System (AIS) data from 2014 for the majority of the analysis. The survey included two study areas. Firstly, passing traffic was assessed using a 12 nm buffer from the approximate centre point of Nigg Bay. Secondly, a 5 nm buffer from the centre point was used to analyse the traffic closer to the coast and Aberdeen Harbour. It should be taken into consideration when viewing the following analysis that activity from smaller vessels is likely to be under-represented, particularly in the case of fishing and recreation vessels due to the carriage requirements of the SOLAS Convention. However, it can be assumed that vessels that do transmit provide an indication of the overall navigational activity and behaviour. Where appropriate this has been highlighted within the section.

The findings of this study were used to define baseline conditions against which the assessment of potential impacts arising from the construction and operation of the project is undertaken.

Further detail on the methods and findings of these studies are presented in Appendix 21-A: Nigg Bay Development Baseline Assessment for Shipping and Navigation.

21.5 Shipping Level and Type

An average of 81 and 70 unique vessels per day passed within 12 nm of Nigg Bay during summer and winter respectively. The busiest day recorded 108 and 102 unique vessels during August and January, respectively. The quietest day recorded 63 and 51 unique vessels during August and January, respectively.

An average of 74 and 64 unique vessels per day passed within 5 nm of Nigg Bay during summer and winter study period respectively. The busiest days during the study period occurred in August and January, which recorded 91 and 92 vessels respectively. The quietest day recorded 58 and 43 unique vessels during the same two months.

Excluding vessels which remained within the Aberdeen Harbour boundary, it was estimated that passing traffic accounted for less than 5% and 3% of the total traffic during the summer and winter study period, respectively.

In both the summer and winter surveys, large commercial vessels avoided the coast. Vessels found in closer proximity to the coastline were small recreational and fishing vessels. During the summer assessment two vessels were seen within Nigg Bay: a 14 m workboat (associated with the Aberdeen Harbour Expansion Project) and an 8 m fishing vessel (Figure 21.1). During the winter no vessels were observed entering Nigg Bay.

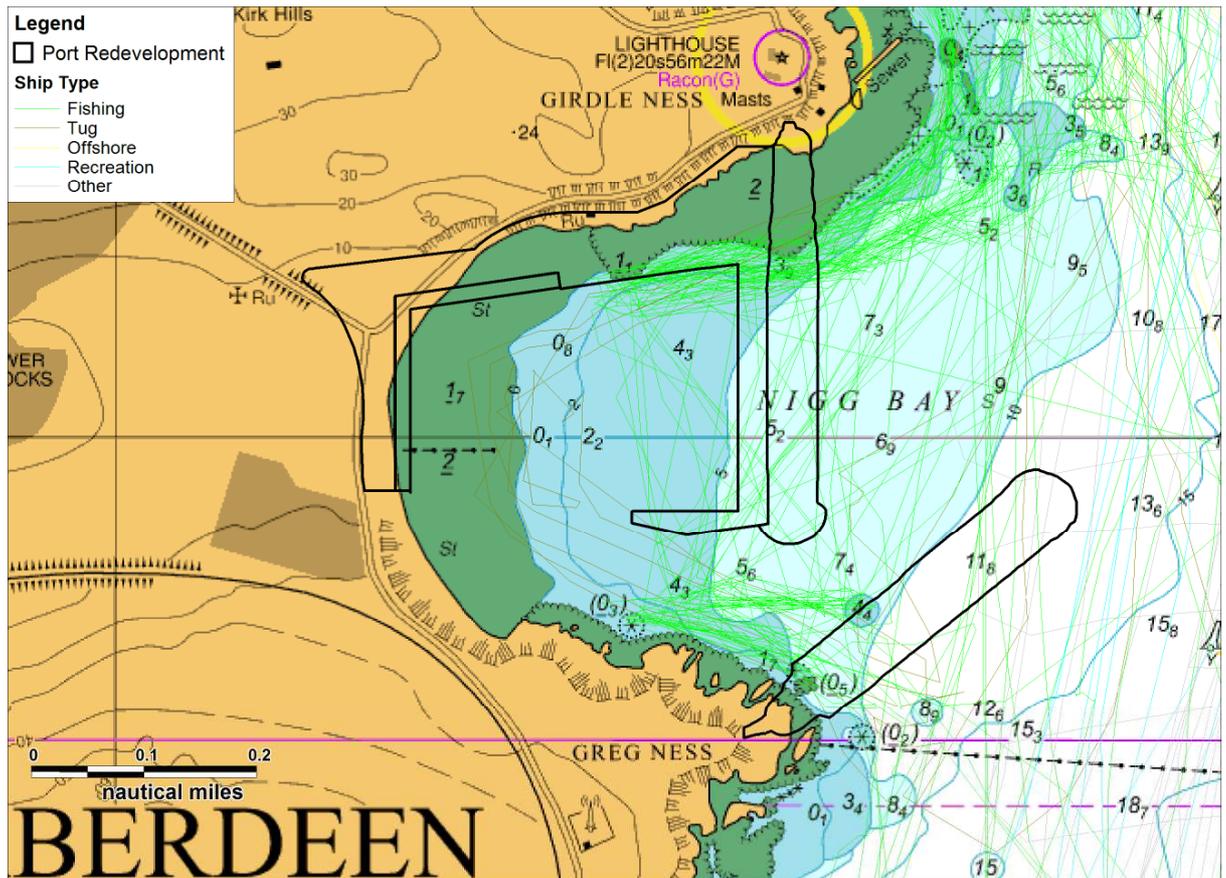


Figure 21.1: Summer vessels within Nigg Bay

Source: Anatec Limited, 2015

Within the 12 nm study area, the most common traffic type in the summer and winter were offshore vessels (68% and 71%, respectively), followed by cargo vessels (7% and 9%, respectively), tugs (4% and 7%, respectively), ‘Other’ vessels (6% and 5%, respectively) and tankers (5% and 4%, respectively). This trend was also the same for shipping density, the highest density in both the summer and winter were caused by offshore vessel traffic associated with Aberdeen Harbour.

The assessment data concluded that in general, larger vessels avoided coastal areas when clear of the harbour and smaller vessels had a closer proximity to the coast south of the harbour. The study identified approximately 63% and 72% of all vessels within the 12 nm study area were destined for Aberdeen Harbour, during the summer and winter period respectively.

21.5.1 Cargo Vessel

Cargo vessels were the second most common traffic type during the assessment, accounting for 7% of vessels in the summer and 9% in the winter. The Roll-on/Roll-off (RO/RO) cargo vessel route between Aberdeen and Northern Isles (headed north-east from Aberdeen Harbour) was used by one to two vessels per day during summer and approximately one during winter. Routes between Aberdeen and other mainland European ports (heading east-north-east and south-south-east from the harbour) account for less than one vessel per day. Other cargo vessels were seen on a route approximately 1 nm east of the coast south of the harbour between Aberdeen and other Scottish ports, and on a route passing approximately 2.8 nm east of the harbour between various Scottish ports in summer.

In general, traffic on passage past Aberdeen Harbour did not come within 2 nm and 1.3 nm of the Nigg Bay expansion boundaries during summer and winter respectively. However, vessels using the anchorage north of the harbour did pass as close as 0.9 nm during the summer. An average of five and four AIS tracks from cargo vessels crossed the Aberdeen Harbour entrance during summer and winter respectively, from an average of three unique vessels. This is inclusive of vessels both entering and departing the harbour. The longest cargo vessels within the 12 nm and 5 nm study areas were 161 m and 146 m respectively. Figure 21.2 illustrates the summer AIS cargo vessel tracks within the 5 nm study area.

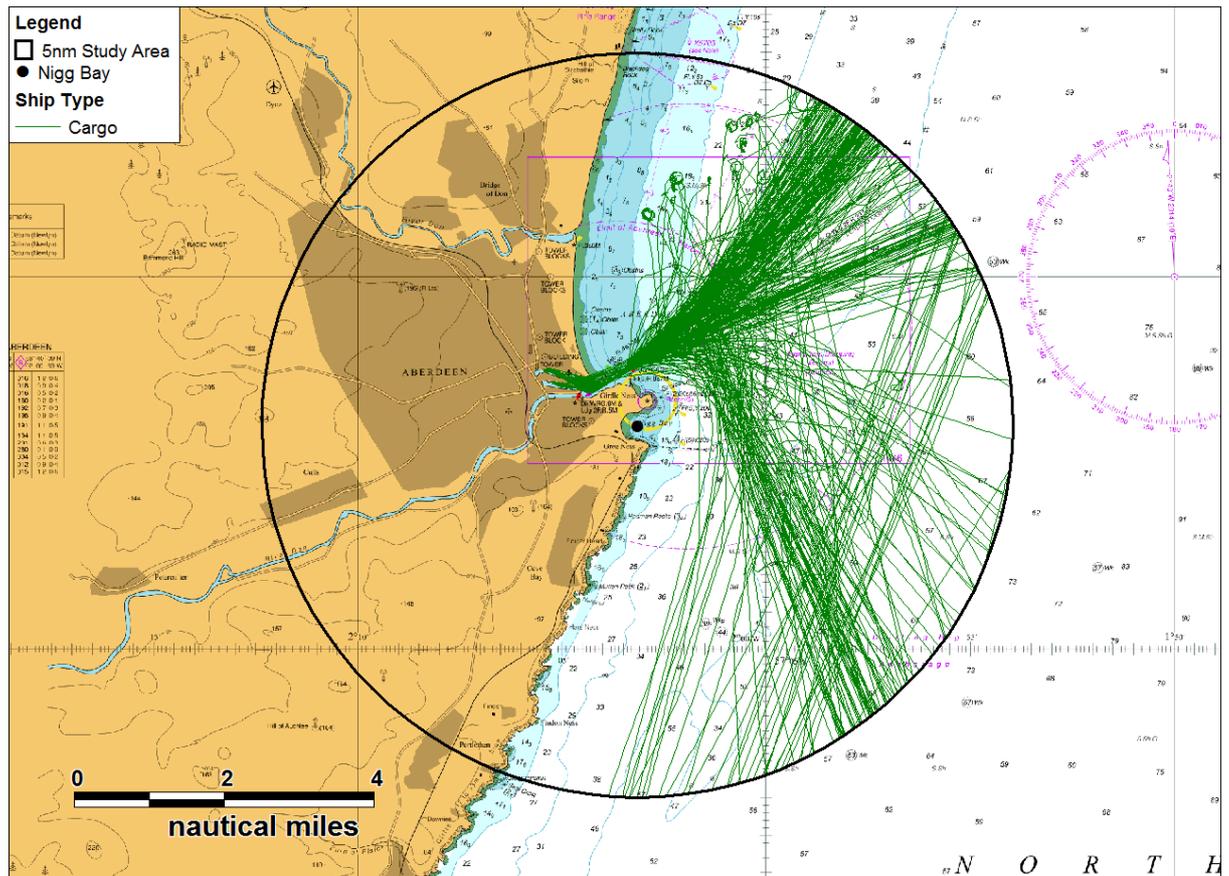


Figure 21.2: Summer cargo vessel tracks - 5 nm study area

Source: Anatec Limited, 2015

21.5.2 Tanker

Tankers account for 5% and 4% of all traffic types during the summer and winter assessment period. The majority of tanker movements were small product tankers (65% in summer and 63% in winter) transiting between Aberdeen and other UK ports, and shuttle tankers associated with various oil fields in the North Sea. During the summer study period an average of two tankers were observed crossing the entrance to Aberdeen Harbour, from two unique vessels, this reduced to one during the winter. Large shuttle tankers were seen to anchor between 1 nm and 3 nm east of Nigg Bay. These tankers were too large to berth in Aberdeen Harbour, instead anchoring offshore while waiting to load at offshore terminals and floating installations. Smaller tankers anchored in the anchorage north of the harbour. The longest tanker within the 12 nm study area was 285 m, and the longest within Aberdeen Harbour was 123 m. Figure 21.3 illustrates the summer AIS tanker tracks within the 5 nm study area.

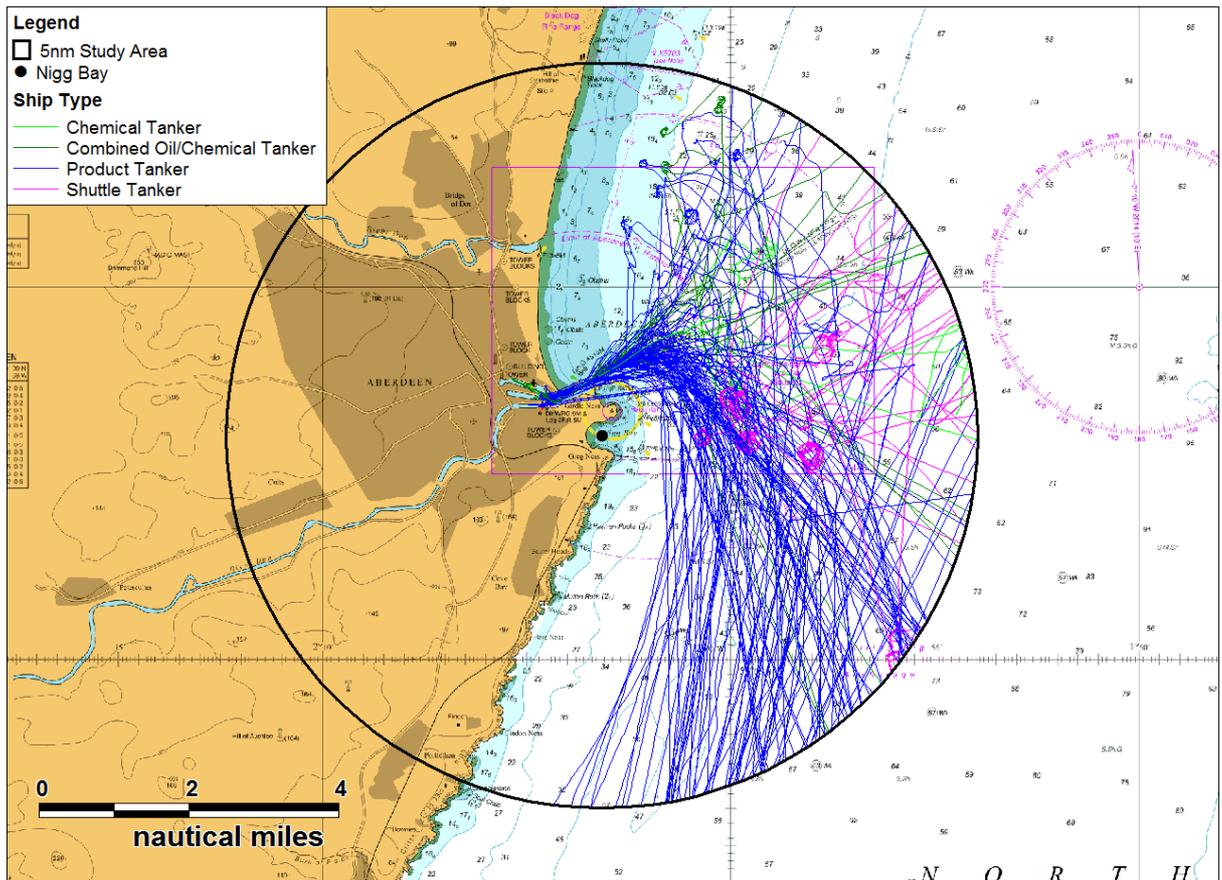


Figure 21.3: Summer Tanker tracks - 5 nm study area

Source: Anatec Limited, 2015

21.5.3 Passenger Vessel

Overall, summer passenger vessel traffic was seen to be higher than during the winter. The vast majority of passenger vessel activity was from two ferries, running between Aberdeen and Lerwick via Kirkwall, and Aberdeen and Lerwick. Other passing traffic mainly consisted of passenger ships conducting cruises, none of which was considered regular traffic. It was found that during the summer study period 41% of all passenger vessels were ferries, followed by tour boats (31%) and cruise vessels (21%). Figure 21.4 illustrates the summer AIS passenger vessel tracks within the 5 nm study area.

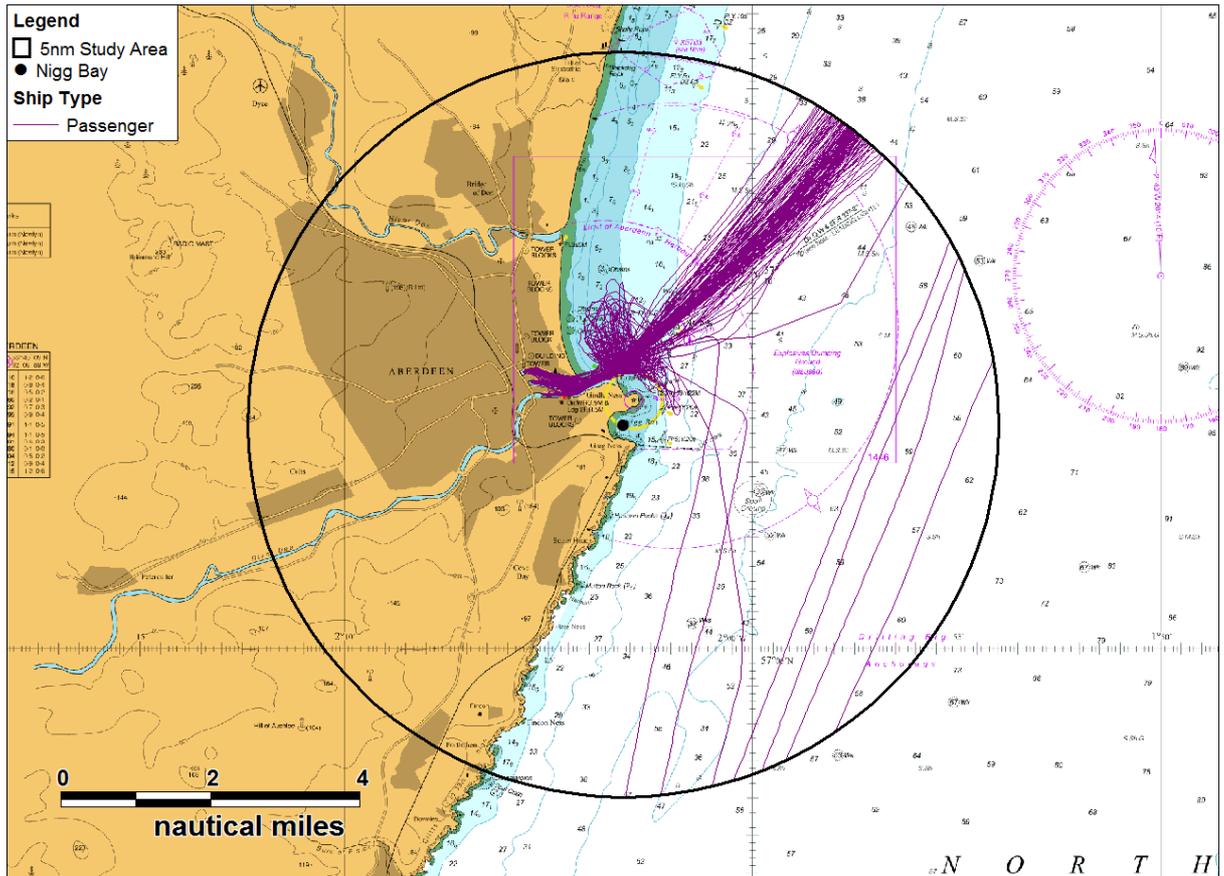


Figure 21.4: Summer passenger vessel tracks - 5 nm study area

Source: Anatec Limited, 2015

21.5.4 Offshore Vessel

Offshore vessels were the most common traffic type during the assessment period, accounting for 68% of vessels in the summer and 71% in the winter. The majority of these offshore vessels were supply vessels (72% in summer and 76% in winter). Offshore vessel activity was generally from vessels on passage between Aberdeen Harbour and various oil and gas fields in the North Sea. It was estimated that an average of 28 and 24 unique vessels per day crossed the entrance to the current harbour during the summer and winter respectively (inclusive of inbound and outbound vessels). The longest offshore vessel transiting through the study area measured 132 m in length, and the longest offshore vessel entering Aberdeen Harbour measured 156 m. Figure 21.5 illustrates the summer AIS offshore vessel tracks within the 5 nm study area.

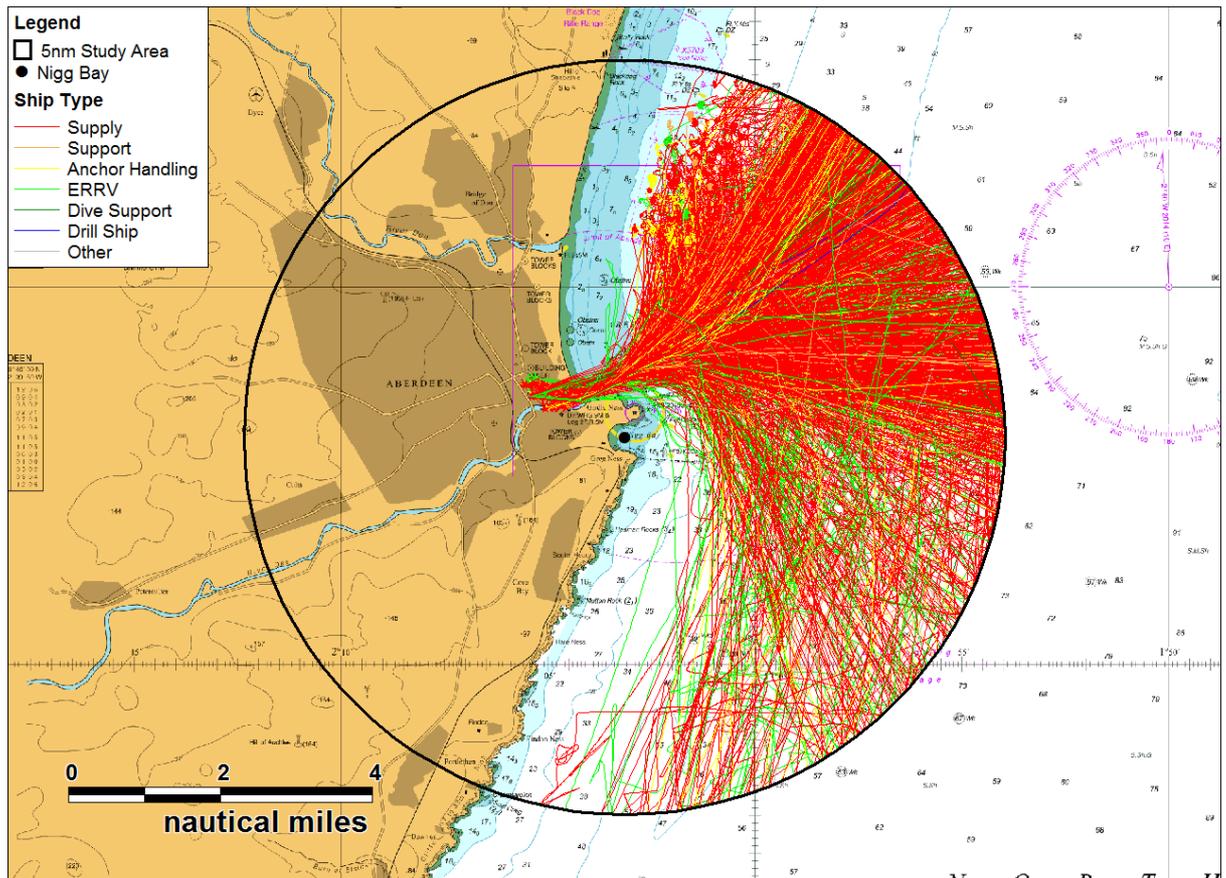


Figure 21.5: Summer offshore vessel tracks - 5 nm study area
Source: Anatec Limited, 2015

21.5.5 Fishing Vessel

Activity from fishing vessels is likely to be under represented as a consequence of the AIS carriage requirements under the SOLAS convention. During the winter study period only vessels larger than 18 m were obligated to carry AIS equipment. However, during the summer survey period this ruling was widened to include all 15 m vessel. Fishing vessels less than 15 m are not obligated to carry AIS equipment or transmit signal; therefore it is thought that their activity was under represented.

To initially identify areas where fishing occurred, Vessel Monitoring Service (VMS) satellite data from 2012 was used. However, VMS data only includes information from vessels with a length of 15 m and above. The majority of fishing occurred between 7 nm and 12 nm to the north-east of Nigg Bay (Figure 21.6). During the summer study period only one vessel was seen to fish frequently within Nigg Bay, an 8 m long potter. During the winter no fishing vessels (15 m length or above) were recorded. During both the summer and winter study period, active dredging activity was noted to have occurred approximately 7 nm to 10 nm north-east of Nigg Bay. During the summer and winter study period there were seven and five unique fishing vessels seen entering the current Aberdeen Harbour, respectively. A total of 25 other fishing vessels were also seen within the 12 nm study area during summer. These fishing vessels are likely to be associated with other fishing ports on the Scottish coast. During the summer study period within the 12 nm and 5 nm zones, the dominant fishing gear were potters, followed by dredgers. However, during the winter study period the reverse was found. As previously discussed it should be taken into consideration that smaller fishing vessels are not obliged to transmit AIS, and activity may be under-represented. For further information please refer to Chapter 22: Commercial Fisheries.

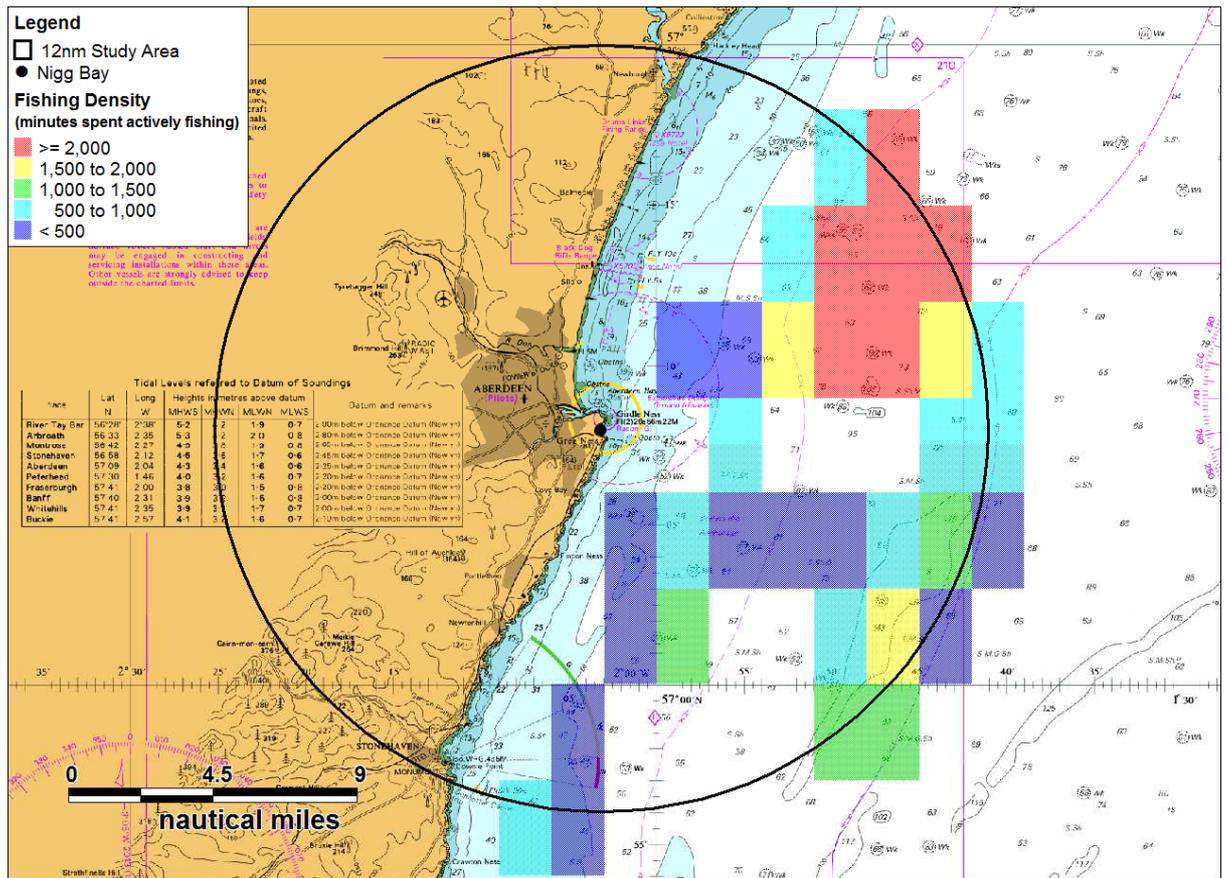


Figure 21.6: 2012 Fishing density VMS data

Source: Anatec Limited, 2015

21.5.6 Recreational Vessel

In general, recreational vessel activity is highly seasonal, with the majority of activity occurring during summer. No recreational vessels were recorded during the winter period. The limitations associated with tracking small recreational vessel activity on AIS are the same as described in Section 21.5.5. Recreational cruising routes based on the Royal Yachting Association (RYA) Coastal Atlas (RYA, 2009) illustrates eight 'medium use' routes intersecting the 12 nm study area, two of which are associated with Aberdeen. 'Medium use' is described as a popular route on which some recreational craft will be seen at most times during summer daylight hours. A total of 80 unique recreational vessels were seen within the 12 nm study area, all of which were less than 25 m in length. The majority of recreation vessels were passing traffic, with a total of 12 unique recreational vessels seen crossing the Aberdeen Harbour entrance. Figure 21.7 illustrates the summer AIS recreational vessel tracks within the 5 nm study area.

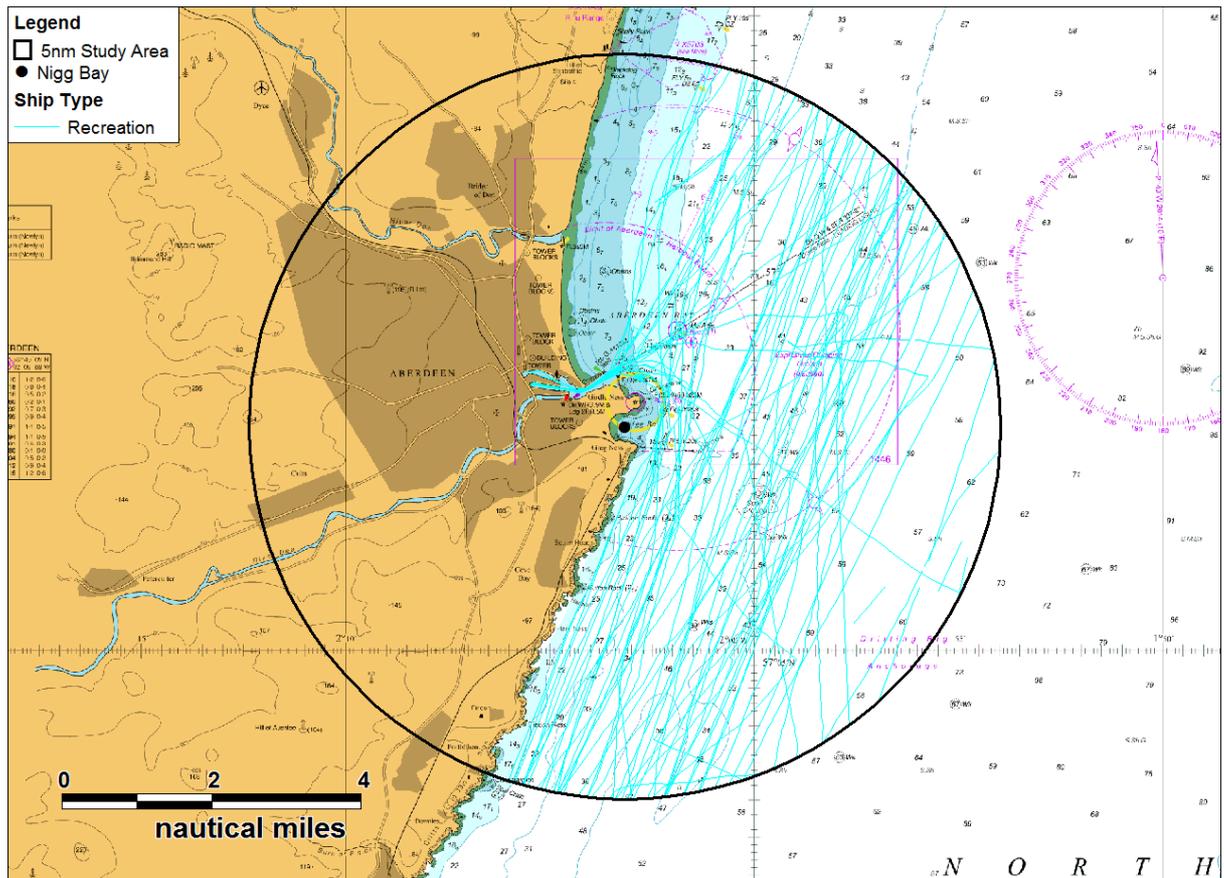


Figure 21.7: Summer recreational vessel tracks - 5 nm study area
Source: Anatec Limited, 2015

In response to the stakeholder consultation (Section 21.2.4) the RYA stated that they were “not aware of any use being made of Nigg Bay for recreational sailing”. They also state that any recreational craft on passage around Nigg Bay would tend to be far enough offshore to avoid shipping traffic from Aberdeen or vessels at anchorage. The Sailing Directions for east coast Scotland are being re-edited with publication scheduled for the end of 2016.

21.5.7 Anchored Vessel

North of Aberdeen Harbour there is a designated anchorage area. Drilling rigs are designated anchorage 5 nm south-east of Nigg Bay. During the study period the majority of anchoring occurred within the designated anchorage north of the existing harbour. During the summer study period 11 vessels per day were recorded using the anchorage, reducing to four in the winter. Large shuttle tankers were also recorded at anchorage east of the harbour during the study period, the closest approximately 1.2 nm from Nigg Bay. Shuttle tankers were also seen anchoring east of the harbour, approximately 1.9 nm from Nigg Bay, and at the drilling rig anchorage. Anchorage in the study area is dominated by offshore vessels, 81% in the summer and 86% in the winter off all vessels anchored. Figure 21.8 illustrates the summer AIS anchored vessel within the 5 nm study area.

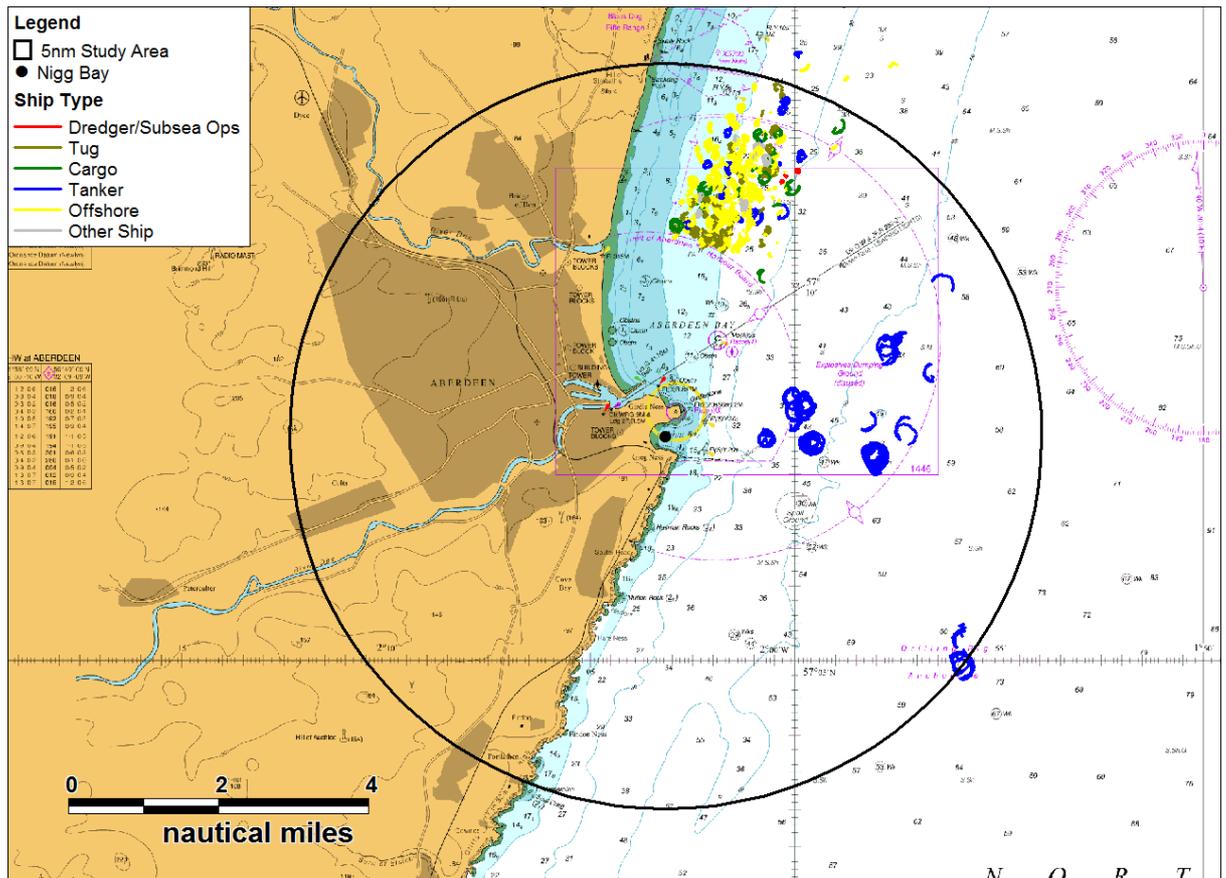


Figure 21.8: Summer Anchor vessel - 5 nm study area
Source: Anatec Limited, 2015

21.5.8 Maritime Incidents

Using data from Marine Accident Investigation Branch (MAIB), the Royal National Lifeboat Institution (RNLI), and internal reports created by Aberdeen Harbour Board, the volume of maritime incidents within the 12 nm study area were assessed.

Data from the MAIB between 2004 and 2013 for all UK commercial vessels within the study area found an average of 11 incidents per year were recorded. It was established that the majority (89 out of 91) of incidents recorded as occurring within the ‘Port/Harbour Area’ were grouped by MAIB into one geographical location just outside the current harbour. This is a limitation of the MAIB data, where the specific location is sometimes grouped to a nearby point. Approximately 37% of incidents were recorded as an ‘accident to person’, with a further 24% as ‘contact’ (ship making contact with a static object). ‘Machinery failure’ and ‘collision’ (involving two moving objects) was responsible for 14% and a further 9% all of incidents respectively. No other incident type represented more than 5%.

Incident data from the RNLI between 2001 and 2010 in the vicinity of the harbour breakwaters found an average of 14 incidents per year. However, many of the incidents involve people rather than vessels. Similarly to the MAIB data, the most common incident type was ‘person in danger’, with approximately 68% of all incidents. A further 11% of incidents occurred as a result of ‘machinery failure’, ‘adverse conditions’ and ‘vessel other’ each represented 6% of incidents.

Incident data from Aberdeen Harbour Board between 2008 and 2013 describe an average of 0.98 incidents per 1,000 vessel movement within the harbour. The majority of these incidents were caused by hard landing/berthing. Data indicates that incidents with the potential for severe consequences (grounding/fire/explosion) are in the minority when compared to the other incident causes (berthing/equipment failure/near miss).

21.5.9 Vessel Encounters

The AIS data was used to identify all vessel encounters (when two vessels come within 500 m of one another) within the vicinity of Nigg Bay (Figure 21.9). An area located 2 nm east and 3 nm north of Nigg Bay were found to have the highest levels of vessel encounters. The total number of encounters during the study period was 1,645 (1,087 in summer and 558 in winter). On average there were 14 encounters per day recorded over the combined study period (18 on average in summer, and 9 in winter). The busiest days were both recorded in summer, when 44 encounters were recorded. The majority of vessel encounters involved offshore vessels (61% of vessels in summer and 65% in winter) followed by tugs (9% in summer and 13% in winter), ‘other’ (11% in summer and 6% in winter) and cargo (7% in summer and 10% in winter).

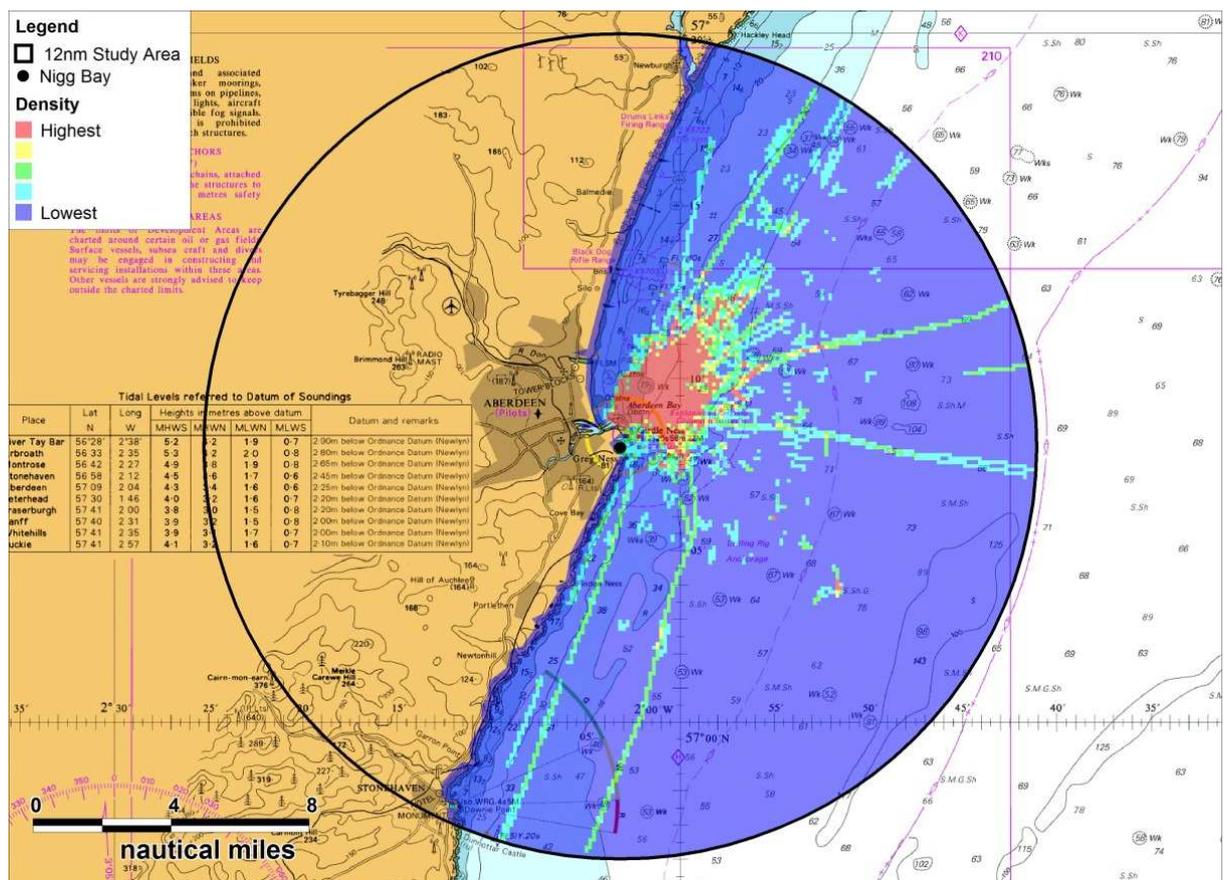


Figure 21.9: Encounter density – 12 nm study area

Source: Anatec Limited, 2015

21.5.10 Ship to Ship Collision Risk

The ‘Ship to Ship’ model within Anatec’s COLLRISK software was used to estimate the current risk of a vessel to vessel collision in the vicinity of Aberdeen Harbour. The AIS data was used to identify the regular shipping routes used by vessels within the 5 nm study area. The number of vessels using each route, broken down by vessel type and size, was then estimated. Recreational vessels, fishing

vessels, and any temporary or non-routine traffic were not included in this route analysis. The total ship to ship collision risk was estimated to be 8.39×10^{-3} , which corresponds to an average of one incident per 119 years. It is perceived that the significant ship to ship risk was caused by vessels on routes bound north-east from the current harbour. The lowest areas of risk were in coastal regions, including Nigg Bay (Figure 21.10).

Further details of the COLLRISK software is provided in Appendix 21-A: Nigg Bay Development Baseline Assessment for Shipping and Navigation.

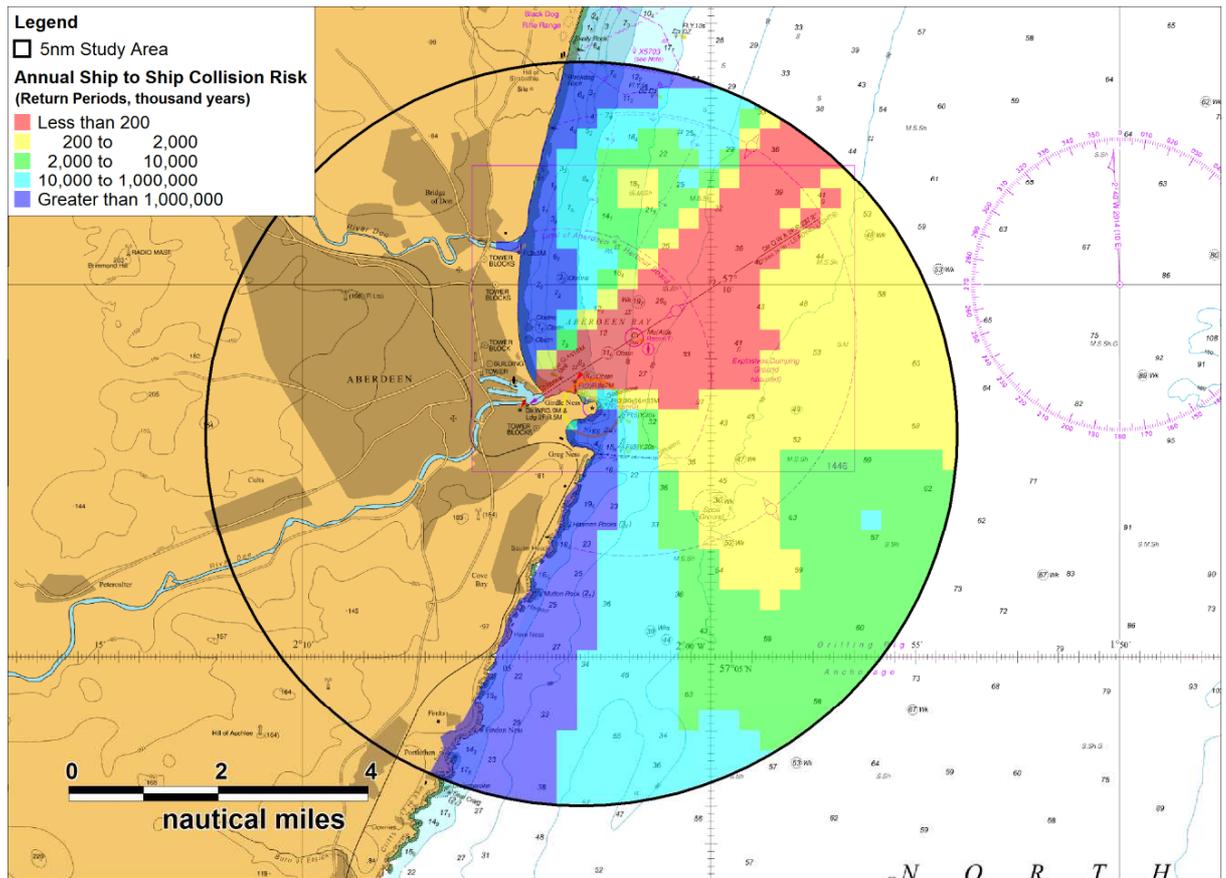


Figure 21.10: Ship to ship collision risk – 5 nm study area

Source: Anatec Limited, 2015

21.5.11 Potential Future Ship To Ship Collision Risk

In order to assess the impact of the Aberdeen Harbour Expansion Project on ship to ship collision risk, increases in shipping traffic in the vicinity of Nigg Bay were estimated and used to create a future case route set. These traffic levels and distributions were based on realistic worst case scenario modelling predictions. A full list of the assumptions used can be found in Appendix 21-A: Nigg Bay Development Baseline Assessment for Shipping and Navigation.

Modelling the new routes associated with Aberdeen Harbour Expansion Project estimated a total collision frequency of 1.71×10^{-2} , which corresponds to a vessel being involved in a collision once every 59 years (per vessel) within the 5 nm study area. The area of significant risk extended further south due to the predicted Nigg Bay traffic. Traffic on routes from the east and south-east were also found to cause higher risk, as did the routes associated with the anchorage (Figure 21.11). The

increased collision risk is thought to be as a consequence of the new routes being provided, an increase in the size of vessels associated with the extra capacity and quay size; and vessel interactions rise at a nonlinear rate as the number of vessels rise. It should be noted that the model does not take into account the use of VTS. However, a study by the MCA (MCA, 1998) noted, in respect of the Dover Strait, that the overall effect of VTS reduced the possibility of collision by 40%. The risk would be further reduced if the boundaries of the VTS were to be expanded as part of the project.

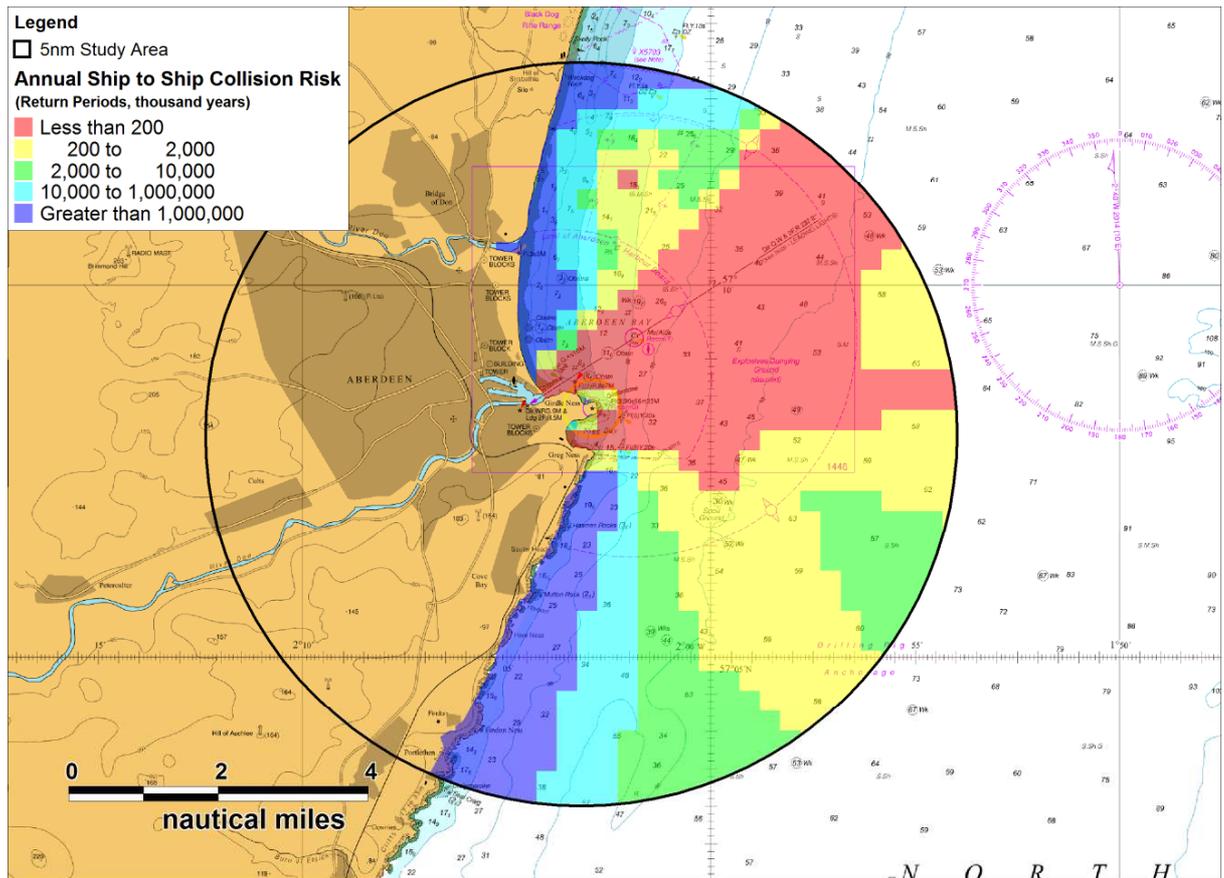


Figure 21.11: Potential future ship to ship collision risk – 5 nm study area
 Source: Anatec Limited, 2015

21.6 Assessment of Impacts

21.6.1 Design Parameters Used in the Assessment

This section details the impacts identified in the impact assessment/NRA workshop. The findings describe the realistic worst case scenarios, which are considered in conjunction with embedded mitigation measures (Section 21.7.1). The realistic worst case scenarios will have a greater consequence and occur less frequently than the most likely consequences. Impact specific mitigation methods (Section 21.8) have been identified to further reduce the consequences of the project on shipping and navigation.

21.6.2 Construction Phase Impacts

Vessel Allision with the Partially Constructed Breakwater/Quayside

During the construction phase, impacts could include an increased risk of vessels alliding with the partially constructed breakwater/quayside, due to the fact that navigational aids (e.g. lights and markings) may not all be present.

Incidents would have a 'moderate' level of consequence due to the potential for damage/injury and the limited ability of a vessel to adapt to the partially exposed (possibly submerged at different states of the tide) breakwater/quayside. The impact will be localised to the extent of the breakwater/quayside construction within Nigg Bay and present for the 3 year construction period. The frequency of occurrence would be 'extremely unlikely' due to the embedded mitigation measures (Section 21.7.1) and low level of traffic in proximity to Nigg Bay, giving the impact an overall ranking of 'tolerable'. Additional specific mitigation measures have been identified to further reduce the consequence of the impact:

- Appointment of dedicated Construction Marine Coordinator to liaise with VTS (Section 21.8.1);
- Advanced announcement of information (to specific receptors) (Section 21.8.2) ;
- Planning so as to not impact adverse weather approaches (Section 21.8.3); and
- VTS (at a suitable level) (Section 21.8.4).

Vessel-to-Vessel Collision due to Avoidance of the Site (Construction Phase)

Construction phase impacts include displaced traffic increasing congestion outside of the site during construction. This can lead to an increase in vessel-to-vessel encounters (passing or crossing traffic) and an increased possibility of collisions.

Incidents would have a 'serious' level of consequence due to the potential for major damage/injury. The impact will be localised to Nigg Bay and near coastal waters where construction activities are taking place. The frequency of occurrence would be 'negligible' due to the embedded mitigation measures (Section 21.7.1) and level of traffic in close proximity to Nigg Bay, giving the impact an overall ranking of 'tolerable'. Additional mitigation measures have been identified to further reduce the consequence of the impact:

- Appointment of dedicated Construction Marine Coordinator to liaise with VTS (Section 21.8.1).

Vessel-to-Vessel Collision due to Construction Phase/Support Vessels in the Area

Due to the increased number of vessels involved in construction activities, congestion outside of the site may occur. The impact would be an increase in vessel-to-vessel encounters (passing or crossing traffic) and an increased possibility of collisions.

Incidents would have a 'serious' level of consequence due to the potential for major damage/injury. The impact will be localised beyond Nigg Bay as far as construction vessels are active, which may be near the coast for the majority of vessels, but may extend further for vessels bringing materials to the development. The frequency of occurrence would be 'negligible' due to the embedded mitigation measures (Section 21.7.1), level of traffic in proximity to Nigg Bay and the duration of the construction

phases, giving the impact an overall ranking of 'tolerable'. Additional mitigation measures have been identified to further reduce the consequence of the impact:

- All work vessels required to carry AIS regardless of size (Section 21.8.6);
- Appointment of dedicated Construction Marine Coordinator to liaise with VTS on the construction plans daily (Section 21.8.1); and
- Installation of CCTV within Nigg Bay (Section 21.8.5).

Fishing Gear Interactions with Subsurface Structure

Construction phase impacts include the potential for fishing vessel gear becoming snagged on subsea structures (breakwater/quay foundation).

Incidents would have a 'moderate' level of consequence due to the potential for damage/injury. The impact will be localised to Nigg Bay. The frequency of occurrence would be 'negligible' due to the embedded mitigation measures (Section 21.7.1) and the low level of fishing occurring within Nigg Bay. Commercial fishing boats would be aware of the hazard during construction activities and would not fish where pots would be damaged and lost, giving the impact an overall ranking of 'broadly acceptable'. Additional mitigation measures have been identified to further reduce the consequence of the impact:

- Advanced announcement of information (to specific receptors) (Section 21.8.2); and
- Liaison with fishermen.

Construction Vessel Allision with the Development

Construction phase impacts include the potential for a construction vessel to allide with the development.

Incidents would have a 'serious' level of consequence due to the potential for major damage/injury. The impact will be localised to the extent of the breakwater/quayside construction within Nigg Bay and will be present for the three year construction period. The frequency of occurrence would be 'remote' due to the embedded mitigation measures (Section 21.7.1) and high level of traffic movements associated with construction activities within Nigg Bay, giving the impact an overall ranking of 'tolerable'. Additional mitigation measures have been identified to further reduce the consequence of the impact:

- Appointment of dedicated Construction Marine Coordinator to liaise with VTS (Section 21.8.1);
- Advanced announcement of information (to specific receptors) (Section 21.8.2);
- Planning so as to not impact adverse weather approaches (Section 21.8.3); and
- VTS (at a suitable level) (Section 21.8.4).

Construction Vessel Collision with Another Construction Vessel

Construction phase impacts include the potential for construction vessel collisions whilst undertaking construction activities at the site.

Incidents would have a 'serious' level of consequence due to the potential for major damage/injury. The impact will be localised to the extent of the construction activities within Nigg Bay and will be present for the three year construction period. The frequency of occurrence would be 'negligible' due to the embedded mitigation measures (Section 21.7.1), the area of available water and slow speed of vessels conducting works activates, giving the impact an overall ranking of 'tolerable'. Additional mitigation measures have been identified to further reduce the consequence of the impact:

- All work vessels required to carry AIS regardless of size (Section 21.8.6); and
- Appointment of dedicated Construction Marine Co-ordinator to liaise with VTS on the construction plans daily (Section 21.8.1).

Construction Vessel Snagging on Fishing Pots

Construction phase impacts include the potential for a workboat to become entangled/disabled by the buoyed line attached to a fishing pot.

Incidents would have a 'minor' level of consequence due to the potential for minor damage/injury. The impact will be localised to near coastal waters (due to potting/construction activities) and will be present for the 3 year construction period. The frequency of occurrence would be 'negligible' due to the embedded mitigation measures (Section 21.7.1) and the low level of fishing occurring within Nigg Bay. Commercial fishing boats would be aware of the hazard during construction activities and would not fish where pots would be damaged and lost, giving the impact an overall ranking of 'broadly acceptable'. Additional mitigation measures have been identified to further reduce the consequence of the impact:

- Construction vessel transit routes made known (Section 21.8.2); and
- Liaison with fishermen.

21.6.3 Sources of Impact During Construction and Operational Phases

Commercial Vessel (Powered) Allision with the Development

Construction and operational phase impacts include the potential for a commercial vessel (e.g. cargo ship, passenger ship or tanker) to allide with the development when under power (steaming).

Incidents would have a 'moderate' level of consequence due to the potential for damage/injury. The impact will be localised to the extent of the breakwater/quayside within Nigg Bay. The frequency of occurrence would be 'extremely unlikely' due to the embedded mitigation measures (Section 21.7.1), the sheltered nature of the harbour (within Nigg Bay) and the low level of traffic transiting in close proximity to Nigg Bay, giving the impact an overall ranking of 'tolerable'. Additional mitigation measures have been identified to further reduce the consequence of the impact:

- Pilotage training (different requirements to current harbour) (Section 21.8.7);
- Expansion of VTS (pre-construction) to cover new harbour limits (Section 21.8.4); and
- Appointment of dedicated Construction Marine Co-ordinator to liaise with VTS (Section 21.8.1).

Drifting Vessel Allision with the Development

Construction and operational phase impacts include the potential for a vessel to lose power and drift with wind and/or tide into the development.

Incidents would have a 'serious' level of consequence due to the potential for major damage/injury. The serious consequence level is due to the slow potential speed, low energy of the impact and the size of vessels anchoring nearby (shuttle tankers). The impact will be localised to the extent of the breakwater/quayside within Nigg Bay. The frequency of occurrence would be 'extremely unlikely' due to the embedded mitigation measures (Section 21.7.1), the sheltered nature of the harbour (within Nigg Bay) and the low level of traffic transiting in close proximity to Nigg Bay and utilising the good holding ground to anchor, giving the impact an overall ranking of 'tolerable'. It should be noted that in the absence of the new harbour, a drifting vessel would drift ashore. Therefore, the impact of the new harbour has no difference in the end result from the baseline conditions. Additional mitigation measures have been identified to further reduce the consequence of the impact:

- Shuttle tanker anchorage area moved during construction, if required (Section 21.8.8).

Fishing Vessel Allision with the Development

Construction and operational phase impacts include the potential for a fishing vessel to allide with the development whilst fishing in the area or steaming in transit.

Incidents would have a 'minor' level of consequence due to the potential for damage/injury and low energy of the impact. The impact will be localised to the extent of the breakwater/quayside within Nigg Bay. The frequency of occurrence would be 'negligible' due to the embedded mitigation measures (Section 21.7.1), the sheltered nature of the harbour (within Nigg Bay) and the very low level of commercial fishing traffic transiting in close proximity to Nigg Bay, giving the impact an overall ranking of 'broadly acceptable'. Additional mitigation measures have been identified to further reduce the consequence of the impact:

- Advanced announcement of information (to specific receptors) (Section 21.8.2); and
- Liaison with fishermen.

Recreational Craft Allision with the Development

Construction and operational phase impacts include the potential for a recreational craft to allide with the development.

Incidents would have a 'minor' level of consequence due to the potential for damage/injury and low energy of the impact. The impact will be localised to the extent of the breakwater/quayside within Nigg Bay. The frequency of occurrence would be 'extremely unlikely' due to the embedded mitigation measures (Section 21.7.1), the sheltered nature of the harbour (within Nigg Bay) and the low level of recreational traffic transiting in close proximity to Nigg Bay, giving the impact an overall ranking of 'broadly acceptable'. Additional mitigation measures have been identified to further reduce the consequence of the impact:

- Use of works vessel as guard vessel (Section 21.8.9);

- CCTV installed in Nigg Bay (Section 21.8.5); and
- Advanced announcement of information to specific receptors (contact with recreational facilities and clubs) (Section 21.8.2).

21.6.4 Sources of Impact During Operational Phase

Vessel Allision with the Fixed Fully Constructed Structure

Operational phase impacts include an increased risk of vessel allisions with the breakwaters and quayside.

Incidents would have a 'moderate' level of consequence due to the potential for damage/injury, and the slow potential speed/low energy of the impact of vessels entering/departing the harbour. The impact will be localised to the extent of the breakwater/quayside within Nigg Bay. The frequency of occurrence would be 'extremely unlikely' due to the embedded mitigation measures (Section 21.7.1), the sheltered nature of the harbour (within Nigg Bay) and the low level of traffic transiting in close proximity to Nigg Bay, giving the impact an overall ranking of 'tolerable'. Additional mitigation measures have been identified to further reduce the consequence of the impact:

- Pilotage training (different competence requirements to current harbour) (Section 21.8.7);
- Pilot exemption and vessel specification considered against the implication to safety (Section 21.8.1); and
- Expansion of VTS upon completion to cover new harbour limits (Section 21.8.4).

Vessel-to-Vessel Collision due to Avoidance of the Site (Operational Phase)

During the operational phase displaced traffic could result in an increase in congestion outside of the site. The impacts would be an increase in vessel-to-vessel encounters (passing or crossing traffic) and a corresponding increase in the possibly of collisions.

Incidents would have a 'serious' level of consequence due to the potential for major damage/injury. The impact will be localised to the near coastal waters. The frequency of occurrence would be 'negligible' due to the embedded mitigation measures (Section 21.7.1), giving the impact an overall ranking of 'tolerable'. Additional mitigation measures have been identified to further reduce the consequence of the impact:

- Expansion of VTS upon completion to cover new harbour limits (Section 21.8.4).

21.7 Mitigation and Residual Impacts

This section details the mitigation measures that have been identified during the NRA, both from good industry practice and specific mitigation measures highlighted during the stakeholder consultation and at the hazard review workshop.

21.7.1 Proposed Embedded Mitigation Measures

- Announcement of information (including Notice to Mariners and/or radio warnings);
- Compliance with MCA guidance;
- Compliance with IALA guidance;

- Safety or Precautionary Zones;
- Compliance with Construction Design and Management Regulations;
- Compliance with industry best practices;
- Compliance with international conventions (SOLAS/COLREGS etc.);
- Compliance with the Port Marine Safety Code and guidance;
- Processes in place for direct liaison between VTS and any marine contractors (planned vessel movements);
- Permanent and temporary/phased aids to navigation;
- Health Safety and Environment Compliance; and
- Works vessel planning and coordination to ensure that construction vessels do not pose a hazard to other users.

21.7.2 Emergency Response Currently in Place

The following section outlines the facilities provided by emergency response organisations relative to the project currently in place which aid in the mitigation of any potential consequences as a result of an impact from the project.

21.7.3 MCA Including HM Coastguard

The Coastguard (HMCG) coordinates Search and Rescue (SAR) through a network of Coastguard Operations Centres (CGOC), previously called Maritime Rescue Co-ordination Centres (MRCCs). There is an MRCC stationed within the current Aberdeen Harbour.

The HMGC is currently introducing a new scheme which will see the overall number of MRCCs reduced to ten, in addition to the National Maritime Operations Centre (NMOC). A number of these MRCCs are currently being upgraded to better manage the SAR workload. The rescue resources themselves will not be reduced, and the Aberdeen CGOC is to remain in place.

21.7.4 Search and Rescue Helicopters

In March 2013 the Department for Transport awarded a ten year UK SAR contract to Bristow Helicopters Ltd. A total of ten helicopter bases are planned by Bristow, with four in range of Nigg Bay. The nearest planned base to Nigg Bay is Inverness, located approximately 75 nm west-north-west, with this base being one of the initial two bases going operational in April 2015. The three subsequent bases with an action radius covering Nigg bay are Prestwick (130 nm south-west), Stornoway (150 nm west-north-west), and Sumburgh (170 nm north). All helicopters operate to a dedicated readiness level, being able to launch within 15 minutes between the hours of 08:00 and 22:00, and within 45 minutes between the hours of 22:00 and 08:00.

Based on the above information, a helicopter sent from Inverness would reach Nigg Bay in approximately 46 minutes during the 15 minute response period (day) and 1 hour 1 minute during the 45 minute response period (night).

21.7.5 Emergency Towing Vessels

Where there is a serious risk of harm to persons or property, or a significant risk of pollution, emergency towing arrangements can be initiated. The MCA has a framework agreement with the British Tugowners Association (BTA) for emergency chartering arrangements for harbour tugs. The agreement covers activation, contractual arrangements, liabilities and operational procedures, should the MCA request assistance from any local harbour tug as part of the response to an incident. Modern harbour tugs are often capable of providing an effective emergency service in all but the worst weather conditions, and to the largest vessels. The availability of towage is noted in Section 21.7.7, where it is expected to be readily available due to the nature of vessels operating locally.

21.7.6 Royal National Lifeboat Institution (RNLI)

The RNLI has a launch station located within the existing Aberdeen Harbour, which operates two lifeboats. It is estimated that in good conditions based on the maximum speed and distance to transit that either lifeboat could reach Nigg Bay in approximately 5 minutes from departing the berth. This however does not include the time taken to muster the crew and receive approval for the response, as this will vary.

21.7.7 Harbour Capability

Aberdeen Harbour Board (AHB) has a planned and exercised capability to assist in the event of an incident. The harbour authority is responsible for managing (AH, 2014) the overall response to any incident within the harbour limits. The responsibilities are noted within the Marine Safety Management System. HM Coastguard will still manage the Search and Rescue phase of the incident, as they do outside the harbour limits, but will coordinate with Aberdeen VTS.

AHB has an advanced level of preparedness for incidents, maintaining plans for incidents, training and exercising staff, as well as documenting this process.

Towage

Towage capability is available from either the tugs that operate at the existing harbour or suitable offshore vessels by arrangement during an incident. These are highly likely to be available during an emergency situation due to the high volume of suitable vessels operating in the area involved in towage and the oil and gas industry.

Pollution

AHB has both equipment and trained staff to respond to pollution incidents within harbour limits, as required by the Oil Pollution Preparedness Response and Cooperation Convention. The Aberdeen Harbour Oil Spill Response Contingency Plan is approved by the MCA and meets the requirements of the convention. In the instance of a large pollution incident the MCA would assist with the response in line with the UK National Contingency Plan.

21.8 Specific Mitigation Measures

The following sections describe the specific mitigation measures which have been identified during the consultation and assessment. A summary of the mitigation measures for each identified consequence is described in Section 21.6.

21.8.1 Appointment of Dedicated Construction Marine Co-ordinator (CMC)

The primary function of this role will be to maintain a complete overview of current and planned construction activities, to liaise daily with VTS on the construction plans and ensure compliance by construction works vessels with the standards set by AHB. This compliance can take place through regular safety checks and be verified by an AHB representative.

21.8.2 Advanced Announcement of Information

Advanced announcement of information to specific receptors would surpass the current announcement process (e.g. Notice to Mariners and/or radio warnings). These announcements would specifically target both local and national/international clubs and associations with safety information. This would highlight hazard presence, detail the construction vessel transit routes and warn of any operations or exclusion zones in force. This is of particular use for fishing and recreational receptor, but may also benefit some elements of the commercial shipping receptors (e.g. shuttle tankers).

21.8.3 Accommodating Vessel Routing

Any construction activities will be planned so as to not impact adverse weather approaches.

21.8.4 VTS

Current VTS coverage and operation would be reviewed and could be utilised (at a suitable level) to further the benefits to safety for the new harbour. This will be planned so as to not impact the current operation of VTS. The review will also include an assessment of the benefit of the expansion of VTS upon completion to cover the new harbour limits and any changes required (staffing etc.).

21.8.5 CCTV

The installation of CCTV within Nigg Bay would allow for remote surveillance activities and provide an opportunity to oversee safety and compliance, as well as monitor passing traffic.

21.8.6 AIS

The use of AIS is well established and the benefit to both collision avoidance and monitoring of vessels is accepted. This will be extended to all vessels involved in construction activities regardless of carriage requirements or size.

21.8.7 Pilotage Training

Pilotage training will be revised to include the different competence requirements for the new harbour. Where required, this will include revisions to the pilot exemption/experience requirement. Vessel specification will be considered against the implication to safety.

21.8.8 Shuttle Tanker Anchorage

The anchorage area preferred by shuttle tankers east of Nigg Bay could be moved further from operations during construction activities. Options around creating a temporary designated anchorage a safe distance from Nigg Bay could be discussed with the MCA as part of this process.

21.8.9 Guard Vessel

The use of a works vessel as guard vessel during construction activities would ensure compliance with any exclusion zone and ensure that in any developing situation a guard vessel would be available.

21.9 Cumulative Impacts

Cumulative impacts have been identified and assessed where there is potential overlap between the project and the activities of those developments listed in Table 21.5. The cumulative impacts of other developments were considered, however, these were scoped out due to distance from the project. The potential cumulative effects are assessed and discussed below. Cumulative effects refers to impacts on shipping and navigation arising from any planned and/or consented port development (and their associated activities).

Table 21.5: Projects and plans considered within the assessment

Project/Proposed Development	Approximate Distance to Project [nm]	Status	Effects Identified
Peterhead Harbour	24	Approved	Not expected to have an effect upon the project due to the distance from the new harbour and that the planned construction phases will only coincide for one year, in 2016, if the construction activities are completed as planned.
European Offshore Wind Deployment Centre	5	Approved	If the construction period of this development coincides with the development of the project then there would be an increase in construction related traffic in the area. However, due to the current capacity of Aberdeen Harbour it is unlikely that construction vessels from this development would be able to operate from here. This would reduce the effect on the project, ensuring that there is no impact in proximity to the harbour development. This, when evaluated within the open waters around these developments would indicate that any impact would be small.
Kincardine Offshore Wind Farm	8	Awaiting approval	If the construction period of this development coincides with the development of the Project then there would be an increase in construction related traffic in the area. However, due to the current capacity of Aberdeen Harbour it is unlikely that construction vessels from this development would be able to operate from here. This would reduce the effect on the project, ensuring that there is no impact in proximity to the harbour development. This, when evaluated within the open waters around these developments would indicate that any impact would be small.
Hywind Scotland Pilot Park	30	Approved	This development is not expected to impact upon the project due to the distance from the new harbour. There is a possibility that the deep water staging area is to be located to the south of the site. However, this would still be a significant distance away. If there is to be passing construction traffic, transiting to the deep water staging area, then this will take place in the open waters out with the coast and only pose a small impact.

21.9.1 Cumulative Impact Assessment Methodology

The cumulative impact assessment/NRA follows the same method as described in Section 21.3.3.

21.9.2 Cumulative Increase in Collisions

Cumulative impacts include an increased number of vessels involved in other relevant developments in the vicinity of Nigg Bay, with the potential to cause a corresponding increase in collisions between construction vessels.

Incidents would have a 'moderate' level of consequence due to the potential for damage/injury. The impact will be localised in the open waters out with the coast. The frequency of occurrence would be 'negligible' due to the embedded mitigation measures in place and the low probability of operating in the close proximity (e.g. during transit only/no capacity at Aberdeen/construction timelines may not occur at the same time), giving the impact an overall ranking of 'broadly acceptable'.

It is thought that the mitigation measures described in Section 21.7 will be sufficient to reduce the cumulative collision risk; therefore no additional specific mitigation measures have been identified.

21.10 Summary and Conclusions

The impact assessment/NRA assessed the shipping and navigational consequences as a result of the impacts ensuing from the Aberdeen Harbour Expansion Project through stakeholder consultation, site specific assessment and document review. This process identified thirteen potential hazards: four were assessed as being at a broadly acceptable level (low risk); nine at a tolerable level (intermediate risk); and there were no high risk/unacceptable hazards identified. The process proposed embedded mitigation, and subsequently recommended additional consequence specific mitigation measures.

The successful implementation of the embedded mitigation and additional specific mitigation measures will reduce the probability of the identified impacts and consequences occurring. This level of probability would result in no residual significant impacts on the safety of shipping and navigation during the construction or operational phase of the Aberdeen Harbour Expansion Project.

21.11 References

1. AH, 2014. *Marine Safety Management System. Version 4.5*. Aberdeen: Aberdeen Harbour.
2. ANATEC LIMITED, 2015. *Nigg Bay Development Baseline Assessment for Shipping and Navigation*. Report reference: A3501-FUG-TN-2.
3. HYDROGRAPHER OF THE NAVY, 2008. *Norwegian Sea – Føroyar to Bergen*. Admiralty Chart 2182D.
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6. UKHO (2009) *North Sea – Central*, Admiralty Chart 2182B. The United Kingdom Hydrographic Office, Somerset.
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