TotalEnergies E&P North Sea UK Ltd

Culzean Floating Offshore Wind Turbine Pilot Project

Environmental Impact Assessment Report – Chapter 13 - Shipping and Navigation

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REV	DATE	DESCRIPTION	ISSUED	CHECKED	APPROVED	CLIENT
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GLOSSARY

TERMINOLOGY	DESCRIPTION
Allision	The act of striking or collision of a moving vessel against a stationary object.
Automatic Identification System (AIS)	A system by which vessels automatically broadcast their identity, key statistics including location, destination, length, speed and current status, e.g., under power. Most commercial vessels and European Union (EU) fishing vessels over 15 m length are required to carry AIS.
Collision	The act or process of colliding (crashing) between two moving objects.
Culzean Floating Offshore Wind Turbine Pilot Project (the 'Project')	The entire Development including all offshore components and all project phases from pre-construction to decommissioning.
Floating Wind Turbine Generator (WTG)	Device that converts the kinetic energy of wind into electrical energy. Can be functionally divided into four parts: wind turbine, tower and transition piece, floating foundation, and mooring system.
Formal Safety Assessment (FSA)	A structured and systematic process for assessing the risks and costs (if applicable) associated with shipping activity.
Future Case	The assessment of risk based on the predicted growth in future shipping densities and traffic types as well as foreseeable changes in the marine environment.
Innovation and Targeted Oil and Gas (INTOG)	The Initial Plan Framework Sectoral Marine Plan for Offshore Wind for INTOG encompasses spatial opportunities and a strategic framework for future offshore wind developments within sustainable and suitable locations that will help deliver the wider United Kingdom (UK) and Scottish Government Net Zero targets. The 'IN' component of INTOG consists of small-scale innovative projects of 100 Megawatts (MW) or less. The aim of the 'TOG' component is to supplying renewable electricity directly to oil and gas infrastructure. The Culzean Floating Wind Pilot Project falls under the TOG component of INTOG.
Main Commercial Route	Defined transit route (mean position) of commercial vessels identified within the specified Study Area.
Marine Guidance Note (MGN)	A system of guidance notes issued by the Maritime and Coastguard Agency (MCA) which provide significant advice relating to the improvement of the safety of shipping at sea, and to prevent or minimise pollution from shipping.
Marine Licence Application ('the Application')	A Marine Licence is granted under the Marine and Coastal Access Act 2009 for projects between 12-200 Nautical Miles (nm) from shore, or the Marine (Scotland) Act 2010 for projects between Mean High-Water Springs (MHWS) out to 12 nm from shore. The Application includes HRA-supporting documentation (where required), an application letter, Marine Licence application form and this EIAR.
Navigational Risk Assessment (NRA)	A document which assesses the overall impact to shipping and navigation of a proposed Offshore Renewable Energy Installation (OREI) based upon Formal Risk Assessment (FSA).
Offshore Renewable Energy Installation (OREI)	As defined by Marine Guidance Note (MGN) 654 (Merchant and Fishing) Safety of Navigation: Offshore Renewable Energy Installations (OREIs) –

TERMINOLOGY	DESCRIPTION
	Guidance on UK Navigational Practice, Safety and Emergency Response (Maritime and Coastguard Agency (MCA), 2021). For the purposes of this report and in keeping with the consistency of the Environmental Impact Assessment, OREI can mean offshore wind turbines and the associated electrical infrastructure such as offshore substations.
Project Design Envelope	The maximum range of design parameters of all infrastructure assessed as part of the EIA.
Project Area	The extent of the immediate area surrounding the floating Wind Turbine Generator (WTG) and cable route as characterised by the extent of the seabed environmental and habitat surveys. Also referred to as the Survey Area where specifically relating to survey activities.
Radio Detection and Ranging (Radar)	An object-detection system which uses radio waves to determine the range, altitude, direction or speed of objects.
Study Area	Receptor specific area used to characterise the baseline.
Survey Area	The area surveyed during site-specific surveys.
Unique Vessel	An individual vessel identified on any particular calendar day, irrespective of how many tracks were recorded for that vessel on that day. This prevents vessels being over counted. Individual vessels are identified using their Maritime Mobile Service Identity (MMSI).

ACRONYMS AND ABBREVIATIONS

ACRONYM/ ABBREVIATION	DESCRIPTION
AIS	Automatic Identification System
ALARP	As Low as Reasonably Practicable
ALB	All-Weather Lifeboat
AtoN	Aid to Navigation
CD	Chart Datum
CEA	Cumulative Effects Assessment
COLREGs	Convention on the International Regulations for Preventing Collisions at Sea
DECC	Department of Energy and Climate Change
DfT	Department for Transport
EEA	European Economic Area
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
ERCoP	Emergency Co-operation Plan
ERRV	Emergency Response and Rescue Vessel
ETAP	Eastern Trough Area Project
FSA	Formal Safety Assessment
FSO	Floating Storage and Offloading
GPS	Global Positioning System
GT	Gross Tonnes
HM Government	His Majesty's Government
HMCG	His Majesty's Coastguard
HSE	Health and Safety Executive
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IMO	International Maritime Organisation
INTOG	Innovation and Targeted Oil and Gas
kt	Knot
LOA	Length Overall
LMP	Lighting and Marking Plan
m	Metre
MAIB	Marine Accident Investigation Branch

ACRONYM/ ABBREVIATION	DESCRIPTION
MCA	Maritime and Coastguard Agency
MD-LOT	Marine Directorate Licensing Operations Team
MGN	Marine Guidance Note
MHWS	Mean High Water Springs
MMO	Marine Management Organisation
MPCP	Marine Pollution Contingency Plan
MSL	Mean Sea Level
NLB	Northern Lighthouse Board
nm	Nautical Mile
NRA	Navigational Risk Assessment
NCP	National Contingency Plan
OREI	Offshore Renewable Energy Installation
PLL	Potential Loss of Life
Radar	Radio Detection and Ranging
RNLI	Royal National Lifeboat Institution
RYA	Royal Yachting Association
SAR	Search and Rescue
SFF	Scottish Fishermen's Federation
SOLAS	Safety of Life at Sea
SWFPA	Scottish White Fish Producers Association
TPV	Third-Party Verification
UK	United Kingdom
UN	United Nations
UKHO	United Kingdom Hydrographic Office
UNCLOS	United Nations Convention on the Law of the Sea
VMS	Vessel Monitoring System
WTG	Wind Turbine Generator

13 SHIPPING AND NAVIGATION

13.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) presents the Shipping and Navigation receptors of relevance to the Culzean Floating Offshore Wind Turbine Pilot Project (the 'Project') and assesses the potential impacts from the construction, operation and maintenance and decommissioning of the Project on these receptors. Where required, mitigation is proposed, and the residual impacts and their significance are assessed. Potential cumulative impacts are also considered while transboundary impacts have been scoped out with the agreement of Scottish Ministers.

Anatec Ltd have drafted and carried out the impact assessment. Further competency details of the Project Team including lead authors for each chapter are provided in Chapter 1: Introduction. Table 13-1 below provides a list of all the supporting studies which relate to and should be read in conjunction with the Shipping and Navigation impact assessment. The key supporting study is the Navigational Risk Assessment (NRA), which is a requirement of the Maritime and Coastguard Agency (MCA) under Marine Guidance Note (MGN) 654 (MCA, 2021).

Table 13-1 Supporting studies

DETAILS OF STUDY	LOCATIONS OF SUPPORTING STUDY
Navigational Risk Assessment	Appendix H: Navigational Risk Assessment

The impact assessment presented herein draws upon information presented within other impact assessments within this EIAR, including:

- Chapter 12: Commercial Fisheries; and
- Chapter 16: Other Sea Users.

Where information is used to inform the impact assessment, reference to the relevant EIAR chapter is given. It is noted that this chapter focuses on navigational safety impacts to vessels in transit. Impacts relating to fishing gear are discussed in Chapter 12: Commercial Fisheries.

13.2 Legislation, policy and guidance

The following legislation, policy and guidance are relevant to the assessment of impacts from the Project on shipping and navigation:

- Legislation:
  - Convention on the International Regulations for Preventing Collisions at Sea (COLREGs) (International Maritime Organization (IMO), 1972/77;
  - International Convention for the Safety of Life at Sea (SOLAS) (IMO, 1974); and

  - United Nations Convention on the Law of the Sea (UNCLOS) (United Nations (UN), 1982).
- Policy:
  - United Kingdom (UK) Marine Policy Statement (UK Government, 2011) – sets out how marine plan authorities and decision makers should take into account and seek to minimise any negative impacts on shipping activity, freedom of navigation and navigational safety and ensure that their decisions are in compliance with international maritime law; and
  - Scotland's National Marine Plan (Scottish Government, 2015) – sets out how navigational safety in relevant areas used by shipping now and in the future should be protected. Relevant provisions are detailed below and have been considered in production of the EIAR:
    - Transport 1 "Navigational safety in relevant areas used by shipping now and in the future will be protected, adhering to the rights of innocent passage and freedom of navigation contained in the United Nations Convention on the Law of the Sea. The following factors will be taken into account when reaching decisions regarding development and use:
      - The extent to which the locational decision interferes with existing or planned routes used by shipping, access to ports and harbours and navigational safety. This includes commercial anchorages and defined approaches to ports.
      - Where interference is likely, whether reasonable alternatives can be identified.
      - Where there are no reasonable alternatives, whether mitigation through measures adopted in accordance with the principles and procedures established by the IMO can be achieved at no significant cost to the shipping or ports sector."
    - Transport 2 "Marine development and use should not be permitted where it will restrict access to, or future expansion of, major commercial ports or existing or proposed ports and harbours."
    - Transport 3 "Ferry routes and maritime transport to island and remote mainland areas provide essential connections and should be safeguarded from inappropriate marine development. Developments will not be consented where they will unacceptably interfere with lifeline ferry services."
    - Transport 6 "Developers should ensure displacement of shipping is avoided where possible to mitigate against potential increased journey lengths (and associated fuel costs, emissions and impact on journey frequency)."
- Guidance:
  - MGN 654 (Merchant and Fishing) Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response (MCA, 2021);
  - Revised Guidelines for Formal Safety Assessment (FSA) for Use in the International Maritime Organization Rule-Making Process (IMO, 2018);
  - MGN 372 Amendment 1 (Merchant and Fishing) Offshore Renewable Energy Installations (OREIs): Guidance to Mariners Operating in the Vicinity of UK OREIs (MCA, 2022);
  - International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Guideline G1162 Guidance on the Marking of Offshore Man-Made Structures (IALA, 2021a);
  - IALA Recommendations O-139 on The Marking of Man-Made Offshore Structures (IALA, 2021b);
  - Regulatory Expectations on Moorings for Floating Wind and Marine Devices (MCA and Health and Safety Executive (HSE), 2017);
  - The RYA's Position on Offshore Renewable Energy Developments: Paper 1 (of 4) – Wind Energy (Royal Yachting Association (RYA), 2019); and
  - Standard Marking Schedule for Offshore Installations (Department of Energy and Climate Change (DECC), 2011).

13.3 Scoping and consultation

Stakeholder consultation has been ongoing throughout the Environmental Impact Assessment (EIA) and has played an important part in ensuring the scope of the baseline characterisation and impact assessment are appropriate with respect to the Project and the requirements of the regulators and their advisors.

The Scoping Report was submitted to Scottish Ministers (Via Marine Directorate – Licensing Operations Team (MD-LOT)), on 14th April 2023, who then circulated the report to relevant consultees. The Scoping Opinion was received on 20th July 2023. Relevant comments from the Scoping Opinion and other consultation specific to shipping and navigation are provided in Table 13-2 below, which provides a high-level response on how these comments have been addressed within the EIAR.

Further consultation has been undertaken throughout the pre-application stage. The list below summarises the consultation activities carried out relevant to shipping and navigation which are also highlighted in Chapter 5: Stakeholder Engagement.

- Meeting with the MCA (13th July 2023) – introduction and discussion of methodology for vessel traffic data collection;
- Scoping Opinion (26th July 2023) – feedback from MD-LOT, MCA, and Scottish Fishermen's Federation (SFF) regarding the Project at the Scoping stage; and
- Hazard Workshop (17th October 2023) – review of baseline environment and discussion of shipping and navigation impacts including relevant embedded mitigation, attended by MCA, Northern Lighthouse Board (NLB), RYA Scotland, and Scottish White Fish Producers Association (SWFPA).

Table 13-2 Summary of consultation responses specific to shipping and navigation

CONSULTEE	COMMENT	RESPONSE
Scoping Opinion		
Scottish Ministers (via MD-LOT)	Section 8.3.3 of the Scoping Report defines the shipping and navigation Study Area as 10 nm (18.5km) around the Proposed Development. The Scottish Ministers are content with the Study Area and the list of scoped impacts in Table 8-7 of the Scoping Report. This is supported by the RYA and MCA representations.	Noted, no further response required.
	As detailed in Chapter 8.3 of the Scoping Report, an NRA is to be undertaken for the Proposed Development using MGN) 654. The Scottish Ministers advise, in line with the MCA representation, carrying out the NRA in accordance with MGN 372 Amendment 1 (2021), rather than MGN 372 (2008) as referenced in Section 8.3.12 of the Scoping Report. Furthermore, the MCA's Methodology for Assessing the Marine Navigation Safety & Emergency Response Risks of Offshore Renewable Energy Installations should be used to inform the NRA and the NRA should be accompanied by a detailed MGN 654 Checklist.	MGN 654 (MCA, 2021) – which includes the MCA's methodology as Annex 1 – and MGN 372 Amendment 1 (MCA, 2022) has been used to inform this chapter and the Appendix I (see Section 13.2).
	The Scoping Report specified that the lighting and marking of the Proposed Development during the offshore construction phase will align with the requirements of the International Association of Marine Aids to Navigation and Lighthouse Authorities, and IALA Recommendation O-139. Table 8-6 of the Scoping Report references IALA 2013; however, the Scottish Ministers highlight that this should be updated to the latest version of the guidance published in 2021. This is in line with the NLB and MCA representations.	Lighting and marking in accordance with IALA Guideline G1162 (IALA, 2021a) and Recommendation O-139 (IALA, 2021b) is included as an embedded mitigation measure (see Section 13.8).
	The Scottish Ministers advise engaging with the MCA, prior to the commencement of construction, on the layout of the Proposed Development to minimise the risks to surface vessels, including rescue boats, and Search and Rescue (SAR) aircraft(s) that may operate within the area. Early engagement will further allow the MCA to advise on any additional navigation safety and SAR requirements. This is supported by the MCA representation.	The position of the WTG will be confirmed in consultation with the MCA post consent.
	Table 8-7 [in the Scoping Report] scopes in the reduction of emergency response capability due to increased incident rates and/or reduced access for SAR responders. The Scottish Ministers advise that the Developer	A hazard relating to reduction of emergency response capability has been assessed (see Section 13.9).

CONSULTEE	COMMENT	RESPONSE
	must address the MCA representation in regard to implication of the size and located on SAR resources and ERCoP and appropriate mitigation in the EIAR.	
	The Scottish Ministers acknowledge the Developer's intention to carry out a cable burial risk assessment and request a Burial Protection Index study is completed. Subject to the volume of traffic, an anchor penetration study may also be necessary. Should cable protection measures be required, a 5% reduction in surrounding depths referenced to Chat Datum is acceptable.	A cable burial risk assessment and compliance with MGN 654 (including the MCA's 5% reduction requirement) are included as an embedded mitigation measure (see Section 13.8).
MCA	A Navigational Risk Assessment (NRA) will need to be submitted in accordance with MGN 654 (and MGN 372 Amendment 1) and the MCA's Methodology for Assessing the Marine Navigation Safety & Emergency Response Risks of Offshore Renewable Energy Installations (OREI). This NRA should be accompanied by a detailed MGN 654 Checklist.	An NRA, including MGN 654 Checklist, has been undertaken in line with MGN 654 and its annexes (see Appendix I).
	The project intends to carry out a vessel traffic survey to the standard of MGN 654 i.e. at least 28 days which is to include seasonal data (two x 14-day surveys). We would suggest this should be from a vessel-based survey using AIS, radar and visual observations to capture all vessels navigating in the study area.	A dedicated meeting with the MCA was undertaken in July 2023 where it was agreed that use of a 12-month AIS dataset alongside other available data was sufficient in lieu of dedicated vessel traffic surveys (see Section 13.5).
	We note that the applicant proposes a single turbine of 3MW to be installed near the Culzean Gas Field, the layout will require MCA approval prior to construction to minimise the risks to surface vessels, including rescue boats, and Search and Rescue aircraft operating within the site. Any additional navigation safety and/or Search and Rescue requirements, as per MGN 654 Annex 5, will be agreed at the approval stage.	The position of the WTG will be confirmed in consultation with the MCA post consent.
	Attention should be paid to cabling routes and where appropriate burial depth for which a Burial Protection Index study should be completed and subject to the traffic volumes, an anchor penetration study may be necessary. If cable protection measures are required e.g. rock bags or concrete mattresses, the MCA would be willing to accept a 5% reduction in surrounding depths referenced to Chart Datum. This will be particularly relevant where depths are decreasing towards shore and potential impacts on navigable water increase, such as at the HDD location.	A cable burial risk assessment and compliance with MGN 654 (including the MCA's 5% reduction requirement) are included as an embedded mitigation measure (see Section 13.8). It is noted that cables will not be installed towards shore.

CONSULTEE	COMMENT	RESPONSE
	Under Section 8.3.6 [of the Scoping Report] note that the applicant mentions 'marking buoys and lighting to meet MCA and NLB and in line with IALA recommendations O-139, we would like to point out that the latest version of this document is G1162 published in 2021. And we would also like to point out that the Civil Aviation Authority (CAA) should also be consulted during this process.	Lighting and marking in accordance with IALA Guideline G1162 (IALA, 2021a) and Recommendation O-139 (IALA, 2021b) is included as an embedded mitigation measure (see Section 13.8). The CAA will be consulted on the lighting and marking requirements for aviation post consent.
	It is to be noted that regulatory mooring expectations should be identified as a potential mitigation and MCA can confirm this guidance should be followed and that a Third-Party Verification of the mooring arrangements will be required.	Compliance with the MCA's floating foundation guidance is included as an embedded mitigation measure (see Section 13.8).
	Particular consideration will need to be given to the implications of the site size and location on SAR resources and Emergency Response Co-operation Plans (ERCoP). Attention should be paid to the level of radar surveillance, AIS and shore-based VHF radio coverage and give due consideration for appropriate mitigation such as radar, AIS receivers and in-field, Marine Band VHF radio communications aerial(s) (VHF voice with Digital Selective Calling (DSC)) that can cover the entire wind farm sites and their surrounding areas. A SAR checklist will also need to be completed in consultation with MCA.	A hazard relating to reduction of emergency response capability has been assessed (see Section 13.9). Compliance with MGN 654, including creation of an ERCoP, is included as an embedded mitigation measure (see Section 13.8).
	The applicant has referred to MGN 372 (2008) within Section 8.3.12 References [in the Scoping Report], we would like to point out that MGN 372 Amendment 1 (2021) is the latest version of this document.	MGN 372 Amendment 1 (MCA, 2022) has been used to inform this chapter and the Appendix I (see Section 13.2).
	MGN 654 Annex 4 requires that hydrographic surveys should fulfil the requirements of the International Hydrographic Organisation (IHO) Order 1a standard, with the final data supplied as a digital full density data set, and survey report to the MCA Hydrography Manager. Failure to report the survey or conduct it to Order 1a might invalidate the Navigational Risk Assessment if it was deemed not fit for purpose.	Compliance with MGN 654, including hydrographic survey requirements, is included as an embedded mitigation measure (see Section 13.8).
	On the understanding that the Shipping and Navigation aspects are undertaken in accordance with MGN 654 and its annexes, along with a completed MGN checklist, MCA is likely to be content with the approach.	Noted, the Project complies with MGN 654 and its annexes as committed to through the embedded

CONSULTEE	COMMENT	RESPONSE
	As this project progress, we would welcome engagement with the developers, and early discussion on the points raised above.	mitigation measures as detailed in Section 13.8 and Appendix I.
	Do you agree with the proposed approach to survey data collection? Yes, we are content with a vessel traffic survey to the standard of MGN 654 i.e. at least 28 days which is to include seasonal data (two x 14-day surveys). We would suggest this should be from a vessel-based survey using AIS, radar and visual observations to capture all vessels navigating in the study area.	A dedicated meeting with the MCA was undertaken in July 2023 where it was agreed that use of a 12-month AIS dataset alongside other available data was sufficient in lieu of dedicated vessel traffic surveys (see Section 13.5).
	Do you agree with the proposed Study Area (incorporating a 10 NM [18.52 km] buffer around the proposed floating wind turbine)? Yes.	Noted, no further response required.
	Do you agree with the list of scoped impacts? Yes, we agree with the list of Scoped in impacts.	Noted, no further response required.
	Do you agree the embedded mitigation is appropriate, or are there other measures that should be included? Yes, we agree the embedded mitigations are appropriate and would also recommend the applicant to consider additional mitigation measures like Third-Party verification of mooring systems.	Noted, compliance with the MCA's floating foundation guidance is included as an embedded mitigation measure (see Section 13.8).
	Are there any additional shipping and navigation organisations that you would recommend be consulted? Along with regular vessel operator, Oil and Gas platforms and operators within the area also to be consulted.	The main operator of oil and gas vessels in proximity to the Project was invited to the Hazard Workshop and provided feedback following the meeting.
Northern Lighthouse Board (NLB)	Thank you for your e-mail correspondence dated 5th May 2023 relating to the Scoping Report submitted by TotalEnergies E&P UK Ltd in relation to the proposed deployment of a single 3MW floating wind turbine connected to the Culzean oil and gas platform via a 2km export cable.	No response required.

CONSULTEE	COMMENT	RESPONSE
	NLB note the inclusion within Section 3.6 Offshore Construction of the intention to provide a lighting and marking solution in line with the requirements of IALA publications G1162 and R0-139, following engagement with NLB.	Lighting and marking of the Project will be deployed in agreement with NLB and in accordance with IALA Recommendation O-139 (IALA, 2021a) and Guideline G1162 (IALA, 2021b), as committed to within the embedded mitigation measures presented in Section 13.8.
	NLB have no objection to the content of the Scoping Report and have no recommendations for further navigational impacts that should be included within the report.	Noted, no further response required.
Marine Directorate - Marine Scotland Science	MSS do not agree that all potential impacts have been identified. MSS advise the potential impact of safety issues for fishing vessels during the operation and maintenance phase of the project are identified, due to the risk of fishing gear becoming entangled in floating foundations and mooring systems. There is also the risk of gear snagging on the cable if burial is not fully achieved.	Snagging risks for fishing gear are considered separately in Chapter 12: Commercial Fisheries.
SFF	Export cable: the final decision on selection of export cable routes and its construction is missing and according to this report, the export cable would be trenched and where possible be buried, if not mechanical protections would be used. SFF would want the export cable to be totally trenched and buried since use of mechanical protection create snagging hazard to fishing vessels. If cable burial is technically not possible, minimal small size rock protections (based on the industry best practices) should be used rather than concrete mattresses.	The Project does not have an export cable to shore, only an export cable between the turbine and associated platform. The cable will be buried where possible, and where that is not possible, the cable will be rock protected, which is expected to be a maximum of 50% of the length of the cable on the seabed (1,000 m). An assessment of vessel interaction with the export cable is provided in Section 13.9.2.
	Moorings: since the length of the moorings are going to be ~600 m, SFF want to see proper safety measures are taken to protect the safety of fishing vessels in the area.	A hazard relating to reduction in under keel clearance due to the presence of the mooring system has been assessed (see Section 13.9) noting that snagging risks

CONSULTEE	COMMENT	RESPONSE
		for fishing gear are considered separately in Chapter 12: Commercial Fisheries.
	Boulders relocation: the report acknowledges existence of boulders within the development area. As relocation of boulders create snagging hazards for fishing vessels, SFF suggest that as far as technically possible the boulders should not be relocated during the construction works especially export cable construction. In case relocation of boulders is inevitable, maximum efforts should be made to relocate as little number of boulders as possible. In addition, we recommend that boulder relocation should be scoped in to the EIAR and if boulders relocated, their new locations to be recorded and shared with SFF via USB sticks for the fishing vessels records.	2023 surveys confirmed that that boulder movement will not be required prior to anchor installation. Should any boulder relocation still have to happen following installation, the SFF will be informed of the location of the relocated boulders.
Cruising Association (CA)	Thank you for inviting the Cruising Association to comment on the Scoping Report for the Culzean Floating Wind Pilot. As we understand it the pilot comprises just one turbine. This will have a very small impact on recreational boaters so provided the turbine is properly lit and marked (as no doubt it will be) we have no comments to make at this stage.	Noted, no further response required.
Royal Yachting Association Scotland (RYA)	Do you agree with the proposed approach to survey data collection? Yes. There is no need to collect additional information on recreational vessel traffic. The key point is that some recreational vessels will pass through the site each year sometimes in conditions of adverse weather and visibility.	Noted, no further response required.
	Do you agree with the proposed Study Area (incorporating a 10 NM [18.52 km] buffer around the proposed floating wind turbine)? Yes.	Noted, no further response required.
	Do you agree with the list of scoped impacts? Yes.	Noted, no further response required.

CONSULTEE	COMMENT	RESPONSE
	Do you agree the embedded mitigation is appropriate, or are there other measures that should be included? The embedded mitigation is appropriate but with regard to marking and lighting it is important to ensure that failure of these can be rectified quickly.	Requirements for an LMP and aids to navigation management plan will be agreed with MD-LOT as required post consent.
	Are there any additional shipping and navigation organisations that you would recommend be consulted? No – the CA and RYA would be happy to take part in the NRA.	Noted, both the CA and RYA were invited to attend the hazard workshop.
Hazard Workshop		
MCA	Routeing by commercial vessels (cargo vessels and tankers) clearly avoids the existing infrastructure at the Culzean Oil Field and therefore there are no concerns.	Acknowledged in the assessment of vessel displacement (see Section 13.9).
	Slight deviations associated with oil and gas routeing is not an issue.	Acknowledged in the assessment of vessel displacement (see Section 13.9).
NLB	NLB have the responsibility to retrieve wrecks in areas of navigation, noting that should the floater sink (whilst on-site or under tow) then it may present a navigational risk. Protocol for wreck response should be considered for the ERCoP.	The foundering of the WTG / floater is considered as a worst-case consequence for a collision event during towage operations (see Section 13.9).
	No concerns with displacement of commercial routeing and such routeing is unlikely to change in the future.	Acknowledged in the assessment of vessel displacement (see Section 13.9).
	No construction buoyage is required given the short nature of the installation campaign, presence of the Emergency Response and Rescue Vessel (ERRV) for the Culzean Oil Field, and coverage from the nearby platform.	Acknowledged as not required in the embedded mitigation measures (see Section 13.8).
	For lighting and marking purposes the WTG will be treated as an isolated structure following IALA guidelines.	Acknowledged in the assessment of allision risk (see Section 13.9).

CONSULTEE	COMMENT	RESPONSE
RYA Scotland	Recently there have been delays in the United Kingdom Hydrographic Office (UKHO) Admiralty charts being updated but other forms of mitigation including notifications to mariners and Kingfisher should raise awareness.	Acknowledged in the assessment of vessel displacement (see Section 13.9).
	No further data is required to characterise recreational vessel movements.	Acknowledged in the data limitations for AIS data (see Section 13.5).
	Recreational routeing between Peterhead and the Baltic may be expected but given the presence of existing infrastructure the additional presence of the WTG does not increase concerns. Any issue arising would likely be in adverse weather conditions.	Acknowledged in the characterisation of recreational vessel movements (see Section 13.5).
SWFPA	AIS does not capture all activity but will capture the majority at the distance offshore of the Project. The area is generally quiet for fishing vessels with movements predominantly transits close to existing infrastructure. There are no concerns.	Acknowledged in the data limitations for AIS data (see Section 13.5) and Vessel Monitoring System (VMS) data has also been used to characterise fishing vessel movements (see Section 13.5).
Vroon	No concerns raised.	Acknowledged in the assessment of vessel displacement (see Section 13.9).
Any other relevant communications		
MCA	No concerns using AIS data and the requirement for a dedicated vessel traffic survey may be waived for the Project[1]. Use of VMS data to support the AIS data is requested.	The MCA's stance is acknowledged in the outline of project site-specific surveys in Section 13.5. VMS data has been used to validate fishing vessel movements in Section 9.2 of Appendix I.

[1] *With the caveat that this decision is location and case specific and should not be taken as a precedent for future developments.*

In line with the Scoping Opinion, no aspects relevant to Shipping and Navigation were scoped out of further assessment in this EIAR.

13.4 Study Area

The Shipping and Navigation Study Area is defined as a 10 nautical mile (nm) buffer of the WTG, as presented in Figure 13-1. Using a buffer of 10 nm is standard practice for defining the shipping and navigation baseline environment and has been used in the majority of UK offshore wind farm shipping and navigation assessments as it captures relevant routeing in the area that may be affected while still remaining site-specific.

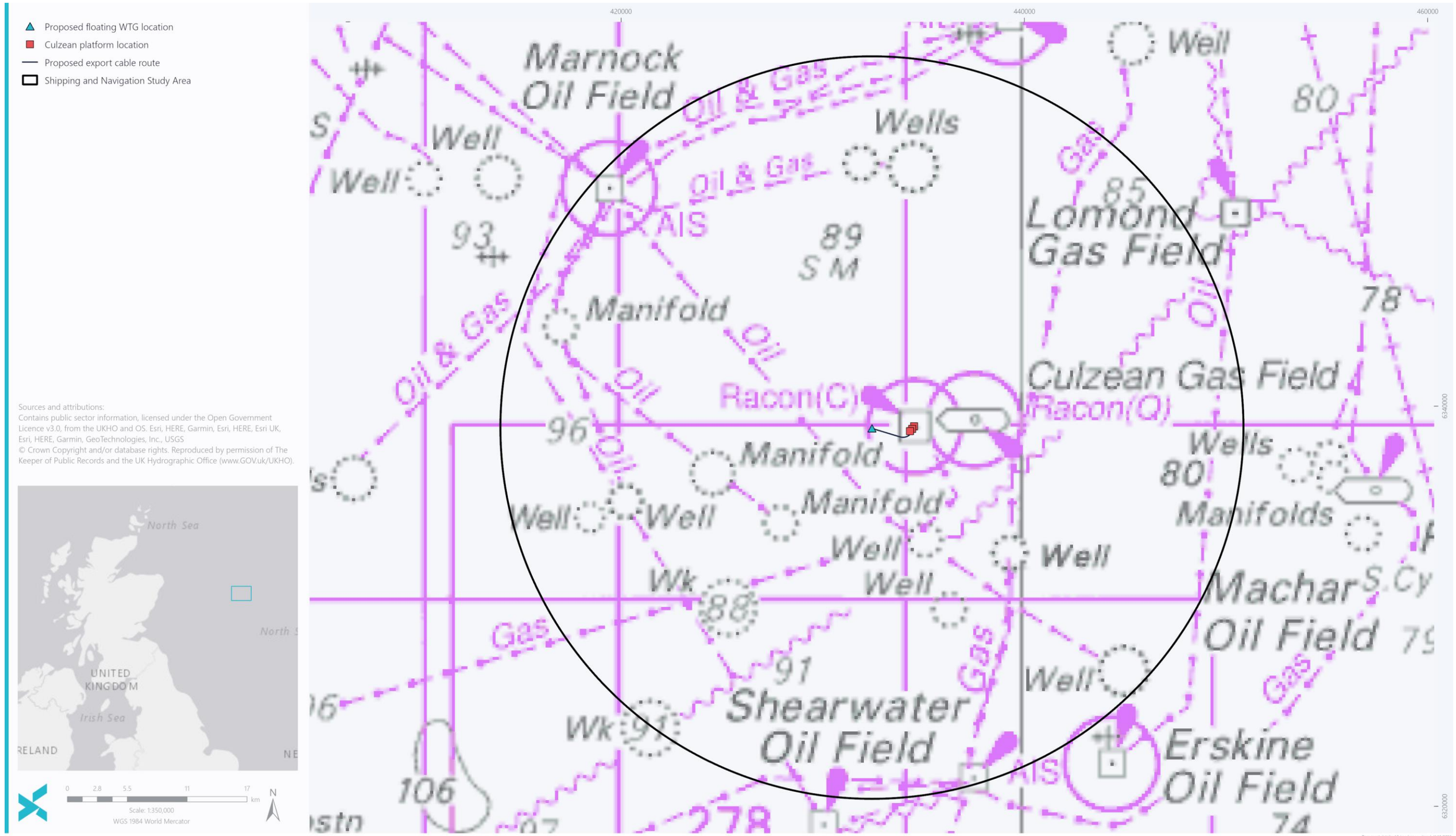

Figure 13-1 Shipping and navigation Study Area

13.5 Baseline environment

13.5.1 Data sources

The existing data sets and literature with relevant coverage to the Project, which have been used to inform the baseline characterisation for shipping and navigation are outlined in Table 13-3. Weather data used to inform the collision and allision risk modelling is outlined in Section 5 of Appendix I.

Table 13-3 Summary of key datasets and reports

TITLE	SOURCE	YEAR	AUTHOR
AIS data	Floating Storage and Offloading (FSO) Ailsa (located at the Culzean Gas Field)	2022/23	Anatec
ShipRoutes database	Anatec	2023	Anatec
Department for Transport (DfT) UK civilian helicopter tasking data	DfT	2015-2023	DfT
Marine Accident Investigation Branch (MAIB) marine accidents database	MAIB	2012-2021	MAIB
VMS data	https://marine.gov.scot/information/fishing-activity	2022	Marine Scotland
Royal National Lifeboat Institution (RNLI) incident data	RNLI	2013-2022	RNLI
Admiralty Sailing Directions North Sea (West) Pilot NP54	UKHO	2021	UKHO
Admiralty charts 274 and 278	UKHO	2023	UKHO

13.5.2 Project site-specific surveys

Dedicated vessel traffic surveys typically required under MGN 654 were not required following agreement with the MCA that long-term AIS data was suitable for characterising vessel traffic movements. Therefore, 12 months of AIS data covering July 2022 to June 2023 within the shipping and navigation Study Area has been considered in the existing baseline.

A number of vessel tracks recorded during the 12-month period were classified as temporary (non-routine). These are presented in Section 9 of Appendix I but have been excluded from the analysis in Section 13.5.3 and Section 9 of Appendix I.

13.5.3 Existing baseline

A review of literature and available data sources augmented by consultation and Project Area-specific surveys has been undertaken to describe the current baseline environment for shipping and navigation.

13.5.3.1 Navigational features

The navigational features in proximity to the Project are presented in Figure 13-2. A detailed view of the navigational features is provided in Section 7 of Appendix I.

There is a single dedicated Aid to Navigation (AtoN) in the area, located approximately 13 nm to the east at the Pierce Oil Field. Additionally, there are three virtual AtoNs situated at the Culzean Gas Field indicating the position of the Ailsa FSO. The closest of these virtual AtoNs is positioned 1.9 nm to the east of the WTG.

The sea area surrounding the WTG includes various oil and gas fields, their surface and subsea infrastructure, and associated 500 m safety zones marked on charts. The WTG is situated within the Culzean Gas Field, with the nearest installation situated approximately 1 nm to the east (Culzean ULQ Platform).

There are a number of pipelines in proximity to the WTG, two of which are associated with the Culzean Gas Field.

Two subsea cables are noted in the vicinity; a power cable passes between the Culzean Gas Field and the Judy Oil Field while a telecommunications cable is situated 3.6 nm to the south-east and runs between Cambois Bay (UK) and Boknafjorden (Norway).

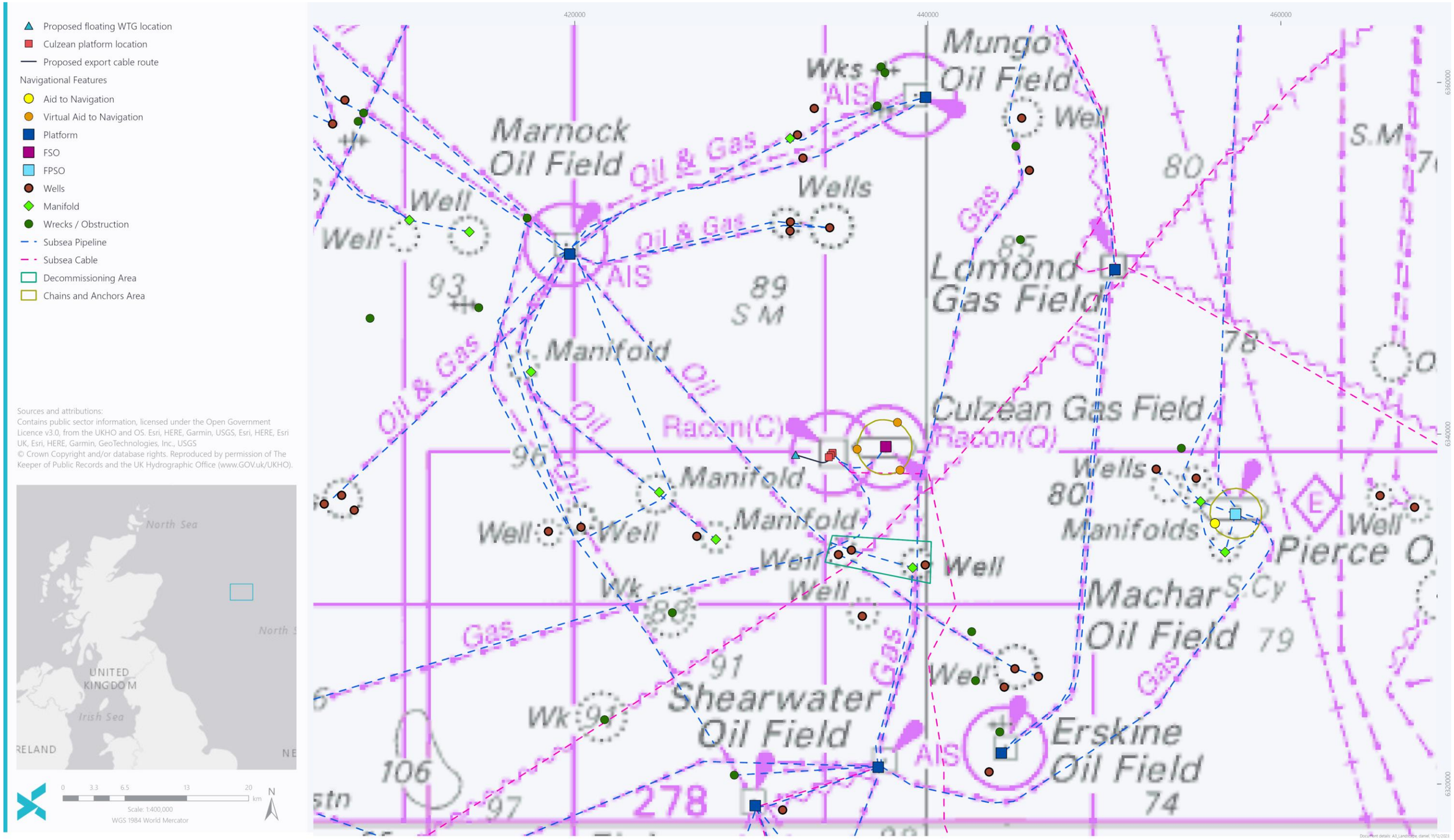

Figure 13-2 Navigational features

13.5.3.2 Vessel traffic movements

The vessel traffic data recorded during the 12-month period in 2022 and 2023 within the shipping and navigation Study Area is colour-coded by vessel type and presented in Figure 13-3.

Overall, an average of eight unique vessels per day was recorded within the shipping and navigation Study Area, with limited variance across the 12-month period. An average of three vessels per week were recorded crossing the export cable.

The main vessel type recorded within the shipping and navigation Study Area was oil and gas vessels (89%). No other vessel type accounted for more than 5% of vessel traffic, with the next highest contributors being cargo vessels (4%), tankers (2%) and fishing vessels (2%). The majority of oil and gas vessels were recorded visiting the oil and gas installations within or close to the Study Area including the Eastern Trough Area Project (ETAP) / Marnock (24%), Culzean (21%), and Shearwater (20%) fields. All vessels recorded crossing the export cable were oil and gas vessels.

Cargo vessels and tankers were also recorded routeing within the shipping and navigation Study Area, albeit in much lower volumes. The majority of tankers recorded within the shipping and navigation Study Area were associated with the Ailsa FSO located at the Culzean Field.

The commercial fishing vessel activity recorded in the shipping and navigation Study Area was generally characteristic of transiting, rather than active fishing. A small number of tracks to the south-west of the WTG were recorded with average speeds below 4 kt, which may be indicative of active fishing. Recreational vessels were recorded in low volumes and typically during the summer months, with the sparse volumes overall indicative of the distance offshore. During the Hazard Workshop, RYA Scotland noted that recreational routeing between Peterhead and the Baltic may be expected; this may be represented by the AIS data (noting that destination information was not broadcast by recreational vessels).

Vessel length was available for approximately 99% of vessels recorded within the shipping and navigation Study Area during the 12-month period. The average length of all vessels (excluding unspecified) was 72 m with the largest vessel recorded a 292 m bulk carrier passing approximately 3 nm to the east of the WTG. Vessel draught was also available for approximately 99% of vessels recorded during the 12-month period. The average draught of all vessels (excluding unspecified) was 5.3 m with the deepest draught recorded 12.4 m for a bulk carrier on passage to Brofjorden (Sweden), passing approximately 3 nm to the north of the WTG.

No vessels were deemed to be at anchor within the shipping and navigation Study Area. Full details of the methodology applied to ascertain this are provided in Section 9.2.6 of Appendix I.

Main commercial routes have been identified using the principles set out in MGN 654 (MCA, 2021). A total of 11 main commercial routes were identified within the shipping and navigation Study Area. A plot of the main commercial routes and corresponding 90th percentiles is presented in Figure 13-4. Descriptions for each of the main commercial routes are provided in Table 13-4.

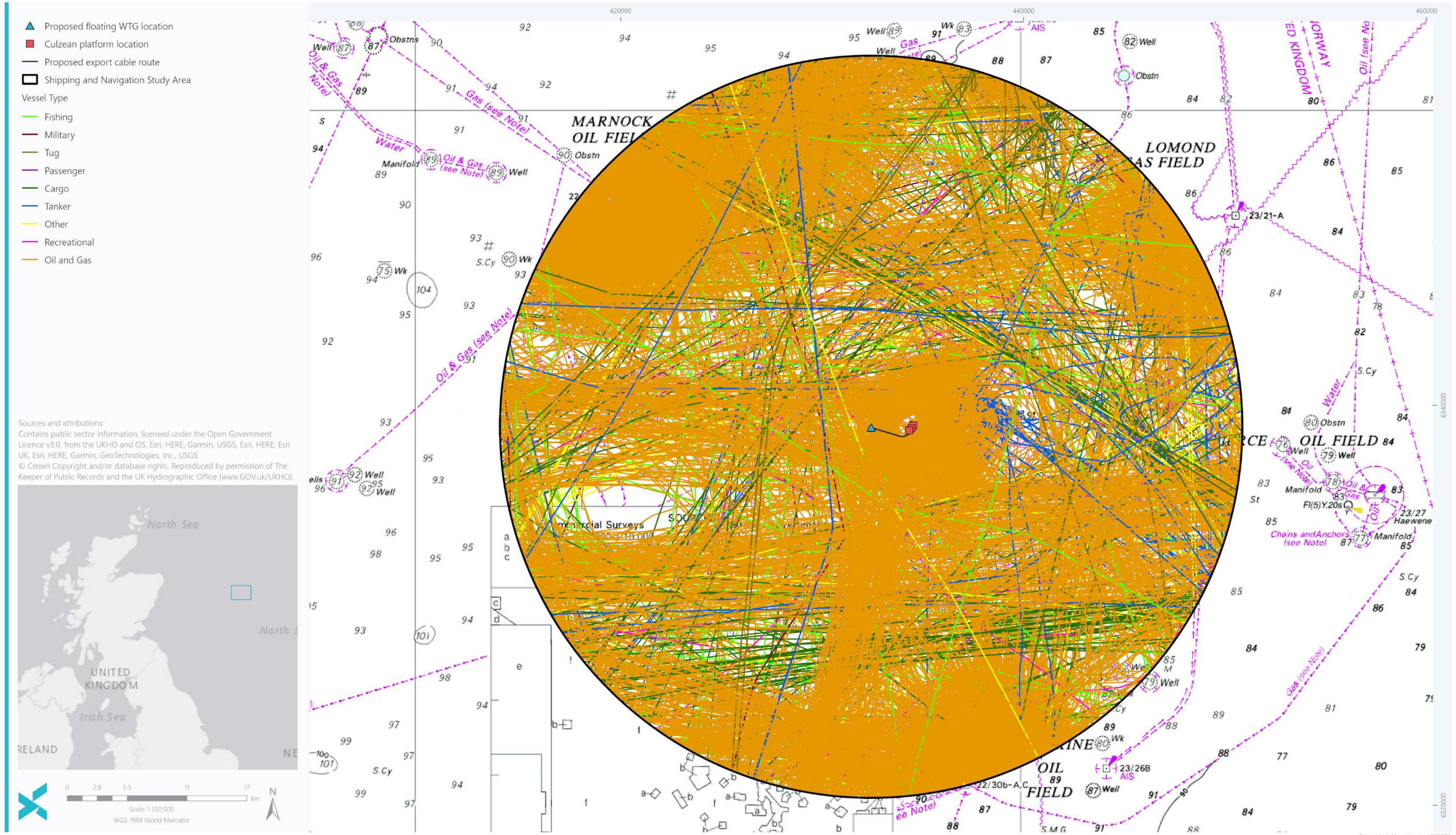

Figure 13-3 12 months AIS data by vessel type

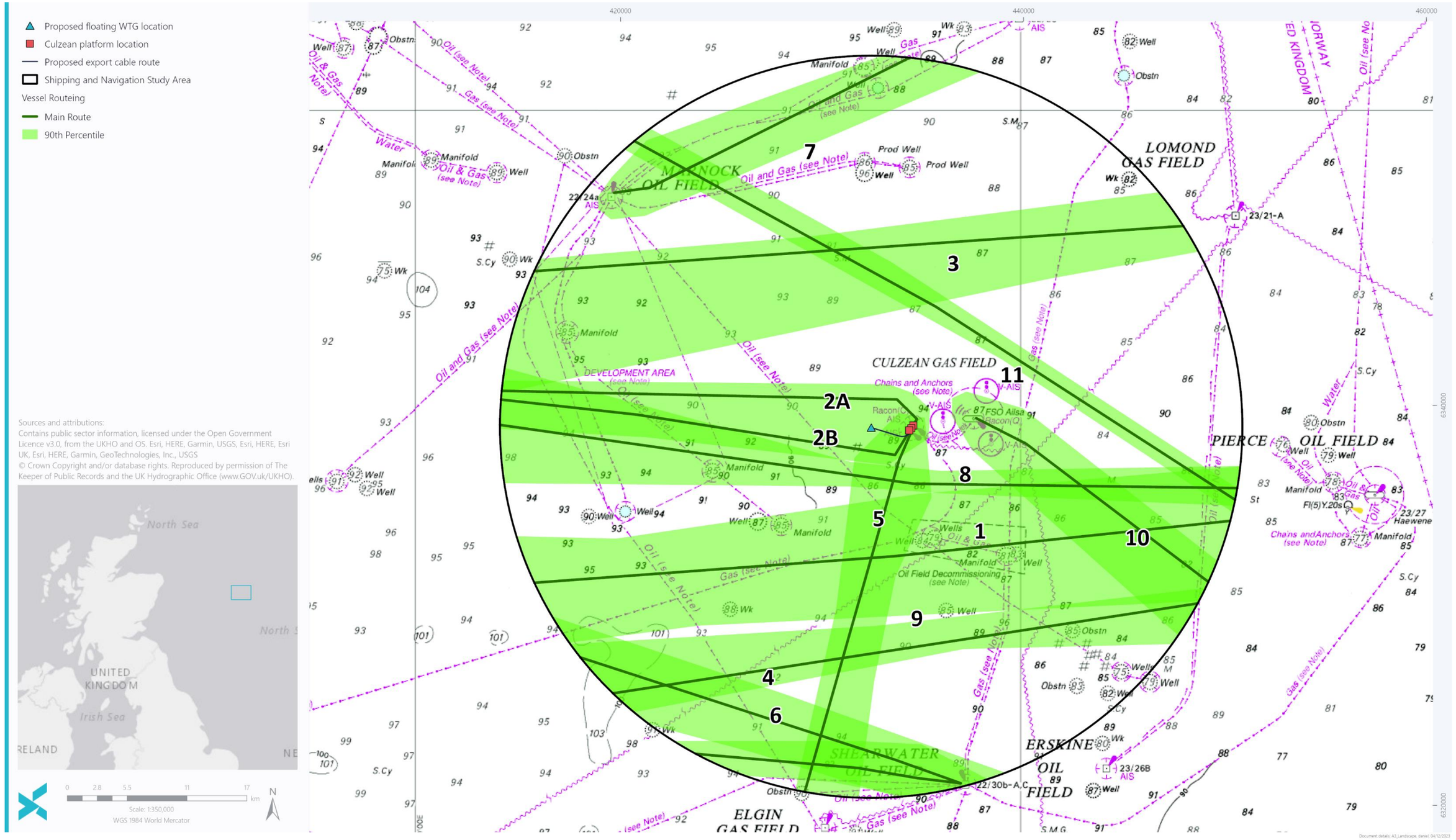

Figure 13-4 Pre WTG main commercial routes

Table 13-4 Details of main commercial routes

ROUTE	KEY DESTINATIONS	AVERAGE VESSELS PER WEEK	VESSEL TYPE BREAKDOWN
1	Aberdeen (UK)–Pierce Oil Field	2 to 3	Oil and gas vessels (100%).
2	Aberdeen (UK)–Culzean Gas Field	2	Oil and gas vessels (100%). Alternative approaches are noted with Route 2a passing to the north of the WTG, while Route 2b passes to the south.
3	Aberdeen (UK)–Lomond Gas Field	2	Oil and gas vessels (100%).
4	Aberdeen (UK)–Shearwater Oil Field	2	Oil and gas vessels (100%).
5	Elgin Field–Culzean Gas Field	1 to 2	Oil and gas vessels (100%).
6	Aberdeen (UK)–Shearwater Oil Field	1 to 2	Oil and gas vessels (100%).
7	ETAP / Marnock Oil Field–Mungo Oil Field	1	Oil and gas vessels (100%).
8	Aberdeen (UK)–Pierce Oil Field	0 to 1	Oil and gas vessels (100%).
9	Montrose (UK)–Kattegat	0 to 1	Cargo vessels (100%).
10	Brunsbüttel (Germany)–Culzean Gas Field	0 to 1	Tankers (100%).
11	Scottish west coast to Esbjerg (Denmark)	0 to 1	Cargo vessels (100%). In one direction only, towards Esbjerg.

13.5.3.3 Historical maritime incidents

There were four unique SAR helicopter taskings within the shipping and navigation Study Area between April 2015 and March 2023. Three of these incidents were responded to from the Inverness base, with the remaining incident responded to from the Sumburgh base. All four incidents featured a rescue / recovery with one located 0.5 nm south-east of the WTG.

The closest RNLI station to the WTG is at Peterhead (UK), located approximately 120 nm to the west, where an All-Weather Lifeboat (ALB) is in use. It is noted that the RNLI have a strategic performance standard of reaching casualties up to a maximum of 100 nm offshore. Therefore, the Project is considered too far offshore to be accessible by the RNLI. This is reflected in the RNLI incident data which indicated no returns of service within the shipping and navigation Study Area in the period 2013 to 2022.

All UK flagged vessels and non-UK flagged vessels in UK territorial waters (12 nm), a UK port or carrying passengers to a UK port are required to report incidents to the MAIB. Data arising from these reports have been assessed, covering the ten-year period between 2012 and 2021. There were no incidents recorded within the MAIB data

between 2012 and 2021 within the shipping and navigation Study Area. A high-level review of the previous 10-year period between 2002 and 2011 indicated two incidents within the shipping and navigation Study Area. Both incidents featured commercial vessels, one of which was a standby safety vessel.

13.5.4 Future baseline

There is uncertainty associated with long-term predictions of vessel traffic growth given the limited reliable information on future trends. Therefore, a conservative assumption of a 10% increase in vessel traffic movements has been assumed for the future case across the design life of the Project.

This assumption incorporates all vessel types including commercial vessels, commercial fishing vessels. And recreational vessels. In the case of oil and gas vessels, the increasing focus on decommissioning of existing assets may lead to a long-term decrease in volumes, although the 10% increase serves as a worst case parameter, noting that activity is heavily influenced by the needs of each individual field asset.

It is possible that climate change and measures taken to slow the effects of climate change could have an effect on shipping and navigation receptors. However, given the temporal nature of climate change, any effects are expected to develop in the long-term (post design life of the Project) rather than the short- or medium-term. Therefore, it is not possible to suitably consider the future baseline for shipping and navigation accounting fully for climate change.

13.5.5 Summary and key issues

Key sensitive receptors for shipping and navigation identified from the existing baseline include:

- Commercial vessels (excluding oil and gas vessels) – includes primarily cargo vessels and tankers, but also tugs, and other support vessels undertaking commercial operations not related to oil and gas;
- Oil and gas vessels – includes vessels undertaking commercial operations related to oil and gas;
- Commercial fishing vessels – includes commercial fishing vessels in transit;
- Recreational vessels – includes larger sailing vessels and other recreational craft (2.4 to 24 m length); and
- UK emergency responders – includes SAR helicopters operating on behalf of the MCA, RNLI lifeboats, and marine pollution responders.

13.5.6 Data gaps and uncertainties

This section discusses key data limitations and uncertainties associated with the data sources used to inform the assessment of this chapter. The use of multiple data sources and consultation (in line with MGN 654 requirements) means that these limitations and uncertainties do not compromise the chapter assessment.

13.5.6.1 Automatic Identification System Data

The carriage of AIS is required on board all vessels of greater than 300 Gross Tonnes (GT) engaged on international voyages, cargo vessels of more than 500 GT not engaged on international voyages, passenger vessels irrespective of size built on or after 1st July 2002, and fishing vessels over 15 m length overall (LOA). Therefore, some fishing vessels under 15 m length and recreational craft may be underrepresented in the data, although SWFPA and RYA

Scotland confirmed during the Hazard Workshop that there were no concerns with the extent of data collected, noting given the distance offshore that smaller fishing vessels are less likely to be present.

13.5.6.2 Vessel Monitoring System Data

The carriage of VMS is required on board all fishing vessels of greater than 12 m LOA. Additionally, the vessel's position is reported at a minimum of every two hours only. Therefore, some fishing vessels and especially those under 12 m LOA may be underrepresented in the data, although again SWFPA confirmed during the Hazard Workshop that there were no concerns with the extent of data collected and given the distance offshore smaller fishing vessels are less likely to be present.

13.5.6.3 Historical Incident Data

Although all UK commercial vessels are required to report accidents to the MAIB, non-UK vessels do not have to report unless they are in a UK port, within 12 nm of territorial waters or carrying passengers to a UK port. There are also no requirements for non-commercial recreational craft to report accidents to the MAIB.

The RNLI incident data cannot be considered comprehensive of all incidents in the shipping and navigation Study Area. Although hoaxes and false alarms are excluded, any incident to which a RNLI resource was not mobilised has not been accounted for in this dataset.

13.5.6.4 United Kingdom Hydrographic Office Admiralty Charts

The UKHO Admiralty charts are updated periodically, and therefore the information shown may not reflect the real-time features within the region with total accuracy. However, during the Hazard Workshop input was sought from relevant stakeholders regarding the navigational features baseline.

13.6 Key parameters for assessment

As detailed in Chapter 6: EIA Methodology, this assessment considers the worst case scenario for the Project parameters which are predicted to result in the greatest environmental impact, known as the 'realistic worst case scenario'. The worst case scenario represents, for any given receptor and potential impact on that receptor that would result in the greatest potential for change.

Given that the worst case scenario is based on the design option (or combination of options) that represents the greatest potential for change, confidence can be held that development of any alternative options within the design parameters will give rise to no worse effects than assessed in this impact assessment. Table 13-5 presents the worst case scenario for potential impacts on shipping and navigation during construction, operation and maintenance and decommissioning.

Table 13-5 Worst case scenario specific to shipping and navigation receptor impact assessment

POTENTIAL IMPACT	WORST CASE SCENARIO	JUSTIFICATION
Construction		
Vessel displacement	• Construction and installation over around one month; • WTG and export cable installation at the locations shown in Figure 6-1 of Appendix I • Presence of 500 m construction safety zones and 50 m pre commissioning safety zones around the WTG; • One export cable of 2,500 m length; and • Up to four construction / decommissioning vessels on-site simultaneously, up to 16 transit days and 54 working days on-site.	Presence of the infrastructure and associated project vessel activities maximising the extent of displacement for third-party vessels.
Collision risk (third-party to third-party)	• Construction and installation over around one month; • WTG and export cable installation at the locations shown in Figure 6-1 of Appendix I; • Presence of 500 m construction safety zones and 50 m pre commissioning safety zones around the WTG; • One export cable of 2,500 m length; and • Up to four construction / decommissioning vessels on-site simultaneously, up to 16 transit days and 54 working days on-site.	Presence of the infrastructure and associated project vessel activities maximising the reduction in navigable sea room and subsequently increasing the likelihood of encounters and collision risk.

POTENTIAL IMPACT	WORST CASE SCENARIO	JUSTIFICATION
Collision risk (third-party to Project)	• Construction and installation over around one month; • WTG and export cable installation at the locations shown in Figure 6-1 of Appendix I; • Presence of 500 m construction safety zones and 50 m pre commissioning safety zones around the WTG; • One export cable of 2,500 m length; and • Up to four construction / decommissioning vessels on-site simultaneously, up to 16 transit days and 54 working days on-site.	Presence of project vessel activities maximising the likelihood of encounters and collision risk involving a project vessel.
Allision risk	• Construction and installation over around one month; • WTG installation at the location shown in Figure 6-1 of Appendix I; and • Maximum floater dimensions of 71.93 m (side length of equilateral triangle shape).	Presence of the WTG with maximum possible associated dimensions resulting in maximum exposure to allision risk for third-party vessels.
Operation and maintenance		
Vessel displacement	• Design life of between 5 and 10 years; • WTG and export cable installed at the locations shown in Figure 6-1 of Appendix I; • Presence of 500 m safety zones during major maintenance around the WTG; and • One operation and maintenance vessel on-site (ERRV for Culzean Oil Field).	Presence of the infrastructure and associated project vessel activities maximising the extent of displacement for third-party vessels.

POTENTIAL IMPACT	WORST CASE SCENARIO	JUSTIFICATION
Collision risk (third-party to third-party)	• Design life of between 5 and 10 years; • WTG and export cable installed at the locations shown in Figure 6-1 of Appendix I; • Presence of 500 m safety zones during major maintenance around the WTG; and • One operation and maintenance vessel on-site (ERRV for Culzean Oil Field).	Presence of the infrastructure and associated project vessel activities maximising the reduction in navigable sea room and subsequently increasing the likelihood of encounters and collision risk.
Collision risk (third-party to Project)	• Design life of between 5 and 10 years; • WTG and export cable installed at the locations shown in Figure 6-1 of Appendix I; • Presence of 500 m safety zones during major maintenance around the WTG; and • One operation and maintenance vessel on-site (ERRV for Culzean Oil Field).	Presence of project vessel activities maximising the likelihood of encounters and collision risk involving a project vessel.
Allision risk	• Design life of between 5 and 10 years; • WTG installed at the location shown in Figure 6-1 of Appendix I; and • Maximum floater dimensions of 71.93 m (side length of equilateral triangle shape).	Presence of the WTG with maximum possible associated dimensions resulting in maximum exposure to allision risk for third-party vessels.
Loss of station	• Design life of between 5 and 10 years; • WTG installed at the location shown in Figure 6-1 of Appendix I; • Maximum floater dimensions of 71.93 m (side length of equilateral triangle shape); and • Up to five catenary mooring lines.	Presence of the WTG with maximum possible associated dimensions resulting in maximum exposure should the WTG go off station.

POTENTIAL IMPACT	WORST CASE SCENARIO	JUSTIFICATION
Vessel interaction with export cable and mooring lines	• Design life of between 5 and 10 years; • WTG and export cable installed at the locations shown in Figure 6-1 of Appendix I; • One export cable of 2,500 m length; • Target burial depth for export cable of at least 0.6 m; • Maximum height of protection for export cable of 1 m above the seabed; • Up to five catenary mooring lines each of 589 m length; • Mooring line connection point with floater at 13.7 m below sea surface; and • Rate of descent for mooring lines of 46° with overall footprint of 600 m radius centred on the floater.	Presence of infrastructure below the sea surface with the maximum associated footprint resulting in maximum exposure to interaction risk for third-party vessels.
Reduction of emergency response capability	• Design life of between 5 and 10 years; • WTG and export cable installed at the locations shown in Figure 6-1 of Appendix I; and • One operation and maintenance vessel on-site (ERRV for Culzean Oil Field).	Presence of the infrastructure and associated project vessel activities maximising the likelihood of a need for an emergency response.
Decommissioning		
Decommissioning works are largely expected to be the reverse of construction works, and therefore impacts and worst case scenarios associated with the decommissioning phase are anticipated to be analogous to those considered for construction phase.		

13.7 Methodology for assessment of effects

An assessment of potential impacts is provided separately for the construction, operation and maintenance and decommissioning phases.

The criteria for the assessment for shipping and navigation differ from those set out in Chapter 6: EIA Methodology, noting that the required MCA methodology for shipping and navigation has been applied. In particular, impacts on shipping and navigation are assessed with application of the IMO FSA process which is the internationally recognised approach.

There are differences between standard EIA terminology applied for other offshore topics and FSA terminology applied for shipping and navigation. This chapter adapts the standard EIA terminology where possible (whilst maintaining the overarching IMO FSA methodology), whilst Appendix I uses FSA terminology throughout. The key differences in terminology are summarised in Table 13-6.

Table 13-6 Summary of differences in terminology between EIA and NRA

EIA TERM	NRA TERM	DEFINITION
Impact	Hazard	A potential threat to human life, health, property, or the environment.
Significance of effect	Significance of risk	The combination of frequency of occurrence and severity of consequence.
Receptor	User	Sufferer of an effect

For each potential impact, the assessment identifies receptors sensitive to that impact and implements a systematic approach to understanding the impact pathways and the level of impacts on given receptors based on two key factors – the frequency of occurrence and severity of consequence. The definitions of frequency of occurrence and severity of consequence for the purpose of the shipping and navigation assessment are provided in Table 13-7 and Table 13-8, respectively. The significance of effect is then determined using the matrix provided in Table 13-9.

Table 13-7 Frequency of occurrence criteria

FREQUENCY OF OCCURRENCE	DEFINITION
Frequent	Yearly.
Reasonably Probable	One occurrence per 1 to 10 years.
Remote	One occurrence per 10 to 100 years.

FREQUENCY OF OCCURRENCE	DEFINITION
Extremely Unlikely	One occurrence per 100 to 10,000 years.
Negligible	Less than one occurrence per 10,000 years.

Table 13-8 Severity of consequence criteria

SEVERITY OF CONSEQUENCE	DEFINITION[2]
Major	More than one fatality, total loss of property, tier 3 national assistance required and international reputational effects.
Serious	Multiple serious injuries or single fatality, damage resulting in critical impact on operations, tier 2 regional assistance required, and national reputational effects.
Moderate	Multiple minor or single serious injury, damage not critical to operations, tier 2 limited external assistance required, and local reputational effects.
Minor	Slight injury to people, minor damage to property, tier 1 local assistance required, and minor reputational effects limited to receptors.
Negligible	No perceptible effect.

Table 13-9 Shipping and navigation significance of effect matrix

		FREQUENCY OF OCCURRENCE				
SEVERITY OF CONSEQUENCE		***Frequent***	***Reasonably Probable***	***Remote***	***Extremely Unlikely***	***Negligible***
	Major	Unacceptable	Unacceptable	Unacceptable	Tolerable with Mitigation	Tolerable with Mitigation
	Serious	Unacceptable	Unacceptable	Tolerable with Mitigation	Tolerable with Mitigation	Broadly Acceptable

[2] *Pollution incident tiers are based on those established in the National Contingency Plan (NCP) (MCA, 2014).*

	FREQUENCY OF OCCURRENCE					
	Moderate	Unacceptable	Tolerable with Mitigation	Tolerable with Mitigation	Broadly Acceptable	Broadly Acceptable
	Minor	Tolerable with Mitigation	Tolerable with Mitigation	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable
	Negligible	Tolerable with Mitigation	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable

13.8 Embedded mitigation

As described in Chapter 6: EIA Methodology, certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the environment, as presented in Table 13-10. These have been accounted for in the assessment presented below. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on shipping and navigation receptors.

It is noted that the deployment of construction buoyage is not included as an embedded mitigation measure; NLB confirmed during the Hazard Workshop that no such marking of the WTG is required given the other mitigation in place.

Table 13-10 Embedded mitigation measures relevant to shipping and navigation

MITIGATION MEASURE	DESCRIPTION	FORM (PRIMARY OR TERTIARY)	HOW MITIGATION WILL BE SECURED
Application for safety zones	The floating WTG is being treated as a supplementary unit under the HSE Offshore Installations and Pipeline Works (Management and Administration) Regulations 1995 and as such, Total are applying for a 500 m safety exclusion zone centred around the WTG. In addition, a 500-m advisory safety zone will also be requested around project vessels (e.g. During cable-laying).	Primary	Application submitted as required under the HSE approach.
Cable Plan (CaP) and Cable Burial Risk Assessment (CBRA)	The cable will be routed to avoid sensitive features wherever practicable and buried as the primary cable protection method. Additional cable protection may be used where adequate burial cannot be achieved and this will be minimised as far as is practicable. This will be informed by a cable burial risk assessment (CBRA), completed to determine the suitable cable protection	Primary	Secured through condition attached to the Marine Licence.

MITIGATION MEASURE	DESCRIPTION	FORM (PRIMARY OR TERTIARY)	HOW MITIGATION WILL BE SECURED
	measures, and implemented through relevant project plans. It is currently assumed that the minimum target depth of lowering will be 0.6 m. Cable protection will be suitably installed and monitored throughout the design life, with any damage, destruction or decay of the protection/cables which may pose a hazard to other sea users notified to MCA, NLB, Kingfisher and UKHO no later than 24 hours after discovery. Repairs will be conducted as necessary, and as soon as is practicable. Details will be provided within the CaP and CBRA. *External protection will be designed to minimise snagging risk as far as practicable.*		
Charting of infrastructure	Notification to UKHO Admiralty Charts / Kingfisher of the proposed works, as-built anchor locations, mooring lines, cable routes, and associated locations of external protection to facilitate sharing of maritime safety information.	Primary	Secured through condition attached to the Marine Licence.
Compliance with floating foundation guidance	The Applicant will ensure compliance with the Regulatory Expectations on Mooring for Floating Wind and Marine Devices (MCA and HSE, 2017).	Primary	Required under MGN 654.
Compliance with MGN 654	The Applicant will ensure compliance with MGN 654 (MCA, 2021) and its annexes, where applicable.	Primary	Secured through condition attached to the Marine Licence.
Promulgation of information	Details of the Project will be promulgated in advance of, and during, construction via the appropriate channels, such as Notifications to Mariners (NtM) and Kingfisher Bulletins to ensure other sea users are informed about ongoing and upcoming works.	Primary	Secured through condition attached to the Marine Licence.
Emergency Response and Rescue Vessel (ERRV)	The ERRV serving the Culzean Gas Field will support the Project including undertaking guard duties.	Primary	Required under MGN 654.
Lighting and marking	Lighting and marking of the Project will be deployed in agreement with NLB and in accordance with IALA Recommendation O-139 (IALA, 2021a) and Guideline G1162 (IALA, 2021b).	Primary	Secured through condition attached to the Marine Licence.

MITIGATION MEASURE	DESCRIPTION	FORM (PRIMARY OR TERTIARY)	HOW MITIGATION WILL BE SECURED
Marine coordination for Project vessels	Marine coordination will be implemented to manage project vessels during construction, maintenance and decommissioning activities, in accordance with the Vessel Management Plan (VMP) and Navigational Safety Plan (NSP). The VMP will detail the number, type and specification of vessels utilised during construction and operation. This will also detail the ports and transit corridors proposed. The NSP will be developed for the Project and will detail all navigational safety measures, construction exclusion zones if required, NtM and radio navigation warnings, anchoring areas, lighting and marking requirements and emergency response procedures during all phases of the project.	Primary	Secured through condition attached to the Marine Licence.
Minimum blade clearance	The minimum blade tip clearance of the WTG will be at least 22 m above Mean Sea Level (MSL).	Primary	Required under MGN 654.
Pollution planning	A Marine Pollution Contingency Plan (MPCP) will be developed for all vessels in accordance with MARPOL requirements. Accordance with this will help to ensure that the potential for release of pollutants is minimised during operations. The MPCP will be included within the Environmental Management Plan (EMP).	Primary	Secured through condition attached to the Marine Licence.
Project vessel compliance with international marine regulations	All project vessels will ensure compliance with Flag State regulations including the Convention on the COLREGs and SOLAS, including the display of appropriate lights and shapes such as when vessels are restricted in their ability to manoeuvre, as per the VMP and NSP.	Tertiary	Secured through condition attached to the Marine Licence.
Decommissioning Programme	A Decommissioning Programme will be developed prior to decommissioning to address the principal decommissioning measures for the Project, this will be written in accordance with applicable guidance and detail the management, environmental management, and schedule for decommissioning.	Tertiary	Secured through condition attached to the Marine Licence.

13.9 Assessment of impacts

13.9.1 Potential effects during construction

13.9.1.1 Vessel displacement – all receptors

Vessels may be displaced from their existing routes due to construction activities associated with the Project.

Main commercial routes have been identified within the Study Area using 12 months of AIS data and applying the principles of MGN 654 (MCA, 2021). From the 11 main commercial routes identified, only one may require a deviation due to construction activities associated with the Project. This is Route 2 – featuring oil and gas vessels transiting between Aberdeen (UK) and the Culzean Gas Field – which requires a deviation of up to 0.33 nm to achieve a 1 nm setback of the mean position from the WTG. The vessel route deviations are presented in Figure 13-5.

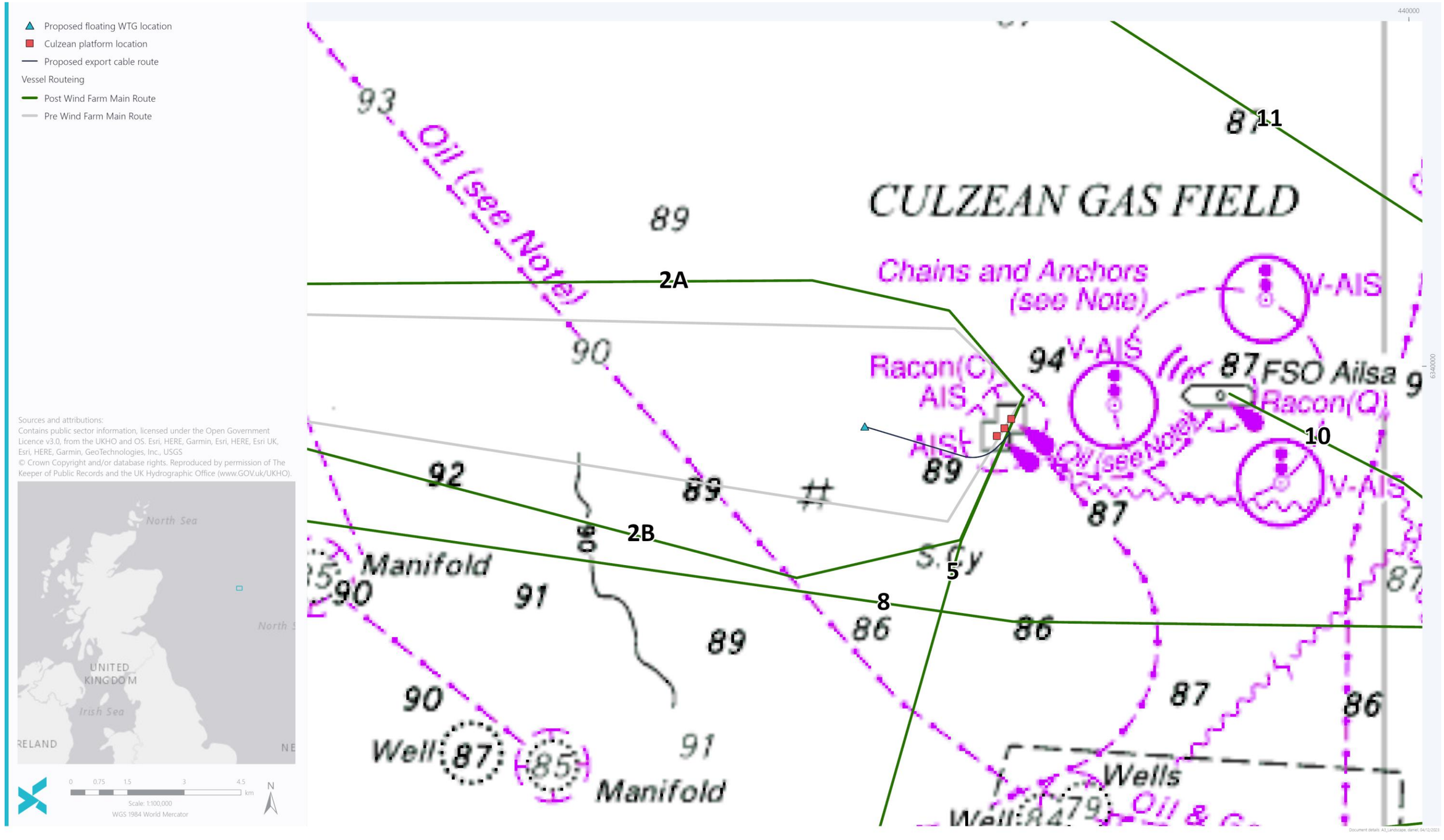

Figure 13-5 Pre and post WTG route deviations

This is a small deviation and reflects the small-scale nature of the Project. Additionally, vessels on this route are already familiar and comfortable navigating in proximity to existing offshore developments in the region and will have good familiarity with the additional presence of the Project given the links to the Culzean Gas Field. The MCA agreed in the Hazard Workshop that disruption to vessels on this route is not a concern, and this has been reiterated by Vroon, the main operator of oil and gas vessels on this route. It is also not anticipated that the additional presence of the Project will affect use of existing aids to navigation in the region given the scale of the Project.

For other commercial routeing, no disruption is anticipated, with the MCA noting in the Hazard Workshop that given the existing presence of offshore infrastructure in the region (specifically in relation to the Culzean Gas Field), commercial vessels are already clearly avoiding the sea area where the construction activities will be located, and this is unlikely to change in the future case.

For small craft, low volumes of activity are noted in the region and, similar to the MCA, RYA Scotland indicated in the Hazard Workshop that the existing presence of offshore infrastructure means that there is no additional concern. Any issue would likely occur in adverse weather conditions, although the likelihood of a recreational vessel navigating as far offshore as the Project in inclement weather is very low.

RYA Scotland did note that recently there have been delays in UKHO Admiralty charts being updated but other forms of mitigation should raise awareness. In addition to the charting of infrastructure, the promulgation of information relating to the Project has been identified as an embedded mitigation measure, including via Notifications to Mariners and Kingfisher Bulletins, with RYA Scotland encouraging recreational users to utilise Kingfisher.

The most likely consequence of the hazard is that there is no effect on journey times and distances for third-party vessels. As a worst case, there could be limited effects on journey times and distances for oil and gas vessels navigating in proximity, but no safety risks are identified.

Embedded mitigation measures identified as relevant to reducing the significance of risk are as follows:

- Charting of infrastructure; and
- Promulgation of information.

The frequency of occurrence is considered to be reasonably probable. The severity of consequence is considered to be negligible. Therefore, the overall effect is considered to be Broadly Acceptable and not significant in EIA terms.

Frequency of Occurrence	Severity of Consequence	Significance of Risk
Reasonably probable	Negligible	Broadly Acceptable

Impact significance - NOT SIGNIFICANT

13.9.1.2 Third-party vessel collision risk – all receptors

Displaced vessels may lead to increased traffic densities in certain areas and a subsequent increase in encounters and collision risk between third-party vessels.

Given that encounters and collision risk arise from the reduction in navigable sea room and subsequent need for vessels to deviate, the assessment of vessel displacement is considered for this hazard.

Based on the collision modelling undertaken, the collision frequency was estimated to be one in 102,000 years for base case traffic levels, representing a 1.7% change compared to the pre WTG scenario. The change is similar when applying future case traffic levels. Since only Route 2 is anticipated to require a deviation due to the presence of the Project, the change is wholly attributable to this main commercial route.

Therefore, this hazard is local in nature and given the proximity to the endpoint of the route (i.e., the Culzean Gas Field), it is expected that mariners will be particularly aware of other vessels in the area, thus further minimising the likelihood of an encounter situation.

In the unlikely event of an encounter situation, the vessels involved are expected to take collision avoidance action as appropriate in line with the COLREGs, thus ensuring the situation does not develop into a collision incident. This is supported by experience at under construction and operational offshore wind farms, where no collision incidents involving two third-party vessels have been reported.

Additionally, stakeholders raised no concerns in relation to third-party collision risk during the Hazard Workshop.

The most likely consequence of the hazard is that the number of encounters occurring in the region increases but with no safety risks arising. As a worst case, a collision event could occur involving vessel damage, Potential Loss of Life (PLL), and pollution, although this is considered highly unlikely. Nevertheless, should such an incident occur, project vessels and vessels associated with nearby offshore developments (including the ERRV for the Culzean Gas Field) may attend the incident under SOLAS obligations (IMO, 1974) and the MPCP may be implemented in liaison with the MCA.

Embedded mitigation measures identified as relevant to reducing the significance of risk are as follows:

- Charting of infrastructure;
- ERRV;
- Marine coordination for project vessels;
- Pollution planning;
- Project vessel compliance with international marine regulations; and
- Promulgation of information.

The frequency of occurrence is considered to be **extremely unlikely**. The severity of consequence is considered to be **moderate**. Therefore, the overall effect is considered to be **Broadly Acceptable** and not significant in EIA terms.

Frequency of Occurrence	Severity of Consequence	Significance of Risk
Extremely unlikely	Moderate	Broadly Acceptable

Impact significance - NOT SIGNIFICANT

13.9.1.3 Third-party to project vessel collision risk – all receptors

The presence of project vessels associated with construction activities may increase the likelihood of vessel to vessel encounters and subsequently increase the collision risk between third-party and project vessels. This includes the potential for encounters and collision risk with towage activities.

Historically, there has been one instance of a third-party vessel colliding with a project vessel associated with a UK offshore wind development, resulting in moderate vessel damage but no harm to persons. The incident occurred in 2011, and awareness of offshore wind developments has improved considerably in the interim, with no further collision incidents reported since.

Project vessel movements will be limited given the scale of the Project. More project vessels are expected to be on-site during the construction phase, although this phase will be short in duration.

Project vessels will be managed by marine coordination, and this is expected to include clear communication with the Culzean Gas Field and any ongoing activities. Project vessels will also carry AIS and comply with international marine regulations including the COLREGs (IMO, 1972/77) and SOLAS (IMO, 1974). When on-site, project vessels are expected to remain local to the location of the Project and an application will be made for a safety zone around the WTG for construction activities. Therefore, interaction with third-party activities other than those related to the Culzean Gas Field is likely to be minimal.

During towage operations for the WTG / floater, there will be multiple project vessels present given the dynamic and restricted manoeuvrability associated with the operation; there will be a main tug but also a supporting vessel in the event of an issue arising, which could include an encounter between the towing operation and a third-party vessel.

All construction activities associated with the Project (including towage operations) will be promulgated via Notifications to Mariners and Kingfisher Bulletins, thus maximising third-party awareness and allowing passage planning to take account of activities.

The most likely consequences of the hazard are analogous to that identified for third-party collision risk. As a worst case, a collision event could occur during towage operations, resulting in vessel damage, PLL, pollution, and the foundering or drifting of the WTG / floater. In such circumstances, the ERCoP would be implemented including in relation to wreck response, as requested by NLB during the Hazard Workshop.

Embedded mitigations measures identified as relevant to reducing the significance of risk are as follows:

- Application for safety zones;
- Charting of infrastructure;
- Compliance with MGN 654;
- ERRV;
- Marine coordination for project vessels;
- Pollution planning;
- Project vessel compliance with international marine regulations; and
- Promulgation of information.

The frequency of occurrence is considered to be extremely unlikely. The severity of consequence is considered to be moderate. Therefore, the overall effect is considered to be Broadly Acceptable and not significant in EIA terms.

Frequency of Occurrence	Severity of Consequence	Significance of Risk
Extremely unlikely	Moderate	Broadly Acceptable
Impact significance – NOT SIGNIFICANT		

13.9.1.4 Allision risk – all receptors

The partially complete and the completed but not yet commissioned structure could create an allision risk (powered or drifting) to passing traffic.

There are two distinct forms of allision risk which are each considered for this hazard – powered and drifting allision risk.

Based on the powered allision modelling undertaken, the allision frequency was estimated to be one in 67,000 years for base case traffic levels. The change is similar when applying future case traffic levels. This low likelihood reflects the localised nature of allision risk (a vessel must be in close proximity to a surface structure for the hazard to exist), the scale of the Project, and the low volume of commercial traffic passing in proximity to the WTG.

Historically there have been two reported instances of a third-party vessel alliding with a UK offshore wind farm structure (in the Irish Sea and Southern North Sea). Both of these incidents involved a fishing vessel, with a RNLI lifeboat attending on both occasions and a helicopter deployed in one case.

As discussed for the vessel displacement hazard, the MCA noted in the Hazard Workshop that given the existing presence of offshore infrastructure in the region (specifically in relation to the Culzean Gas Field), commercial vessels are already clearly avoiding the sea area where the WTG will be located and this is unlikely to change in the future case.

For small craft, it is again acknowledged that there are low volumes of activity in the region and, similarly to the MCA, RYA Scotland indicated in the Hazard Workshop that the existing presence of offshore infrastructure means that there is no additional concern.

For all vessels the charting of infrastructure will assist with passage planning to ensure safe navigation when in the region, and this will be further assisted by the promulgation of information relating to the Project, including via Notifications to Mariners and Kingfisher Bulletins. Furthermore, the WTG will be lit and marked in agreement with NLB and in accordance with IALA Recommendation O-139 (IALA, 2021a) and Guideline G1162 (IALA, 2021b), including by temporary lighting during the installation works. In particular, NLB confirmed during the Hazard Workshop that the WTG should be marked as an isolated structure.

In the unlikely event of a powered allision situation developing, the ERRV or on-site project vessels (if present) may initiate contact with the third-party vessel to advise of the need to take immediate action, particularly where a safety zone is active.

Based on the drifting allision modelling undertaken, the allision frequency was estimated to be negligible for base case traffic levels. The change is also negligible when applying future case traffic levels. This low likelihood again reflects the nature of allision risk, scale of the Project, and low volume of commercial traffic passing in proximity to the WTG. Additionally, a vessel adrift may only develop into an allision situation if the wind and / or tide directs the vessel towards the WTG.

In the exceptionally unlikely event of a drifting allision situation developing, the third-party vessel may take action to prevent an allision occurring. For a powered vessel, the ideal and likely solution would be to regain power prior to reaching the WTG (i.e., by rectifying any faulty). Failing this, the vessel's emergency response procedures would be implemented which may include an emergency anchoring event following a check of the relevant UKHO Admiralty charts to ensure the deployment of the anchor will not lead to other risks (such as anchor snagging on a subsea cable or pipeline), or the use of thrusters (depending upon availability and power supply).

For an unpowered vessel, the ERRV and / or project vessels may be able to render assistance in liaison with the MCA and line with SOLAS obligations (IMO, 1974). This response would be managed by His Majesty's Coastguard (HMCG). It is noted that the likelihood of an unpowered vessel navigating at the distance offshore of the Project is very low.

For sailing vessels with a mast, the allision risk also extends to a blade allision event. However, the minimum blade tip clearance of the WTG will be at least 22 m above MSL, and it will be ensured that there is also compliance with MGN 654 (22 m above Mean High Water Springs (MHWS)), noting this also aligns with the RYA's recommendation (RYA, 2019). Additionally, no negative effects such as wind shear, masking, and turbulence associated with sailing vessels navigating in proximity to the WTG are expected noting that none have been reported to date.

The most likely consequence of the hazard is an unsafe passing distance resulting in a need for late adjustments to speed and / or course, but with no long-term effects. As a worst case, an allision event could occur involving vessel damage, PLL, and pollution, although this is considered highly unlikely. Given that a drifting vessel is likely to be moving at a lower speed than a powered vessel, the consequences are likely to be less severe for a drifting allision. Similarly to a collision event, should an allision event occur, project vessels and vessels associated with nearby offshore developments (including the ERRV for the Culzean Gas Field) may attend the incident under SOLAS obligations (IMO, 1974) and the MPCP may be implemented in liaison with the MCA.

Embedded mitigation measures identified as relevant to reducing the significance of risk are as follows:

- Application for safety zones;
- Charting of infrastructure;
- Compliance with MGN 654;
- ERRV;
- Marine coordination for project vessels;
- Pollution planning;
- Project vessel compliance with international marine regulations; and

- Promulgation of information.

The frequency of occurrence is considered to be **extremely unlikely**. The severity of consequence is considered to be **moderate**. Therefore, the overall effect is considered to be **Broadly Acceptable** and not significant in EIA terms.

Frequency of Occurrence	Severity of Consequence	Significance of Risk
Extremely unlikely	Moderate	Broadly Acceptable

Impact significance – NOT SIGNIFICANT

13.9.2 Potential effects during operation and maintenance

13.9.2.1 Vessel displacement – all receptors

Vessels may be displaced from their existing routes due to activities associated with the Project or due to the presence of the Project.

Based on experience at existing operational offshore wind farms, it is anticipated that commercial vessels will choose not to navigate in proximity to the WTG and therefore the main route deviations established for the equivalent construction phase hazard in line with MGN 654 (MCA, 2021) are again considered. In particular, a deviation of up to 0.33 nm will be needed to achieve a 1 nm setback of the mean position from the WTG for an oil and gas vessels route between Aberdeen (UK) and the Culzean Gas Field.

With this deviation matching that established for the equivalent construction phase hazard, the main consequences of vessel displacement during the operational phase are also considered to be equivalent, in particular potential for increased journey times and distances. As for the construction phase, promulgation of information relating to the Project and relevant nautical charts will allow vessels to passage plan in advance.

It is also not anticipated that the additional presence of the Project will affect use of existing aids to navigation in the region given the scale of the Project.

Embedded mitigation measures identified as relevant to reducing the significance of risk are as per the equivalent construction phase hazard.

The frequency of occurrence is considered to be **reasonably probable**. The severity of consequence is considered to be **negligible**. Therefore, the overall effect is considered to be **Broadly Acceptable** and not significant in EIA terms.

Frequency of Occurrence	Severity of Consequence	Significance of Risk
Reasonably probable	Negligible	Broadly Acceptable

Impact significance – NOT SIGNIFICANT

13.9.2.2 Third-party vessel collision risk – all receptors

Displaced vessels may lead to increased traffic densities in certain areas and a subsequent increase in encounters and collision risk between third-party vessels.

Given the main route deviations are anticipated to remain as per those established for the equivalent construction phase hazard, the likelihood of an encounter occurring are also likely to be similar. The annual collision frequency for the post WTG scenario (one in 102,000 years) represents a 1.7% increase compared to the pre WTG base scenario. This relatively low level of estimated collision risk aligns well with the incident datasets assessed.

In the event that an encounter or collision does occur, the respective consequences are expected to be the same as for the equivalent construction phase hazard, with the most likely consequences of a collision being minor damage incurred. The worst-case consequences could include the foundering of one of the vessels resulting in a PLL and pollution.

As with the equivalent construction phase hazard, for all vessels the risk will be present throughout the operation and maintenance phase, but the promulgation of information relating to maintenance activities and charting of infrastructure will allow vessel Masters to passage plan in advance, minimising disruption. Additionally, as with the construction phase, mariner awareness will be further maximised by promulgation of information to fishing vessels via an FLO and deployment of lighting and marking.

Embedded mitigation measures identified as relevant to reducing the significance of risk are as per the equivalent construction phase hazard.

The frequency of occurrence is considered to be extremely unlikely. The severity of consequence is considered to be moderate. Therefore, the overall effect is considered to be Broadly Acceptable and not significant in EIA terms.

Frequency of Occurrence	Severity of Consequence	Significance of Risk
Extremely unlikely	Moderate	Broadly Acceptable
Impact significance – NOT SIGNIFICANT		

13.9.2.3 Third-party to project vessel collision risk – all receptors

The presence of project vessels associated with operation and maintenance activities may increase the likelihood of vessel to vessel encounters and subsequently increase the collision risk between third-party and project vessels. This includes the potential for encounters and collision risk with towage activities.

As with the equivalent construction phase hazard, encounter and collision risk involving a project vessel will be well mitigated, including through marine coordination, carriage of AIS and compliance with Flag State regulations by project vessels, and promulgation of information to fishing fleets via an appointed FLO.

Furthermore, an application will be made for a safety zone around the WTG for major maintenance activities. This will serve to protect project vessels engaged in major maintenance activities. Minimum advisory passing distances, as

defined by risk assessment, may also be implemented where safety zones do not apply, with advanced warning and accurate locations of both safety zones and any minimum advisory safe passing distances provided by Notifications to Mariners and Kingfisher Bulletins.

The WTG and floater will exhibit lights, marks, sounds, signals and other aids to navigation as required by NLB and the MCA, maximising mariner awareness to the potential for project vessel presence when in proximity, both in day and night conditions including in poor visibility.

Should an encounter or collision occur between a third-party vessel and a project vessel, the consequences are expected to be as for the equivalent construction phase hazard, with the most likely consequences being moderate damage incurred and no injuries to persons based on historical incident data. The worst-case consequences could include the foundering of one of the vessels resulting in a PLL and pollution, with the environmental risk of the latter minimised by the implementation of the MPCP.

Embedded mitigation measures identified as relevant to reducing the significance of risk are as per the equivalent construction phase hazard.

The frequency of occurrence is considered to be negligible. The severity of consequence is considered to be moderate. Therefore, the overall effect is considered to be Broadly Acceptable and not significant in EIA terms.

Frequency of Occurrence	Severity of Consequence	Significance of Risk
Negligible	Moderate	Broadly Acceptable
Impact significance – NOT SIGNIFICANT		

13.9.2.4 Allision risk – all receptors

The structure could create an allision risk (powered or drifting) to passing traffic.

As with the equivalent construction phase hazard, the spatial extent of an allision is small given that a vessel must be in close proximity to the WTG structure for an allision incident to occur. The annual powered allision frequency for the post WTG scenario is given as one 67,000 years whilst the drifting allision frequency is negligible.

In the event that an allision does occur, the respective consequences are expected to be the same as for the equivalent construction phase hazard, with the most likely consequences of unsafe passing distance being the need for late adjustments to speed/course. The worst-case consequences could include vessel damage, PLL, and pollution, although these effects would likely be reduced in a drifting allision incident compared to a powered allision incident due to typically lower speeds.

Embedded mitigation measures identified as relevant to reducing the significance of risk are as per the equivalent construction phase hazard.

The frequency of occurrence is considered to be negligible. The severity of consequence is considered to be moderate. Therefore, the overall effect is considered to be Broadly Acceptable and not significant in EIA terms.

Frequency of Occurrence	Severity of Consequence	Significance of Risk
Negligible	Moderate	Broadly Acceptable
Impact significance - NOT SIGNIFICANT		

13.9.2.5 Loss of station – all receptors

A mooring system failure could cause the floating structure to lose station and create a hazard to navigation.

The Project will comply with the MCA's Regulatory Expectations on Mooring for Floating Wind and Marine Devices (MCA and HSE, 2017). This includes the arrangement of third-party verification (TPV) of the mooring system by an independent and competent person or body as a 'continuous activity', i.e., additional TPV will be required should any modifications be made to the mooring system or if new information becomes available relating to reliability.

On this basis, the likelihood of a loss of station is considered to be very low, noting that for a total loss of station all moorings would have to fail.

The Regulatory Expectations also require the provision of continuous monitoring either by Global Positioning System (GPS) or other suitable means. The Applicant will put such a system in place, with the floater continuously monitored, and with capability of being tracked via AIS in the event of a loss of station as detailed in MGN 654 (MCA, 2021). The WTG will also have an alarm system in place, whereby an alert will be provided to the Applicant in the event that the floater leaves a pre-defined ringfenced alarm zone. This means in the unlikely event that the floater suffers total loss of station and drifts outside of its alarm zone, the Applicant would be made aware and able to track its position and make necessary arrangements, including promulgating details of the floater's movements via Notifications to Mariners and Kingfisher Bulletins. Additionally, operational lighting associated with the floater may assist mariners with identifying the presence of the floater, thus minimising the likelihood of an interaction.

The most likely consequence of the hazard is a singular mooring failure which increases the maximum excursion of the floater but with limited safety risks. As a worst case, a total loss of station could occur, resulting in the floater drifting, potentially encountering a third-party vessel or the platforms associated with the Culzean Gas Field, depending upon the wind and / or tide. This could result in an allision event involving vessel damage, damage to a platform, PLL, and significant pollution, although this is considered exceptionally unlikely. Nevertheless, should such an incident occur, the Marine Pollution Contingency Plan may be implemented in liaison with the MCA.

Embedded mitigation measures identified as relevant to reducing the significance of risk are as follows:

- Compliance with floating foundation guidance;
- ERRV;
- Lighting and marking;
- Pollution planning; and

- Promulgation of information.

The frequency of occurrence is considered to be extremely unlikely. The severity of consequence is considered to be moderate. Therefore, the overall effect is considered to be Broadly Acceptable and not significant in EIA terms.

Frequency of Occurrence	Severity of Consequence	Significance of Risk
Extremely unlikely	Moderate	Broadly Acceptable
Impact significance - NOT SIGNIFICANT		

13.9.2.6 Vessel interaction with export cable and mooring lines – all receptors

The presence of the mooring lines and export cable associated with the Project may increase the likelihood of anchor interaction for third-party vessels or impact under keel clearance.

There are three distinct forms of anchor interaction which are each considered for this hazard – planned anchoring, unplanned anchoring, and anchor dragging.

No vessels were deemed to be at anchor during the 12-month period within the Study Area (see Section 9.2.6). Therefore, the risk of a planned anchoring or anchor dragging interaction with a mooring line or the export cable is very low. For emergency anchoring, traffic volumes in proximity to the WTG and export cable are low given the existing infrastructure in the region, and so the likelihood of such a scenario arising is also very low. This is compounded by the water depths and expectation that mariners will account for the presence of the mooring lines and export cables on appropriate UKHO Admiralty charts prior to dropping the anchor in line with Regulation 34 of SOLAS (IMO, 1974).

For the export cable, the burial of the cable and use of external rock protection – as informed by the cable burial risk assessment – will minimise the likelihood of an interaction occurring should a vessel drop anchor in proximity. Such mitigation does not apply to the sections of the export cable in the water column, nor the mooring lines. However, these will be in proximity to the WTG, and as per Section 14.1, vessels are not expected to navigate in such proximity.

The most likely consequence of the hazard is that a vessel drops anchor close to or over the export cable but no interaction occurs given the burial / protection of the cable. As a worst case, a snagging incident could occur and / or the vessel's anchor could be damaged, with potential for loss of stability for a smaller vessel. However, this is highly unlikely to occur given the water depths which will inhibit a smaller vessel from anchoring. For an interaction with a mooring line or the export cable in the water column, a further consequence could be the breaking of the mooring line or export cable, which may then have implications for the stability of the floater.

If necessary to deploy, the maximum height of rock protection above the seabed will be 1 m. This compares against a water depth of 89 m below Chart Datum (CD) for the location of the export cable.

The requirements of MGN 654 in relation to cable protection will apply, namely that cable protection will not change the charted water depth by more than 5% unless appropriate mitigation is agreed with the MCA. This also aligns with

the RYA's recommendation that the 'minimum safe under keel clearance over submerged structures and associated infrastructure should be determined in accordance with the methodology set out in MGN 543 [since superseded by MGN 654]' (RYA, 2019).

Accounting for the rock protection height and charted water depth, it is not anticipated that the presence of cable protection associated with the export cable will reduce charted water depth by more than 5%.

The most likely consequence of the hazard is that a vessel navigates over the location of cable protection but no under keel interaction occurs. As a worst case, an underwater allision could occur but this is considered exceptionally unlikely in this area.

Section 13.8 of Appendix I provides a draught assessment for oil and gas vessels navigating in proximity to the WTG and export cable. This assessment found that there is substantial clearance between the largest draught vessels and the mooring lines and export cable where these are in the water column. The under keel interaction risk would be greatest close to the WTG where the mooring lines and export cable are highest in the water column; however, third-party vessels are expected to maintain a safe passing distance from the WTG and thus the under keel interaction risk is minimal. This particularly holds true given that the connection point for the mooring lines and export cable to the floater is substantially below the sea surface.

Nevertheless, it will be necessary to confirm the available under keel clearance from the mooring lines and export cable post installation. The confirmed available clearance should be discussed with the MCA and NLB post installation to determine if any additional mitigation is required.

The most likely consequence of the hazard is that a vessel passes close to or over a mooring line or the export cable but no interaction occurs given the depth of the mooring line / export cable. As a worst case, an interaction event could occur with potential for loss of stability for a smaller vessel and the breaking of the mooring line or export cable, which may then have implications for the stability of the floater.

Embedded mitigation measures identified as relevant to reducing the significance of risk are as follows:

- Cable burial risk assessment;
- Charting of infrastructure;
- Compliance with floating foundation guidance;
- Compliance with MGN 654; and
- Promulgation of information.

The frequency of occurrence is considered to be extremely unlikely. The severity of consequence is considered to be moderate. Therefore, the overall effect is considered to be Broadly Acceptable and not significant in EIA terms.

Frequency of Occurrence	Severity of Consequence	Significance of Risk
Extremely unlikely	Moderate	Broadly Acceptable
Impact significance - NOT SIGNIFICANT		

13.9.2.7 Reduction of emergency response capability – all receptors

The presence of the Project may result in an increased number of incidents requiring emergency response associated with work vessels or third-party vessels. Also, the presence of the structure may reduce access for SAR responders, such as helicopters.

Given the scale of the Project, any associated SAR operation is likely to cover a small spatial extent and is not expected to be impeded by the presence of the Project. In particular, the distance between the WTG and closest platform associated with the Culzean Gas Field is approximately 1 nm which is sufficient to allow a SAR helicopter asset to navigate between them.

Given the distance offshore of the Project and historical incident data, the RNLI are unlikely to respond to an incident occurring on-site. Instead, a SAR helicopter from the Sumburgh or Inverness base is likely to be the first responder from shore. It is likely that a project vessel (including the ERRV for the Culzean Gas Field) or a vessel supporting another offshore development in the region will be well equipped to assist an incident under SOLAS obligations (IMO, 1974). Such a response would occur in liaison with the MCA.

From historical incident data (MAIB and DfT), there is a very low rate of incidents in the region, with the likelihood of an incident relating to the Project occurring simultaneously exceptionally unlikely.

The most likely consequence of the hazard is that there are no limitations on the capability of emergency responders should an incident occur. As a worst case, there could be a delay to a response request leading to vessel damage, PLL, and pollution.

Embedded mitigation measures identified as relevant to reducing the significance of risk are as follows:

- Compliance with MGN 654;
- ERRV;
- Lighting and marking;
- Marine coordination;
- Pollution planning; and
- Project vessel compliance with international marine regulations.

The frequency of occurrence is considered to be extremely unlikely. The severity of consequence is considered to be serious. Therefore, the overall effect is considered to be Tolerable with mitigation and not significant in EIA terms.

Frequency of Occurrence	Severity of Consequence	Significance of Risk
Extremely unlikely	Serious	Tolerable with mitigation

Impact significance - NOT SIGNIFICANT

13.9.3 Potential effects during decommissioning

The targeted scenario for decommissioning is a clear seabed. Given the nature of the decommissioning activities, which will largely be a reversal of the installation process, the impacts during decommissioning are expected to be similar to or less than those assessed for the construction stage. It should be noted that the decommissioning options for the export cable removal will be subject to comparative assessment of options at the end of the installation life. This will involve assessing the potential removal of artificial hard structures associated with the Project. Therefore, the impact significance for vessel displacement, third-party collision risk, project vessel collision risk, and allision risk are unchanged from the equivalent construction phase assessments.

13.9.4 Summary of potential effects

A summary of the outcomes of the assessment of potential effects from the construction, operation and maintenance and decommissioning of the Project is provided in

Table 13-11. No significant effects on shipping and navigation receptors were identified. Therefore, mitigation measures in addition to the embedded mitigation measures listed in Section 13.8 are not considered necessary.

Table 13-11 Summary of potential effects

POTENTIAL EFFECT	RECEPTOR	FREQUENCY OF OCCURRENCE	SEVERITY OF CONSEQUENCE	SIGNIFICANCE OF EFFECT	SECONDARY MITIGATION REQUIREMENTS	RESIDUAL SIGNIFICANT OF EFFECT
Construction						
Vessel displacement	All users	Reasonably probable	Negligible	Broadly Acceptable (not significant)	None required above existing embedded mitigation measures.	Negligible (not significant)
Third-party vessel collision risk	All users	Extremely unlikely	Moderate	Broadly Acceptable (not significant)	None required above existing embedded mitigation measures.	Negligible (not significant)
Third-party to project vessel collision risk	All users	Extremely unlikely	Moderate	Broadly Acceptable (not significant)	None required above existing embedded mitigation measures.	Negligible (not significant)
Allision risk	All users	Extremely unlikely	Moderate	Broadly Acceptable (not significant)	None required above existing embedded mitigation measures.	Negligible (not significant)
Operation and maintenance						
Vessel displacement	All users	Reasonably probable	Negligible	Broadly Acceptable (not significant)	None required above existing embedded mitigation measures.	Negligible (not significant)

POTENTIAL EFFECT	RECEPTOR	FREQUENCY OF OCCURRENCE	SEVERITY OF CONSEQUENCE	SIGNIFICANCE OF EFFECT	SECONDARY MITIGATION REQUIREMENTS	RESIDUAL SIGNIFICANT OF EFFECT
Third-party vessel collision risk	All users	Extremely unlikely	Moderate	Broadly Acceptable (not significant)	None required above existing embedded mitigation measures.	Negligible (not significant)
Third-party to project vessel collision risk	All users	Negligible	Moderate	Broadly Acceptable (not significant)	None required above existing embedded mitigation measures.	Negligible (not significant)
Allision risk	All users	Negligible	Moderate	Broadly Acceptable (not significant)	None required above existing embedded mitigation measures.	Negligible (not significant)
Loss of station	All users	Extremely unlikely	Moderate	Broadly Acceptable (not significant)	None required above existing embedded mitigation measures.	Negligible (not significant)
Vessel interaction with export cable and mooring lines	All users	Extremely unlikely	Moderate	Broadly Acceptable (not significant)	None required above existing embedded mitigation measures.	Negligible (not significant)
Reduction of emergency response capability	Emergency responders	Extremely unlikely	Serious	Tolerable with Mitigation (not significant)	None required above existing embedded mitigation measures.	Negligible (not significant)
Decommissioning						
Vessel displacement	All users	Reasonably probable	Negligible	Broadly Acceptable (not significant)	None required above existing embedded mitigation measures.	Negligible (not significant)

POTENTIAL EFFECT	RECEPTOR	FREQUENCY OF OCCURRENCE	SEVERITY OF CONSEQUENCE	SIGNIFICANCE OF EFFECT	SECONDARY MITIGATION REQUIREMENTS	RESIDUAL SIGNIFICANT OF EFFECT
Third-party vessel collision risk	All users	Extremely unlikely	Moderate	Broadly Acceptable (not significant)	None required above existing embedded mitigation measures.	Negligible (not significant)
Third-party to project vessel collision risk	All users	Extremely unlikely	Moderate	Broadly Acceptable (not significant)	None required above existing embedded mitigation measures.	Negligible (not significant)
Allision risk	All users	Extremely unlikely	Moderate	Broadly Acceptable (not significant)	None required above existing embedded mitigation measures.	Negligible (not significant)

13.10 Proposed monitoring

AIS tracking will be deployed on the floater to allow monitoring in the event of a loss of station incident.

13.11 Cumulative effects assessment

As the Project is situated significantly offshore, there are limited developments considered relevant to the Cumulative Effects Assessment (CEA). Due to the relative size of the Project, only cumulative issues within 10 nm have been considered. The only developments within 10 nm are the Cenos Floating Offshore Windfarm and Central North Sea Electrification (CNSE) Project; these developments have been scoped and are situated 17.5 km (9.3 nm) to the west and aa km (5.9 nm) to the northwest, respectively. Taking into account the baseline traffic, no substantial interaction between the Project and either Cenos or CNSE is anticipated, and therefore both has been screened out of the CEA.

Existing oil and gas infrastructure is noted in the vicinity; however this is considered part of the shipping and navigation baseline. Since there are no cumulative developments screened into the CEA, no assessment of cumulative effects has been undertaken.

13.12 Inter-related effects

Inter-relationships are defined as the interaction between the impacts assessed within different topic assessment chapters on a receptor. The other chapters and impacts related to the assessment of potential effects on Commercial Fisheries are provided in Table 13-12. For shipping and navigation, it is not anticipated that any inter-related effects will be produced that are of greater significance than the assessments presented for each individual topic assessment noting that for all phases vessel displacement was deemed Broadly Acceptable and As Low as Reasonably Practicable (ALARP) under the FSA (IMO, 2018).

Table 13-12. Shipping and Navigation inter-relationships

CHAPTER	IMPACT	DESCRIPTION
Chapter 12: Commercial Fisheries	Further exclusion of sea space through fishing vessel presence and potential vessel displacement. Direct impacts from safety issues through vessel-to-vessel collision, vessel to structure allision, interference with navigation equipment and loss of station.	Impacts on Shipping and Navigation resulting from vessel presence, further excluding available sea space. Safety issues may arise from vessel-to-vessel collision, vessel to structure allision, interference with navigation equipment and loss of station are also relevant to fishing vessels.
Chapter 16: Other Sea Users	Further exclusion of sea space through vessel presence. Direct impacts from safety issues through vessel-to-vessel collision,	Impacts on Shipping and Navigation resulting from presence of Other Sea Users, further excluding available sea space.

CHAPTER	IMPACT	DESCRIPTION
	vessel to structure allision, interference with navigation equipment and loss of station.	Safety issues may arise from vessel-to-vessel collision, vessel to structure allision, interference with navigation equipment and loss of station.

13.13 Transboundary effects

Transboundary effects arise when impacts from a development within one European Economic Area (EEA) state's territory affects the environment of another EEA state(s).

Given the international nature of routeing by commercial vessels a transboundary effect relating to the displacement of commercial vessels undertaking international voyages has been identified.

Since the use of AIS transceivers (the primary data source for characterisation of commercial vessel movements) is international, the characterisation of the existing environment is suitable for identifying relevant other EEAs. Other EEAs with port(s) which feature in the main commercial routes include German and Danish ports.

Since such international commercial routeing is captured in the existing environment, the environmental assessment for the Project in isolation suitably considers this effect in transboundary terms.

13.14 Summary of impacts and mitigation measures

Significance of effect for each impact was assessed in Section 13.9.

The significance of effect for vessel displacement, third-party vessel collision risk, third-party to project vessel collision risk, allision risk, loss of station, and vessel interaction with export cable and mooring lines were deemed as Broadly Acceptable (not significant in EIA terms) for all assessed phases.

The significance of risk for reduction of emergency response capability was deemed as Tolerable with Mitigation (not significant in EIA terms), noting that this is applicable only for the operations and maintenance phase.

Significance of effect for each impact assumes that embedded mitigation measures are applied – this includes charting of infrastructure, compliance with MGN 654 and floating foundation guidance, and lighting and marking in agreement with NLB and in line with IALA guidance, among others (full list provided in Section 13.8). There will also be a requirement for continuous monitoring of the floater in case of loss of station, with AIS tracking to be implemented on the structures.

No secondary mitigation, over and above the embedded mitigation measures proposed in Section 13.8 is either required or proposed in relation to the potential effects of the Project on shipping and navigation as no significant impacts are predicted.

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