Cenos Offshore Windfarm Limited

Cenos EIA

Chapter 15 – Shipping and Navigation

ASSIGNMENT	**A100907-S01**
DOCUMENT	**A100907-S01-A-ESIA-016**
CLIENT	**CEN001-FLO-CON-ENV-RPT-0018**

XODUS
www.xodusgroup.com

Aberdeen

5th Floor Capitol Building
429-431 Union Street . Aberdeen
AB11 6DA . UK

REVISIONS & APPROVALS

This document has been prepared by Anatec exclusively for the benefit and use of Cenos Offshore Windfarm Limited. Xodus Group expressly disclaims any and all liability to third parties (parties or persons other than Cenos Offshore Windfarm Limited) which may be based on this document.

The information contained in this document is strictly confidential and intended only for the use of Cenos Offshore Windfarm Limited. This document shall not be reproduced, distributed, quoted or made available – in whole or in part – to any third party other than for the purpose for which it was originally produced without the prior written consent of Anatec.

The authenticity, completeness and accuracy of any information provided to Anatec in relation to this document has not been independently verified. No representation or warranty express or implied, is or will be made in relation to, and no responsibility or liability will be accepted by Anatec as to or in relation to, the accuracy or completeness of this document. Anatec expressly disclaims any and all liability which may be based on such information, errors therein or omissions therefrom."

REV	DATE	DESCRIPTION	ISSUED	CHECKED	APPROVED	CLIENT
R05	17/12/24	Final for Issue	Anatec	AF	AF	Cenos
R04	13/12/24	Issued for Review	Anatec	JA	AF	Cenos
R03	04/12/24	Issued for Review	Anatec	JA	AF	Cenos
R02	18/10/24	Issued for Review	Anatec	JA	AF	Cenos
R01	16/09/24	Issued for Review	Anatec	JA	AF	Cenos

CONTENTS

ACRONYMS

ACRONYM	DEFINITION
AIS	Automatic Identification System
CaP	Cable Plan
CBRA	Cable Burial Risk Assessment
COLREGS	Convention on the International Regulations for Preventing Collisions at Sea
CoS	Chamber of Shipping
DECC	Department of Energy and Climate Change
DfT	Department for Transport
DoL	Depth of Lowering
DSLP	Development Specification and Layout Plan
EEA	European Economic Area
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EICC	Export/Import Cable Corridor
EMF	Electromagnetic Field
EMP	Environmental Management Plan
ERCoP	Emergency Response Cooperation Plan
FLO	Fisheries Liaison Officer
FMMS	Fisheries Management and Mitigation Strategy
FPSO	Floating, Production, Storage and Offloading Unit
FSA	Formal Safety Assessment
FTU	Floating Turbine Unit
GPS	Global Positioning System
GT	Gross Tonnes
HMCG	His Majesty's Coastguard
HSE	Health and Safety Executive
HVDC	High Voltage Direct Current
IAC	Inter-Array Cable
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IMO	International Maritime Organization
INTOG	Innovation and Targeted Oil and Gas
km	Kilometre

ACRONYM	DEFINITION
LMP	Lighting and Marking Plan
LOA	Length Overall
m	Metre
MAIB	Marine Accident Investigation Branch
MARPOL	The International Convention for the Prevention of Pollution from Ships
MCA	Maritime and Coastguard Agency
MD-LOT	Marine Directorate – Licensing Operations Team
MGN	Marine Guidance Note
MLA	Marine Licence Application
MPCP	Marine Pollution Contingency Plan
NLB	Northern Lighthouse Board
NM	Nautical mile
NRA	Navigational Risk Assessment
NSP	Navigational Safety Plan
OFLO	Offshore Fisheries Liaison Officer
OWF	Offshore Wind Farm
PLL	Potential Loss of Life
Radar	Radio Detection and Ranging
RAM	Restricted in the Ability to Manoeuvre
RNLI	Royal National Lifeboat Institution
RYA	Royal Yachting Association
SAR	Search and Rescue
SFF	Scottish Fishermen's Federation
SOLAS	International Convention for the Safety of Life at Sea
SOPEP	Ship Oil Pollution Emergency Plan
TPV	Third Party Verification
UK	United Kingdom
UKHO	United Kingdom Hydrographic Office
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
VMS	Vessel Monitoring System
WTG	Wind Turbine Generator

GLOSSARY

TERM	DEFINITION
2023 Scoping Opinion	Scoping Opinion received in June 2023, superseded by the 2024 Scoping Opinion.
2023 Scoping Report	Environmental Impact Assessment (EIA) Scoping Report submitted in 2023, superseded by the 2024 Scoping Report.
2024 Scoping Opinion	Scoping Opinion received in September 2024, superseding the 2023 Scoping Opinion.
2024 Scoping Report	EIA Scoping Report submitted in April 2024, superseding the 2023 Scoping Report.
Applicant	Cenos Offshore Windfarm Ltd.
Area of Opportunity	The area in which the limits of electricity transmission via High Voltage Alternating Current (HVAC) cables can reach oil and gas assets for decarbonisation. This area is based on assets within a 100 kilometre (km) radius of the Array Area.
Array Area	The area within which the Wind Turbine Generators (WTGs), floating substructures, moorings and anchors, Offshore Substation Converter Platforms (OSCPs) and Inter-Array Cables (IAC) will be present.
Cenos Offshore Windfarm ('the Project')	'The Project' is the term used to describe Cenos Offshore Windfarm. The Project is a floating offshore windfarm located in the North Sea, with a generating capacity of up to 1,350 Megawatts (MW). The Project which defines the Red Line Boundary (RLB) for the Section 36 Consent and Marine Licence Applications (MLA), includes all offshore components seaward of Mean High Water Springs (MHWS) (WTGs, OSCPs, cables, floating substructures moorings and anchors and all other associated infrastructure). The Project is the focus of this Environmental Impact Assessment Report (EIAR).
Cenos Offshore Windfarm Ltd. (The Applicant)	The Applicant for the Section 36 Consent and associated marine licences.

TERM	DEFINITION
Cumulative Assessment	The consideration of potential impacts that could occur cumulatively with other relevant projects, plans, and activities that could result in a cumulative effect on receptors.
Environmental Impact Assessment (EIA)	The statutory process of evaluating the likely significant environmental effects of a proposed project or development. Assessment of the potential impact of the proposed Project on the physical, biological and human environment during construction, operation and maintenance and decommissioning.
Environmental Impact Assessment Regulations	This term is used to refer to the Environmental Impact Assessment Regulations which are of relevance to the Project. This includes the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended); and the Marine Works (Environmental Impact Assessment) Regulations 2007.
Environmental Impact Assessment Report	A report documenting the findings of the EIA for the Project in accordance with relevant EIA Regulations.
Export/Import Cable	High voltage cable used to export/import power between the OSCPs and Landfall.
Export/Import Cable Bundle (EICB)	Comprising two Export/Import Cables and one fibre-optic cable bundled in a single trench.
Export/Import Cable Corridor (EICC)	The area within which the Export/Import Cable Route will be planned and the Export/Import Cable will be laid, from the perimeter of the Array Area to MHWS.
Export/Import Cable Route	The area within the Export/Import Export Corridor (EICC) within which the Export/Import Cable Bundle (EICB) is laid, from the perimeter of the array area to MHWS.
Floating Turbine Unit (FTU)	The equipment associated with electricity generation comprising the WTG, the floating substructure which supports the WTG, mooring system and the dynamic section of the IAC.
Flotation Energy	Joint venture partner in Cenos Offshore Windfarm Ltd.

TERM	DEFINITION
Habitats Regulations	The Habitats Directive (Directive 92/43/ECC) and the Wild Birds Directive (Directive 2009/147/EC) were transposed into Scottish Law by the Conservation (Natural Habitats &c) Regulations 1994 ('Habitats Regulations') (up to 12 NM); by the Conservation of Offshore Marine Habitats and Species Regulations 2017 ('Offshore Marine Regulations') (beyond 12 NM); the Conservation of Habitats and Species Regulations 2017 (of relevance to consents under Section 36 of the Electricity Act 1989); the Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001; and the Wildlife and Countryside Act 1981. The Habitats Regulations set out the stages of the Habitats Regulations Appraisal (HRA) process required to assess the potential impacts of a proposed project on European Sites (Special Areas of Conservation, Special Protection Areas, candidate SACs and SPAs and Ramsar Sites).
Habitats Regulations Appraisal	The assessment of the impacts of implementing a plan or policy on a European Site, the purpose being to consider the impacts of a project against conservation objectives of the site and to ascertain whether it would adversely affect the integrity of the site.
High Voltage Alternating Current (HVAC)	Refers to high voltage electricity in Alternating Current (AC) form which is produced by the WTGs and flows through the IAC system to the OSCPs. HVAC may also be used for onward power transmission from the OSCPs to assets or to shore over shorter distances.
High Voltage Direct Current (HVDC)	Refers to high voltage electricity in Direct Current (DC) form which is converted from HVAC to HVDC at the OSCPs and transmitted to shore over longer distances.
Horizontal Directional Drilling (HDD)	An engineering technique for laying cables that avoids open trenches by drilling between two locations beneath the ground's surface.
Innovation & Targeted Oil and Gas (INTOG)	In November 2022, the Crown Estate Scotland (CES) announced the Innovation & Targeted Oil and Gas (INTOG) Leasing Round, to help enable this sector-wide commitment to decarbonisation. INTOG allowed developers to apply for seabed rights to develop offshore windfarms for the purpose of providing low carbon electricity to power oil and gas installations and help to decarbonise the sector. Cenos is an INTOG project and in November 2023 secured an Exclusivity Agreement as part of the INTOG leasing round.

TERM	DEFINITION
Inter-Array Cable (IAC)	The cables which connect the WTGs to the OSCPs. WTGs may be connected with IACs into a hub or in series as a 'string' or a 'loop' such that power from the connected WTGs is gathered to the OSCPs via a single cable.
Joint Venture	The commercial partnership between Flotation Energy and Vårgrønn, the shareholders which hold the Exclusivity Agreement with CES to develop the Cenos site as an INTOG project.
Landfall	The area where the Export/Import Cable from the Array Area will be brought ashore. The interface between the offshore and onshore environments.
Marine Licence	Licence required for certain activities in the marine environment and granted under the Marine and Coastal Access Act 2009 and/or the Marine (Scotland) Act 2010.
Marine Protected Area (MPA)	Marine sites protected at the national level under the Marine (Scotland) Act 2010 out to 12 NM, and the Marine and Coastal Access Act 2009 between 12-200 NM. In Scotland MPAs are areas of sea and seabed defined so as to protect habitats, wildlife, geology, underseas landforms, historic shipwrecks and to demonstrate sustainable management of the sea.
Marine Protected Area (MPA) Assessment	A three-step process for determining whether there is a significant risk that a proposed development could hinder the achievement of the conservation objectives of an MPA.
Mean High Water Springs (MHWS)	The height of Mean High Water Springs is the average throughout the year, of two successive high waters, during a 24-hour period in each month when the range of the tide is at its greatest.
Mean Low Water Springs (MLWS)	The height of Mean Low Water Springs is the average throughout a year of the heights of two successive low waters during periods of 24 hours (approximately once a fortnight).
Mitigation Measures	Measures considered within the topic-specific chapters in order to avoid impacts or reduce them to acceptable levels. • Primary mitigation - measures that are an inherent part of the design of the Project which reduce or avoid the likelihood or magnitude of an adverse environmental effect, including location or design; • Secondary mitigation – additional measures implemented to further reduce environmental effects to 'not significant' levels (where

TERM	DEFINITION
	appropriate) and do not form part of the fundamental design of the Project; and • Tertiary mitigation – measures that are implemented in accordance with industry standard practice or to meet legislative requirements and are independent of the EIA (i.e. they would be implemented regardless of the findings of the EIA). Primary and tertiary mitigation are referred to as embedded mitigation. Secondary mitigation is referred to as additional mitigation.
Mooring System	Comprising the mooring lines and anchors, the mooring system connects the floating substructure to the seabed, provides station-keeping capability for the floating substructure and contributes to the stability of the floating substructure and WTG.
Nature Conservation Marine Protected Area (NCMPA)	MPA designated by Scottish Ministers in the interests of nature conservation under the Marine (Scotland) Act 2010.
Offshore Substation Converter Platforms (OSCPs)	An offshore platform on a fixed jacket substructure, containing electrical equipment to aggregate the power from the WTGs and convert power between HVAC and HVDC for export/import via the export/import cable to/from the shore. The OSCPs will also act as power distribution stations for the Oil & Gas platforms.
Onward Development	Transmission projects which are anticipated to be brought forward for development by 3rd party oil and gas operators to enable electrification of assets via electricity generated by the Project. All Onward Development will subject to separate marine licensing and permitting requirements.
Onward Development Area	The area within which oil and gas assets would have the potential to be electrified by the Project.
Onward Development Connections	Oil and gas assets located in the waters surrounding the Array Area will be electrified via transmission infrastructure which will connect to the Project's OSCPs. These transmission cables are referred to as Onward Development Connections.
Project Area	The area that encompasses both the Array Area and EICC.
Project Design Envelope	A description of the range of possible elements that make up the Project design options under consideration and that are assessed as part of the EIA for the Project.

TERM	DEFINITION
Study Area	Receptor specific area where potential impacts from the Project could occur.
Transboundary Assessment	The consideration of impacts from the Project which have the potential to have a significant effect on another European Economic Area (EEA) state's environment. Where there is a potential for a transboundary effect, as a result of the Project, these are assessed within the relevant EIA chapter.
Transmission Infrastructure	The infrastructure responsible for moving electricity from generating stations to substations, load areas, assets and the electrical grid, comprising the OSCPs, and associated substructure, and the Export/Import Cable.
Vårgrønn As (Vårgrønn)	Joint venture partner in Cenos Offshore Windfarm Ltd.
Wind Turbine Generator (WTG)	The equipment associated with electricity generation from available wind resource, comprising the surface components located above the supporting substructure (e.g., tower, nacelle, hub, blades, and any necessary power transformation equipment, generators, and switchgears).
Worst-Case Scenario	The worst-case scenario based on the Project Design Envelope which varies by receptor and/or impact pathway identified.

15 SHIPPING AND NAVIGATION

15.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) presents the Shipping and Navigation receptors of relevance to 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 and transboundary impacts are also considered.

Table 15.1 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). The NRA is appended to this EIAR (EIAR Vol. 4 Appendix 26).

Table 15.1 Details of study / Supporting studies and location (where relevant)

DETAILS OF STUDY	LOCATIONS OF SUPPORTING STUDY
EMF (Electromagnetic Field) Studies	EIAR Vol. 4 Appendix 14A – Export Cable EIAR Vol. 4 Appendix 14B – Inter-Array Cables
NRA	EIAR Vol. 4 Appendix 26
Compass Deviation Study	EIAR Vol. 4 Appendix 14C

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

- EIAR Vol. 3, Chapter 14: Commercial Fisheries – which assesses the commercial impacts on fishing vessels, complementing the Shipping and Navigation Chapter which assesses safety impacts to fishing vessels in transit. Impacts on fishing vessels of a commercial nature are discussed in Chapter 14 and are not considered within this Chapter.
- EIAR Vol. 3, Chapter 17: Infrastructure and Other Users – which assesses the impacts on any other sea users in proximity to the Project.
- EIAR Vol. 3, Chapter 18: Military and Civil Aviation – which assesses the impacts on aviation.

Where information is used to inform the impact assessment, reference to the relevant EIAR Chapter is given.

The following specialists have contributed to the assessment:

- *Anatec Ltd.* – baseline description, impact assessment, NRA and EIAR Chapter:
  - Adam Foster, Anatec Ltd; and
  - Sam Westwood, Anatec Ltd.

15.2 Legislation, policy, and guidance

The wider marine planning, legislation, policy and guidance is discussed in EIAR Vol. 2, Chapter 3: Policy and Legislative Context. 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 (HM 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;
- 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)."
- Sectoral Marine Plan for Offshore Wind Energy (Scottish Government, 2020).

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);
- MGN 661 Navigation (Merchant and Fishing) - Safe and Responsible Anchoring and Fishing Practices (MCA, 2021a);

- Revised Guidelines for Formal Safety Assessment 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);
- IALA Guideline G1162 Guidance on the Marking of Offshore Man-Made Structures (International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), 2022);
- The RYA's Position on Offshore Renewable Energy Developments: Paper 1 (of 4) – Wind Energy (Royal Yachting Association (RYA), 2019);
- Standard Marking Schedule for Offshore Installations (Department of Energy and Climate Change (DECC), 2011); and
- Regulatory Expectations on Moorings for Floating Wind and Marine Devices – (MCA and Health and Safety Executive (HSE), 2017).

15.3 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 2024 Scoping Report was submitted to Marine Directorate – Licensing Operations Team (MD-LOT) in April 2024, relevant stakeholders were consulted. The Scoping Opinion was received in September 2024. The 2024 Scoping Report and Scoping Opinion supersedes the 2023 Scoping Report and Scoping Opinion for the Project. Relevant comments from the Scoping Opinion and other consultation specific to Shipping and Navigation are provided in Table 15.2 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 phase. The list below summarises the consultation activities carried out relevant to Shipping and Navigation:

- Scoping Opinion;
- Meeting with the MCA (July 2023) – discussions over data collection proposals;
- Regular operator outreach (May 2024) – email correspondence with vessel operators in the area; and
- Hazard Workshop (June 2024) – meeting to identify and discuss potential shipping and navigation impacts with local/national marine stakeholders, attended by the MCA, Northern Lighthouse Board (NLB), North Star Shipping, RYA Scotland, Tidewater and UK Chamber of Shipping (CoS).
- An additional post workshop consultation opportunity was offered to the MCA and NLB, however both confirmed they were content with the consultation to date.

Table 15.2 Comments from the Scoping Opinion relevant to Shipping and Navigation

REGULATOR/CONSULTEE	COMMENT	RESPONSE
Scottish Ministers UK CoS	"The Scottish Ministers are broadly content with the proposed study area and baseline data sources identified in chapter 14 of the Scoping Report however directs the Developer to the UK Chamber of Shipping ("UKCoS") representation to consider extending this to 50 nautical miles for the cumulative impacts assessment" "The defined study area of 10NM is industry standard and as expected, but the Chamber recommends extending the cumulative routeing study area to 50 nautical miles to ensure a comprehensive cumulative impact assessment. This extension aligns with industry standards and best practices for such projects"	A 10 nautical mile (NM) study area, introduced in Section 15.4.1, is used as the main study area for Shipping and Navigation assessment and a 50 NM study area is used for cumulative assessment in Section 15.7.
Scottish Ministers UK CoS	"Additionally, the Scottish Ministers advise the Developer to consider the data source recommendations from the UKCoS, particularly in relation to increasing the scope of the Marine Accident Investigation Branch spatial accident data to fully assess trends and historic incidents." "The data sources considered, including AIS data and MAIB reports, are appropriate. The Chamber recommends: • Using a 12-month AIS dataset to account for seasonal variations, ideally from the most recent complete year. • Extending the MAIB dataset analysis to cover at least 20 years, which provides a robust historical context for incident trends. • Including data from the UK Hydrographic Office (UKHO) for marine charts and Admiralty Sailing Directions."	A 12-month Automatic Identification System (AIS) dataset spanning 2023 has been analysed in EIAR Vol. 4, Appendix 26: Navigational Risk Assessment. Marine Accident Investigation Branch (MAIB) data spanning 20 years has been analysed in Section 15.4.4.3. Admiralty charts and Admiralty Sailing Directions have been used for the navigational features assessment in Section 15.4.4.1.

REGULATOR/CONSULTEE	COMMENT	RESPONSE
Scottish Ministers **Scottish Fishermen's Federation (SFF)**	"The Scottish Ministers are broadly content with the impacts proposed to be scoped in and out of the EIA Report in table 14-7 of the Scoping Report but advise that risk of loss of station during construction and decommissioning in addition to the operational phase must be scoped in." "SFF notes from Table 14-7: that "Loss of station for a floating structure" have been scoped out for construction and decommissioning stages. We agree that there will be no risk of loss of station pre-construction and post-decommissioning; however, when a number of WTGs have been installed or in the case of decommissioning, when all WTGs and related infrastructures are not yet removed, the risks of vessels to structure collision and 'loss of station' risk to other users of the sea exist/is imperative. Therefore, we propose the above two points be scoped in for construction and decommissioning phases"	Loss of station is scoped into all phases for the risk assessment undertaken in Section 15.6 as requested.
Scottish Ministers **NLB**	"Management of lighting and marking during maintenance or repair and the potential impact that a wreck could have on navigation should also be scoped in.." "NLB do request that consideration is given within the EIA to the potential impact that a wreck (either that of a vessel or WTG) could have upon navigation, both within the Cenos array area and the immediate vicinity."	Management of lighting and marking during maintenance or repair is considered in the risk assessment in Section 15.6. See EIAR Vol. 3, Chapter 21: Major Accidents and Disasters.
Scottish Ministers	"Furthermore, the Scottish Ministers direct the Developer to the MCA response in relation to the possible impact on navigational issues for both commercial and recreational craft and advise that this is fully considered in the EIA Report."	Section 15.6 considers impacts on both commercial and recreational craft.

REGULATOR/CONSULTEE	COMMENT	RESPONSE
Scottish Ministers MCA	"Finally, the Scottish Ministers refer the Developer to the advice provided by the MCA specifically in relation to the electromagnetic deviation on ships' compasses from the use of HVDC cable and advise that this must be scoped in and fully addressed within the EIA Report." "We understand a HVDC cable will be used as part of the project, consideration of electromagnetic deviation on ships' compasses should be included within the assessment. We note that in Table 12- 3 that electromagnetic field effects from operation of subsea power cables are considered as operational impacts and is included in the EIA process. The MCA would be willing to accept a three degree deviation for 95% of the cable route, and for the remaining 5% of the cable route no more than five degrees should be attained. We would expect a desk based compass deviation study conducted based on the proposed cable parameters and MCA may request a deviation survey post the cable being laid"	EIAR Vol. 4, Appendix 26: Navigational Risk Assessment considers the impact of HVDC cables. A compass deviation study has been undertaken in EIAR Vol. 4 Appendix 13C.
Scottish Ministers	"Section 3.7.1.7 of the Scoping Report states that mooring lines may be installed and stored temporarily until the FTU can be installed. The Scottish Ministers refer the Developer to the SFF representation and the advice to consider the need for guard vessels"	Plans on the pre-lay of mooring lines and IACs, including mitigations, will be included in the Construction Method Statement which will be required to be approved by MD-LOT in consultation with the MCA.
Scottish Ministers	"The Developer's commitment to producing a Navigational Risk Assessment ("NRA") in accordance with MGN 654 is acknowledged by the Scottish Ministers. In addition to the key stakeholders proposed to be consulted as part of the NRA process in section 14.12.1.1 of the Scoping Report, in line with the MCA response, the Scottish Ministers advise that The Cruising Association must also be included. A completed MGN checklist must also be submitted"	The Hazard Workshop documentation has been distributed to the Cruising Association. A completed MGN checklist is included in EIAR Vol. 4, Appendix 26: Navigational Risk Assessment.
Scottish Ministers	"With regards to cabling routes and cable burial, the Scottish Ministers advise that a Burial Protection Index study should be completed and, subject to the traffic volumes, an anchor penetration study may be necessary. The Scottish Ministers advise that this should be fully addressed	Compliance with MGN 654 is assumed as embedded mitigation including under keel clearance requirements. A Cable Burial Risk Assessment (CBRA) will be undertaken. See Section 15.5.4.

REGULATOR/CONSULTEE	COMMENT	RESPONSE
	in the EIA Report and highlight the MCA representation regarding a 5% reduction in surrounding depths referenced to Chart Datum if cable protection measures are required"	
Scottish Ministers MCA	"In addition, the Scottish Ministers highlight the MCA representation regarding Search and Rescue ("SAR"), Emergency Response Co-operation Plans, radar surveillance, AIS and shore-based VHF radio coverage. The Scottish Ministers advise that the MCA representation must be fully addressed within the EIA Report and that a SAR checklist must be completed by the Developer in consultation with the MCA" "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 site and its surrounding areas. A SAR checklist will also need to be completed in consultation with MCA"	Section 15.6 includes assessment of the impact on Search and Rescue (SAR) resources. EIAR Vol. 4, Appendix 26: Navigational Risk Assessment includes an overview of nearby SAR resources. The layout will be agreed with the MCA and in line with MGN 654 requirements to ensure any SAR operations are facilitated. Additionally, an Emergency Response Cooperation Plan (ERCoP) will be submitted to the MCA in line with the requirements of MGN 654 (MCA, 2021), and a SAR checklist will be completed and agreed with the MCA. See Section 15.5.4.
Scottish Ministers MCA	"For completeness, the Developer is directed to the representation from the MCA and advised that compliance with regulatory expectations on moorings for floating wind and marine devices is required and a third-party verification of the mooring arrangements will be required" "It should be noted that the regulatory mooring expectations should be identified as a potential mitigation and MCA/HSE guidance should be followed which includes a Third-Party Verification of the mooring arrangement. This guidance is available from: https://www.gov.uk/guidance/offshore-renewable-energyinstallations-impact-on-shipping"	Application of the Regulatory Expectations is assumed as embedded mitigation (see Section 15.5.4) and is considered in the risk assessment undertaken in Section 15.6.

REGULATOR/CONSULTEE	COMMENT	RESPONSE
MCA	"We note, in Table 14-3 that a three-week summer survey was undertaken between 22 August 2023 and 12 September 2023, 12 months of AIS data will be analysed as part of the NRA process, and the RYA and Cruising Association are included as key stakeholders. This is acceptable to MCA"	Noted. Detailed analysis of the three-week summer survey data of the 12 months of AIS data can be found in EIAR Vol. 4, Appendix 26: Navigational Risk Assessment. The RYA and Cruising Association have also been included in the consultation process.
MCA	"The turbine layout design 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"	Compliance with MGN 654 is assumed as embedded mitigation including with regards to layout design and SAR Annex 5, as per Section 15.5.4.
MCA	"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"	Compliance with MGN 654 is assumed as embedded mitigation including under keel clearance requirements. A CBRA will be undertaken. See Section 15.5.4.
MCA	"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"	Section 15.5.4 includes compliance with MGN 654 as embedded mitigation which includes hydrographic surveys.
MCA	"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. As this project progress, we would welcome engagement with the developers, and early discussion on the points raised above."	Noted. Compliance with MGN 654 is embedded mitigation as per Section 15.5.4. A complete MGN checklist can be found in EIAR Vol. 4, Appendix 26: Navigational Risk Assessment. A Hazard Workshop has been undertaken with the MCA in attendance.

REGULATOR/CONSULTEE	COMMENT	RESPONSE
Ministry of Defence	"The MOD has highly surveyed routes which maybe relevant to the installation of the export cables & associated infrastructure. MOD should be consulted at the next stage of any application to determine any impact on these routes"	The Ministry of Defence have been consulted and it was confirmed, via email correspondence on the 18th November 2024, that they "*have no concerns for highly surveyed routes for the array and export cables for Cenos Offshore Windfarm*".
NLB	"Northern Lighthouse Board note the inclusion of Chapter 14 – Shipping and Navigation within the report, and welcome the commitment to develop Post-Consent documentation including a Lighting and Marking Plan (LMP), Development Specification and Layout Plan (DSLP) and a Navigational Safety Plan (NSP) as embedded mitigations across all phases of the project. NLB will continue to engage with the developer with regard to these documents"	The Lighting and Marking Plan (LMP), Development Specification and Layout Plan (DSLP) and Navigational Safety Plan (NSP) will be produced as per Section 15.5.4.
NLB	"NLB also welcome the inclusion of Section 14.9 (Cumulative Effects) and 14.10 (Potential Transboundary Effects)."	Cumulative impact assessment is provided in Section 15.7. Transboundary effects are considered in Section 15.9.
RYA Scotland	Do you agree that the data sources identified are sufficient to inform the shipping and navigation baseline for the Project NRA? "I agree. It is clear that some recreational craft are likely to pass through the site, possibly in adverse weather conditions."	Noted. Data sources are provided in Section 15.4.2. The potential for recreational craft to transit through the Array Area is considered in Section 15.6.
RYA Scotland	Have all potential impacts resulting from the Project been identified for shipping and navigation users? "I am unaware of any other potential impacts"	Noted. Section 15.6 provides an assessment of all identified impacts.
RYA Scotland	Do you have any concerns in relation to the location or nature of the Project and cumulative routeing within the North Sea? "These can be elaborated during the Navigation Risk Assessment and appropriate mitigation agreed."	Cumulative routeing assessment is provided in EIAR Vol. 4, Appendix 26: Navigational Risk Assessment.
RYA Scotland	Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the potential effects of the Project on shipping and navigation users? "These provide a good starting point. There can be a significant time lag between sites being marked on the UKHO charts and them being available on the electronic charts	Noted. Section 15.5.4 presents the embedded mitigation measures. This includes marking on charts however also includes promulgation of information to increase awareness. Also included as embedded mitigation is an LMP in agreement with NLB and IALA.

REGULATOR/CONSULTEE	COMMENT	RESPONSE
	downloaded by recreational boaters. It is important that AtoNs on the devices are resilient to storm damage and other breakdowns as experience with wind farms shows that repairs can take a considerable time due to adverse weather preventing access."	
Salamander Wind Project Company Ltd.	"The Cenos Offshore Windfarm has a Scoping Boundary which directly overlaps with the offshore application boundary of the Salamander Offshore Wind Farm. We understand that the Cenos export cable route under consideration would require crossing(s) of our export cables (either Cenos crossing Salamander or vice versa depending on construction timelines). Therefore, there is the potential for our respective projects to interact and for both developments to have cumulative environmental effects on other receptors. We would therefore expect any EIA in respect of your proposals to fully consider the potential effects on, and potential cumulative effects with, our Salamander Offshore Wind Farm"	From a shipping and navigation perspective, the water depths in the area where the two export cables would cross would be approximately 70 metres (m) below chart datum (based on review of the submitted Salamander Offshore EIA Report (Salamander Offshore Wind Farm, 2024)) and therefore the reduction of depth via cable crossing is not of concern.
UK CoS	"The Chamber finds the proposed legislation, policy, and guidance, including the Navigational Risk Assessment, suitable and sufficient. The inclusion of MGN 654 and IMO standards is expected and supported."	Noted. See Section 15.2 for guidance and legislation.
UK CoS	"The Chamber supports the outlined methodology, including cumulative assessments and the use of Anatec's CollRisk software for enhanced accuracy."	The methodology is outlined in Section 15.5. Anatec's CollRisk software has been used for quantitative modelling undertaken in EIAR Vol. 4, Appendix 26: Navigational Risk Assessment.
UK CoS	"The Chamber acknowledges the identified potential hazards such as vessel displacement, collision risk, and under-keel clearance issues. Additional considerations for floating turbines include: • Risk of loss of station during construction, transit, and decommissioning. • Navigational risks from wet storage areas and potential vessel displacement from traditional anchoring zones. • Management of lighting and marking during maintenance or repair, especially when turbines on the boundary are temporarily removed."	Loss of station risk is assessed for all phases in Section 15.6. Wet storage of FTUs is not being considered within this application but will be assessed separately including from a navigational safety perspective. Plans on the pre-lay of mooring lines and IACs, including mitigations, will be included in the Construction Method Statement which will be required to be approved by MD-LOT in consultation with the MCA.

REGULATOR/CONSULTEE	COMMENT	RESPONSE
		An LMP will be produced in agreement with NLB and IALA as per Section 15.5.4. This will include agreement of procedures in the event that a Wind Turbine Generator (WTG) with a key marine aid to navigation is towed from site.
UK CoS	"The proposed mitigation measures are suitable and sufficient for managing and mitigating the identified risks. The Chamber recommends further detailed plans for: • Safety zones management during all project phases. • Mitigation strategies for electromagnetic interference impacts on navigational equipment."	Section 15.5.4 presents the embedded mitigation measures. The safety zone application will set out procedures by which safety zones will be managed, monitored and policed. EIAR Vol. 4, Appendix 26: Navigational Risk Assessment considers the impact of HVDC cables in terms of EMF impacts. A compass deviation study has been undertaken in EIAR Vol. 4 Appendix 13C.
SFF Dedicated meeting (August 2024)	Stated that the 21-day survey occurred during a period where fishing vessel traffic levels were relatively low.	The 21-day survey fishing data has been supplemented by 12 months of AIS data and 12 months of Vessel Monitoring System (VMS) data (see EIAR Vol. 4, Appendix 26: Navigational Risk Assessment). An analysis of three years AIS data for fishing vessels has also been undertaken.
SFF Dedicated meeting (August 2024)	Noted that the southernmost oil and gas route would have to deviate south to avoid the Array Area, which will affect the fishing vessels that may desire to perform fishing in that area.	Post wind farm route deviations and post wind farm collision risk are considered in detail in EIAR Vol. 4, Appendix 26: Navigational Risk Assessment. Displacement of vessels in assessed in Section 15.6. Commercial fishing vessel impacts are assessed within EIAR Vol. 3, Chapter 14: Commercial Fisheries.
SFF Dedicated meeting (August 2024)	Stated that there would not be under keel clearance concerns for fishing vessels if the subsea infrastructure was 20 m below the waterline.	Under keel clearance assessment is provided in Section 15.6.
SFF Dedicated meeting (August 2024)	Noted the recreational traffic that uses Peterhead Port would also need consideration.	Recreational vessel impacts are considered in in Section 15.6.

REGULATOR/CONSULTEE	COMMENT	RESPONSE
Peterhead Port Authority Email Correspondence (August 2024)	No concerns, but noted that forward planning and communication are important.	Reduction of port access is assessed in Section 15.6.
Tidewater Hazard Workshop (June 2024)	Tidewater operate vessels in the vicinity of the Array Area but their vessels will likely avoid the Array Area and it is not a concern.	Vessel displacement is assessed in Section 15.6.
Tidewater Hazard Workshop (June 2024)	Noted that supply and Anchor Handling Tug Supply (AHTS) vessels have the ability to manoeuvre very quickly, but that cargo vessels and tankers may not have the same level of manoeuvrability. Also noted that the tides in the area are relatively favourable.	Allision risk modelling undertaken in EIAR Vol. 4, Appendix 26: Navigational Risk Assessment includes a drifting allision hazard. Subsequent assessment is provided in Section 15.6.
Tidewater Hazard Workshop (June 2024)	Noted that project vessels using the local ports would increase traffic density.	Project vessel to third-party vessel collision risk and reduced port access are assessed in Section 15.6.
Tidewater Hazard Workshop (June 2024)	Noted the variability of where fishing vessels perform active fishing.	Fishing vessel traffic data is presented in EIAR Vol. 4, Appendix 26: Navigational Risk Assessment. Additional information on commercial fishing trends is contained within EIAR Vol. 3, Chapter 14: Commercial Fisheries.
Tidewater Hazard Workshop (June 2024)	Commented that fishing vessels would avoid using deep fishing gear in the Array Area due to the subsea infrastructure.	Fishing vessel traffic data is presented in EIAR Vol. 4, Appendix 26: Navigational Risk Assessment. Commercial fishing vessel impacts are assessed within EIAR Vol. 3, Chapter 14: Commercial Fisheries. Under keel clearance interaction risk is assessed in Section 15.6.
North Star Shipping Hazard Workshop	North Star Shipping has vessels transiting in/out of Aberdeen on a monthly basis and their vessels would avoid the Array Area.	Section 15.6 provides an assessment of vessel displacement.

REGULATOR/CONSULTEE	COMMENT	RESPONSE
(June 2024)		
North Star Shipping Hazard Workshop (June 2024)	In terms of cumulative, North Star Shipping vessels would choose an appropriate route and remain committed to safe navigation.	Cumulative assessment is provided in Section 15.7.
North Star Shipping Hazard Workshop (June 2024)	Stated that under keel clearance is not a concern if the mooring line is 20 m under the water at a distance of 50 m from the structure and that their vessels would be advised to avoid the Array Area regardless.	Under keel clearance assessment is provided in Section 15.6.
North Star Shipping Hazard Workshop (June 2024)	Stated that transiting fishing vessels are likely to deviate to avoid the Array Area.	Section 15.6 provides an assessment of vessel displacement.
North Star Shipping Hazard Workshop (June 2024)	Commented that most mariners will become accustomed to avoiding the Array Area during the construction phase and that this would be carried into the operational phase.	Section 15.6 provides an assessment of vessel displacement and takes this into account.
North Star Shipping Hazard Workshop (June 2024)	Expressed (in relation to under keel clearance and an assumption that the mooring line would be 20 m below the water when 50 m from the structure) that 50 m is a very close distance to the structure.	Under keel clearance assessment is provided in Section 15.6.
UK CoS Hazard Workshop (June 2024)	Queried about Banff Oil Field decommissioning timelines.	Expectation is that the Banff Oil Field decommissioning would likely not overlap with the timeframes for the Project. This is taken into account by the post wind farm routeing presented in EIAR Vol. 4, Appendix 26: Navigational Risk Assessment.
UK CoS Hazard Workshop	Noted potential impact of layout design on fishing vessels.	A DSLP will be produced post-consent in liaison with the MCA. The worst-case layout for Shipping and Navigation, presented in EIAR Vol. 4, Appendix 26: Navigational Risk Assessment, is

REGULATOR/CONSULTEE	COMMENT	RESPONSE
(June 2024)		included in the project design envelope and complies with MGN 654 guidance.
MCA Hazard Workshop (June 2024)	Noted that third-party verification of the mooring lines is required under the relevant guidance.	The relevant guidance is embedded mitigation and is considered in the risk assessment undertaken in Section 15.6.
MCA Hazard Workshop (June 2024)	Stated no major concerns for oil and gas vessels.	Oil and gas vessel traffic is considered in the risk assessment undertaken in Section 15.6. The deviations for the main commercial routes in the area are assessed in EIAR Vol. 4, Appendix 26: Navigational Risk Assessment.
MCA Hazard Workshop (June 2024)	Stated no concerns for cargo vessels and tankers, noting options to deviate south of the site.	Cargo vessels and tankers are considered in the risk assessment undertaken in Section 15.6. The deviations for the main commercial routes in the area are assessed in EIAR Vol. 4, Appendix 26: Navigational Risk Assessment.
MCA Hazard Workshop (June 2024)	Commented that mariners navigating the area will be aware of what is happening in the area and also commented that measures such as charting and lighting of the structures should mitigate issues.	Promulgation of information is an embedded mitigation measure (Section 15.5.4).
MCA Hazard Workshop (June 2024)	Stated that a desk study demonstrating no magnetic anomalies should be sufficient for assessing risks associated with DC export cables.	A desktop study has been undertaken in EIAR Vol. 4 Appendix 13C.
MCA Hazard Workshop (June 2024)	Noted that vessels that are more likely to pass through the array are likely to have shallower draughts.	Under keel clearance assessment is provided in Section 15.6.
NLB	Commented that the Eastern Green Link 3 project would use Direct Current (DC) cables that would cross the Cenos cables.	Consultation has been undertaken with Eastern Green Link 3 and there will be collaboration.

REGULATOR/CONSULTEE	COMMENT	RESPONSE
Hazard Workshop (June 2024)		
NLB Hazard Workshop (June 2024)	Noted the importance of considering the scenario of a turbine or vessel sinking in or around the Array Area.	Section 15.6 assesses risk of loss of station and reduction of emergency response capability.
NLB Hazard Workshop (June 2024)	Queried about what plans/procedures are in place for the scenario where an FTU with a marine light is towed from site for maintenance, a suggesting that the project consult with the NLB on their proposals.	The LMP is embedded mitigation (Section 15.5.4), and will include procedures agreed with NLB for this scenario.
NLB Hazard Workshop (June 2024)	Wet storage is a key concern.	Wet storage of FTUs is not being considered within this application but will be assessed separately including from a navigational safety perspective. Plans on the pre-lay of mooring lines and IACs, including mitigations, will be included in the Construction Method Statement which will be required to be approved by MD-LOT in consultation with the MCA.
RYA Scotland Hazard Workshop (June 2024)	Stated that most fishing vessels would likely stay clear of mooring lines.	Under keel clearance assessment is provided in Section 15.6.
RYA Scotland Hazard Workshop (June 2024)	Stated that the EICC is not a concern for recreational vessels.	Noted. Risk assessment is provided in Section 15.6.
RYA Scotland Hazard Workshop (June 2024)	Stated that nearby oil and gas platforms could have assets to assist in the scenario of an incident.	This is taken into consideration within the risk assessment undertaken in Section 15.6.

REGULATOR/CONSULTEE	COMMENT	RESPONSE
RYA Scotland **Hazard Workshop (June 2024)**	Stated that wet storage is an issue, commenting that there could be crowding if multiple projects use the same areas and that recreational users would not be used to a large amount of traffic towing structures. However it was added that it would not be an issue if suitable mitigations were in place.	Wet storage of FTUs is not being considered within this application but will be assessed separately including from a navigational safety perspective. Plans on the pre-lay of mooring lines and IACs, including mitigations, will be included in the Construction Method Statement which will be required to be approved by MD-LOT in consultation with the MCA.
Sea Cargo **Email Correspondence (May 2024)**	"This windfarm will not give us any major deviations in our sailing route"	Noted. The deviations for the main commercial routes in the area are assessed in EIAR Vol. 4, Appendix 26: Navigational Risk Assessment.
Tidewater **Email Correspondence (May 2024)**	"The proposal is likely to impact our routing on port approaches during the shore end installation phase"	Details on the construction phase, including project vessel numbers, are provided in EIAR Vol. 4, Appendix 26: Navigational Risk Assessment. Reduced port access is assessed in Section 15.6.
Tidewater **Email Correspondence (May 2024)**	"At present, we have no business passing in the vicinity of the array area. However, we would consider passing internally through the array area if we had to sail there often. Occasional passage (1-2 times per week) would most likely avoid the area. I imagine that floating turbines are not always in the same position. Depending on the flexibility of the moorings and the depth of the sea, they could move up to 50 meters around their central position (?). Thus, navigating internally through the array area would obviously have to be risk assessed"	Navigation through the Array Area by commercial traffic is considered in the risk assessment undertaken in Section 15.6.
Tidewater **Email Correspondence (May 2024)**	"Even though it is highly unlikely, it is easy to imagine a giant floating wind turbine breaking loose at sea and drifting towards vessels in the vicinity (sabotage, collision, or manufacturing flaws). Therefore, from a passing vessel perspective, we consider it safer to pass fixed turbines than floating ones"	Potential loss of station is assessed Section 15.6.

REGULATOR/CONSULTEE	COMMENT	RESPONSE
Tidewater **Email Correspondence (May 2024)**	"While laying the cable back to Peterhead from the Turbine Array Area (TAA) I presume it will be conducted as per any other operation where a vessel is Restricted in its Ability to Manoeuvre (RAM) , and information will be sent out Via normal channels as WZ`s and Navarea warnings"	The embedded mitigation measures, as per Section 15.5.4, includes the promulgation of information.
Tidewater **Email Correspondence (May 2024)**	"The construction of the project would not impact our vessel's regular passage; the only thing would potentially be keeping clear of any cable laying vessel that will be building the pipeline or any construction vessels heading to the array area. This is a collision avoidance issue rather than a passage planning issue however and would not cause any problems"	Details on the construction phase, including project vessel numbers, are provided in EIAR Vol. 4, Appendix 26: Navigational Risk Assessment. Reduced port access and third-party vessel to project vessel collision is assessed in Section 15.6.
MCA **Dedicated meeting (July 2023)**	Non-AIS traffic is unlikely during the winter and the MCA are open to considering an exemption on the winter survey if the summer survey was extended to three weeks in duration.	A three-week summer survey has been undertaken and its findings are analysed in EIAR Vol. 4, Appendix 26: Navigational Risk Assessment (with no non-AIS traffic recorded, confirming the low likelihood of non-AIS traffic during the winter).
MCA **Dedicated meeting (July 2023)**	Consultation with the Cruising Association and RYA Scotland should be undertaken during the scoping and NRA processes to ensure they are included.	RYA Scotland and the Cruising Association were consulted on the Hazard Workshop materials. See EIAR Vol. 4, Appendix 26: Navigational Risk Assessment for details.
MCA **Dedicated meeting (July 2023)**	Given the distance offshore, SAR would be an important consideration.	SAR impacts are assessed in the risk assessment undertaken in Section 15.6.

15.4 Baseline characterisation

This Section outlines the current baseline for Shipping and Navigation within the Study Area. A dedicated survey was undertaken to capture vessel traffic data during the period 22nd August 2023 – 12th September 2023, with desk-based sources used to characterise long-term vessel movements, navigational features and historical incidents.

15.4.1 Study Area

The Study Area is defined as a 10 NM (18.5 kilometres (km)) buffer around the Array Area; this is an industry-standard radius for Shipping and Navigation assessments as it captures relevant routeing in the area while remaining site-specific. An additional Study Area, hereafter the 'EICC Study Area', has been defined as a 2 NM buffer of the Export/Import Cable Corridor (EICC). The radius of each buffer is as per the scoping report, and the Study Areas were also presented at the Hazard Workshop to key stakeholders including the MCA, NLB and UK CoS. Figure 15.1 presents both of these Study Areas.

The Shipping and Navigation temporal scope is defined as the entire lifetime of the Project including construction, operation and maintenance, and decommissioning.

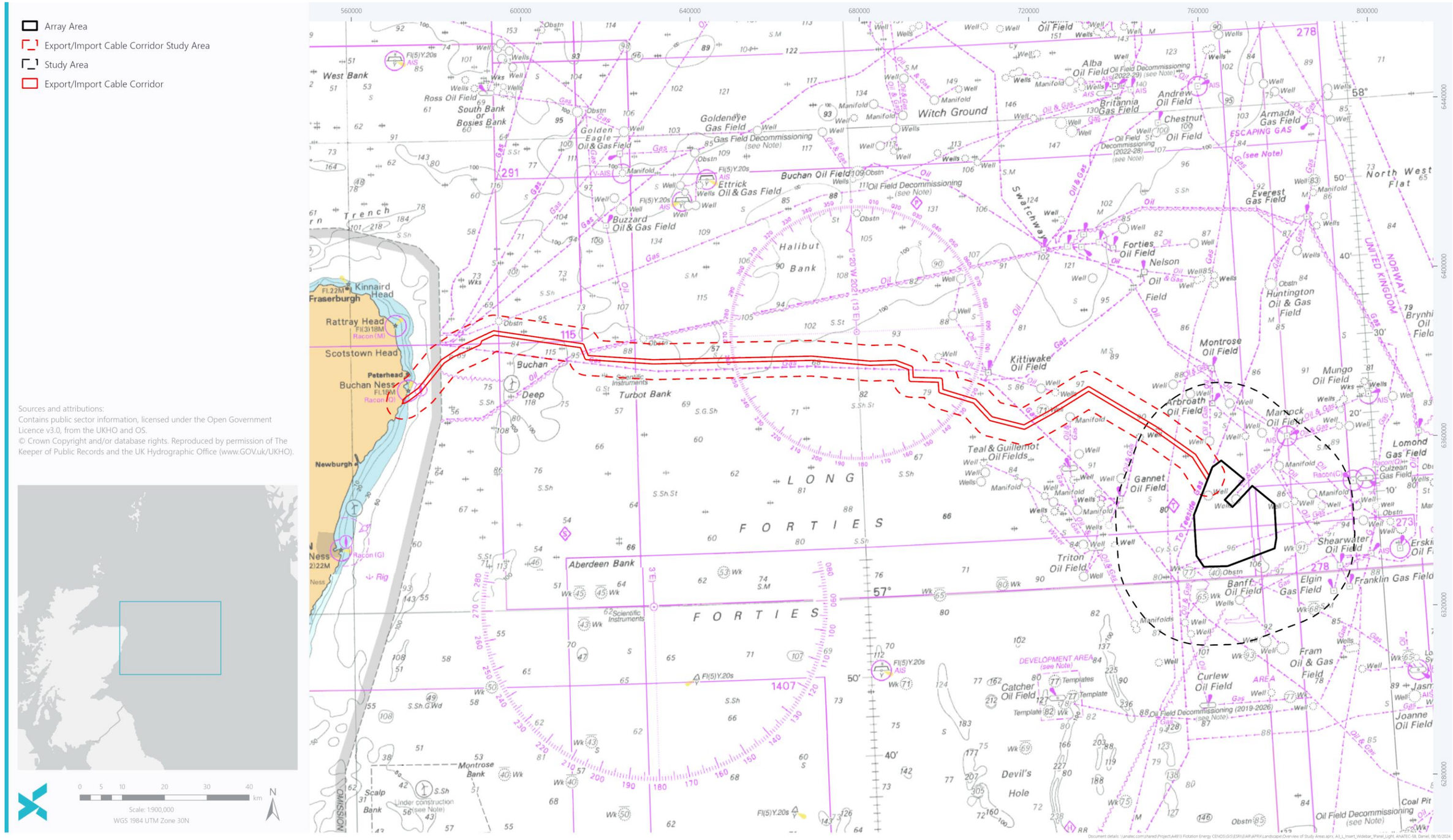

Figure 15.1 Overview of Study Areas

15.4.2 Data sources

The existing data sets and literature with relevant coverage of the Project, which have been used to inform the baseline characterisation for Shipping and Navigation, are outlined in Table 15.3. Project specific data obtained and used to inform this topic assessment are presented in Section 15.4.3.

Table 15.3 Summary of key datasets and reports

TITLE	SOURCE	YEAR	AUTHOR
Long-term AIS data	Anatec	2023	Anatec
ShipRoutes database	Anatec	2024	Anatec
Marine incidents data	MAIB	2003 – 2022	MAIB
Marine incidents data	Royal National Lifeboat Institution (RNLI)	2013 – 2022	RNLI
Helicopter tasking data	Department for Transport (DfT)	2015 – 2023	DfT
Admiralty charts	United Kingdom Hydrographic Office (UKHO)	2023	UKHO
RYA coastal atlas	RYA	2019	RYA
VMS data	Marine Scotland	2023	Marine Scotland
Admiralty Sailing Directions North Sea West Pilot NP54	UKHO	2021	UKHO
Fishing vessel AIS data	Anatec	2021 – 2024	Anatec

15.4.3 Project site-specific surveys

A vessel traffic survey based from a dedicated on-site survey vessel was undertaken, spanning a 21-day period between 22nd August 2023 to 12th September 2023, with AIS, Radio Detection and Ranging (Radar) and visual observations all utilised to collect data. Given that non-AIS traffic in the vicinity of the Array Area is likely to be rare due to its distance offshore (which was validated by the findings of the summer survey which found no non-AIS traffic), it was agreed with the MCA that a 21-day summer survey was sufficient in addition to a 12-month dataset for long-term analysis, and to cover the winter period.

15.4.4 Existing baseline

A review of literature and available data sources, augmented by consultation and a Project site-specific survey, has been undertaken to describe the current baseline environment for Shipping and Navigation. It is noted that planned developments are not considered as part of the baseline and have been considered separately in Section 15.7.

15.4.4.1 Navigational features

This Section presents analysis of charted navigational features of relevance to the Project, which are mainly concentrated in the vicinity of the Array Area and landfall noting that the charts in proximity to the remainder of the EICC were also reviewed. Further details can be found within the NRA (EIAR Vol. 4, Appendix 26: Navigational Risk Assessment).

The charted navigational features in proximity to the Array Area and the landfall are presented in Figure 15.2 and Figure 15.3 respectively.

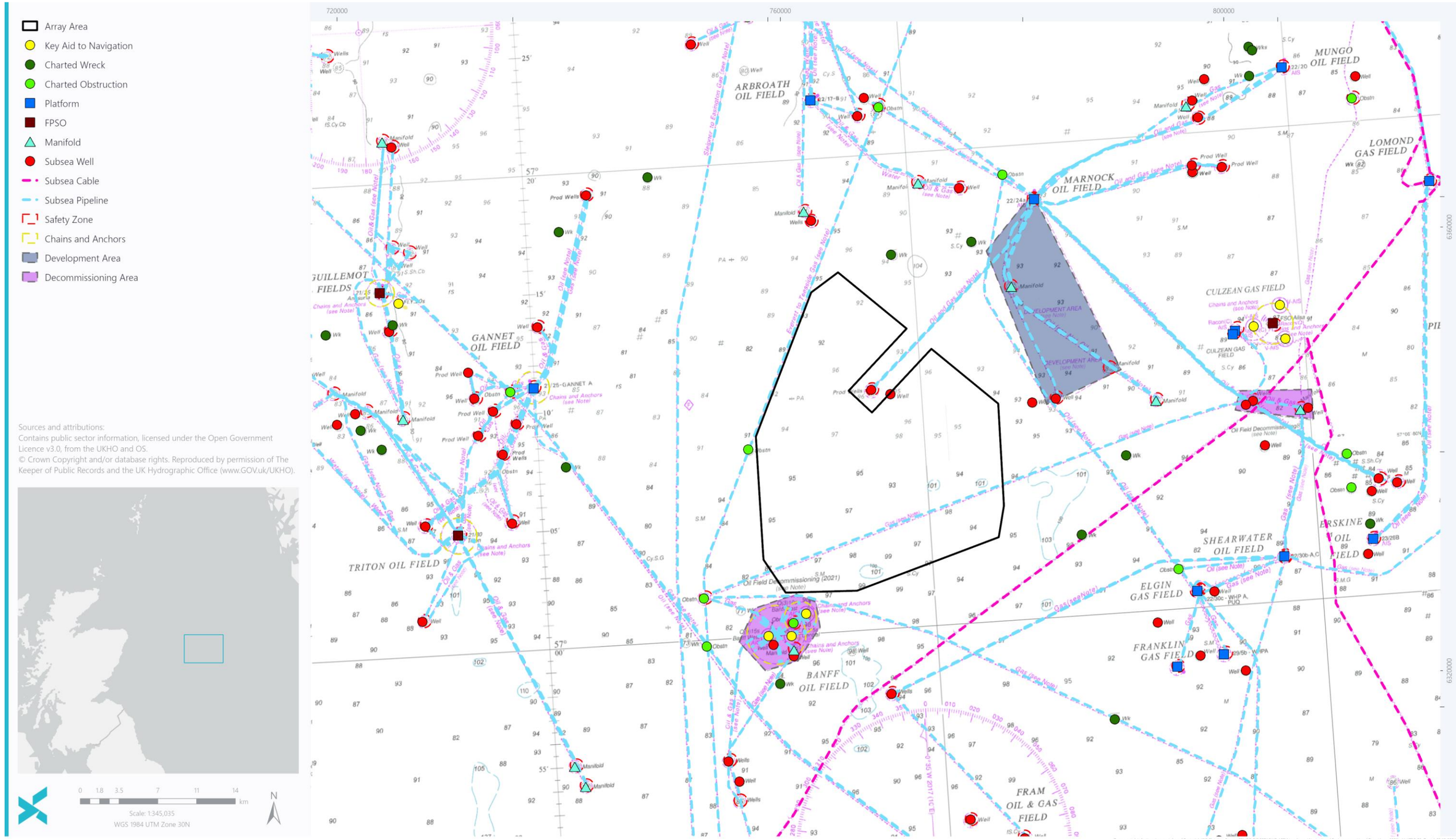

Figure 15.2 Navigational features (Array Area)

The majority of navigational features in proximity to the Array Area are associated with oil and gas infrastructure. This includes pipelines, subsea wells, platforms and safety zones. Navigational features of particular note include:

- A gas pipeline intersecting the southern portion of the Array Area;
- A production well within the inset section of the Array Area (Madoes) and associated pipelines; and
- The Banff Oil Field, which contains a Floating, Production, Storage and Offloading Unit (FPSO), a manifold and associated aids to navigation. The Banff Oil Field is in the process of being decommissioned at the time of writing (October 2024).

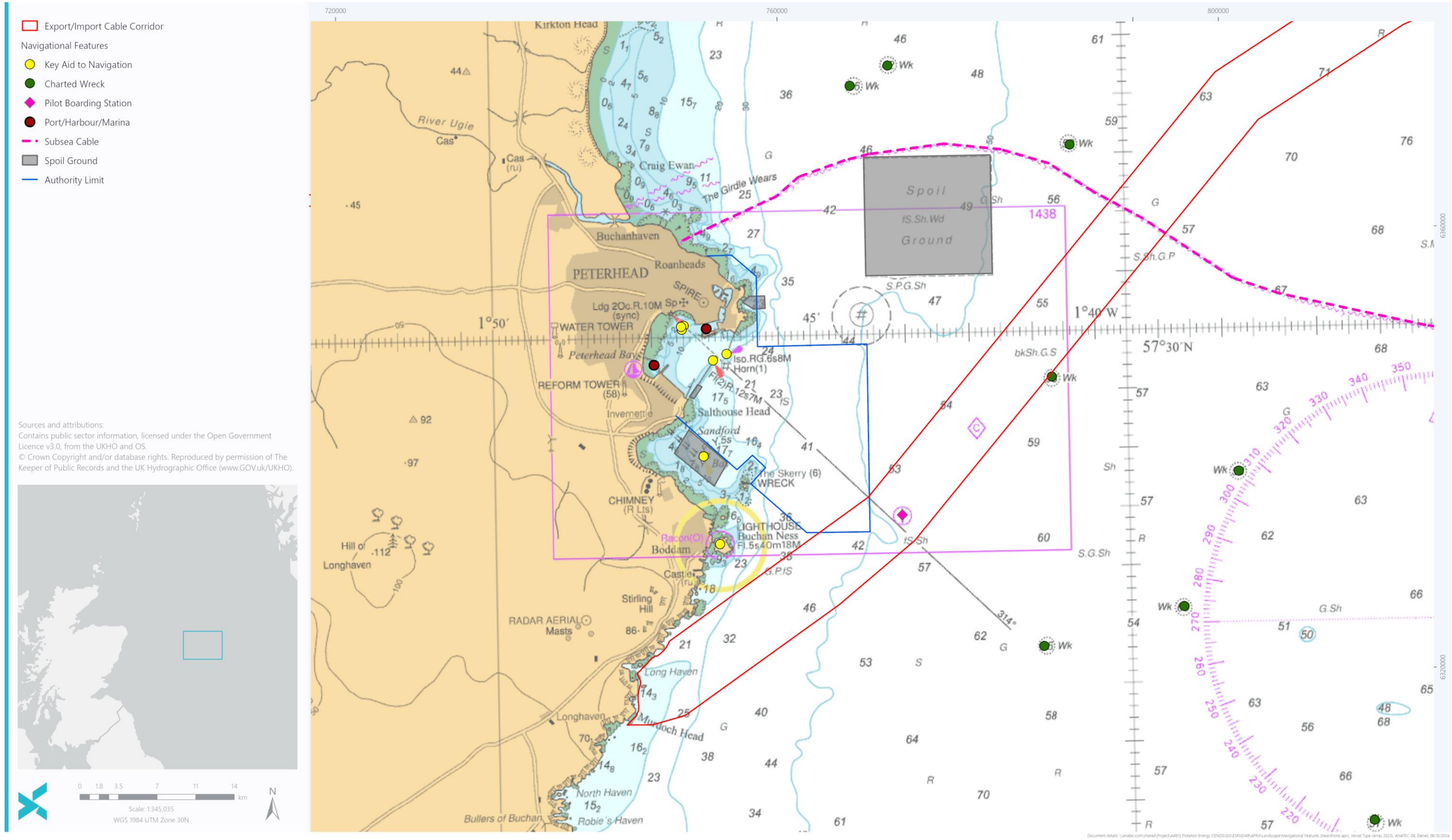

Figure 15.3 Navigational features (nearshore)

Navigational features charted in proximity to the landfall include subsea cables, charted wrecks, pipelines, spoil grounds and aids to navigation. The Peterhead Port Authority limits and charted pilot boarding location overlap the EICC. It is noted that aids to navigation in the area include the Peterhead Port leading lights[1] (the approach line of which intersects the EICC).

15.4.4.2 Vessel traffic

Figure 15.4 presents the vessel traffic recorded during the dedicated 21-day summer survey, colour-coded by type. No non-AIS traffic was recorded, noting the distance offshore of the Array Area. Full details of the analysis of this traffic can be found within the NRA (EIAR Vol. 4, Appendix 26: Navigational Risk Assessment).

[1] *From the Peterhead Port Authority Information for Ship Masters, Owners and agents (Peterhead Port Authority, 2024): "In general terms, inbound vessels will normally be aligned with the leading marks (2 synchronised occulting Red lights vertically disposed, by night and 2 Orange triangles apex together by day) on a bearing of 314° T which marks the centre of the navigation fairway in Peterhead Bay Harbour. Thereafter navigation under pilot's advice to the allocated berth will commence."*

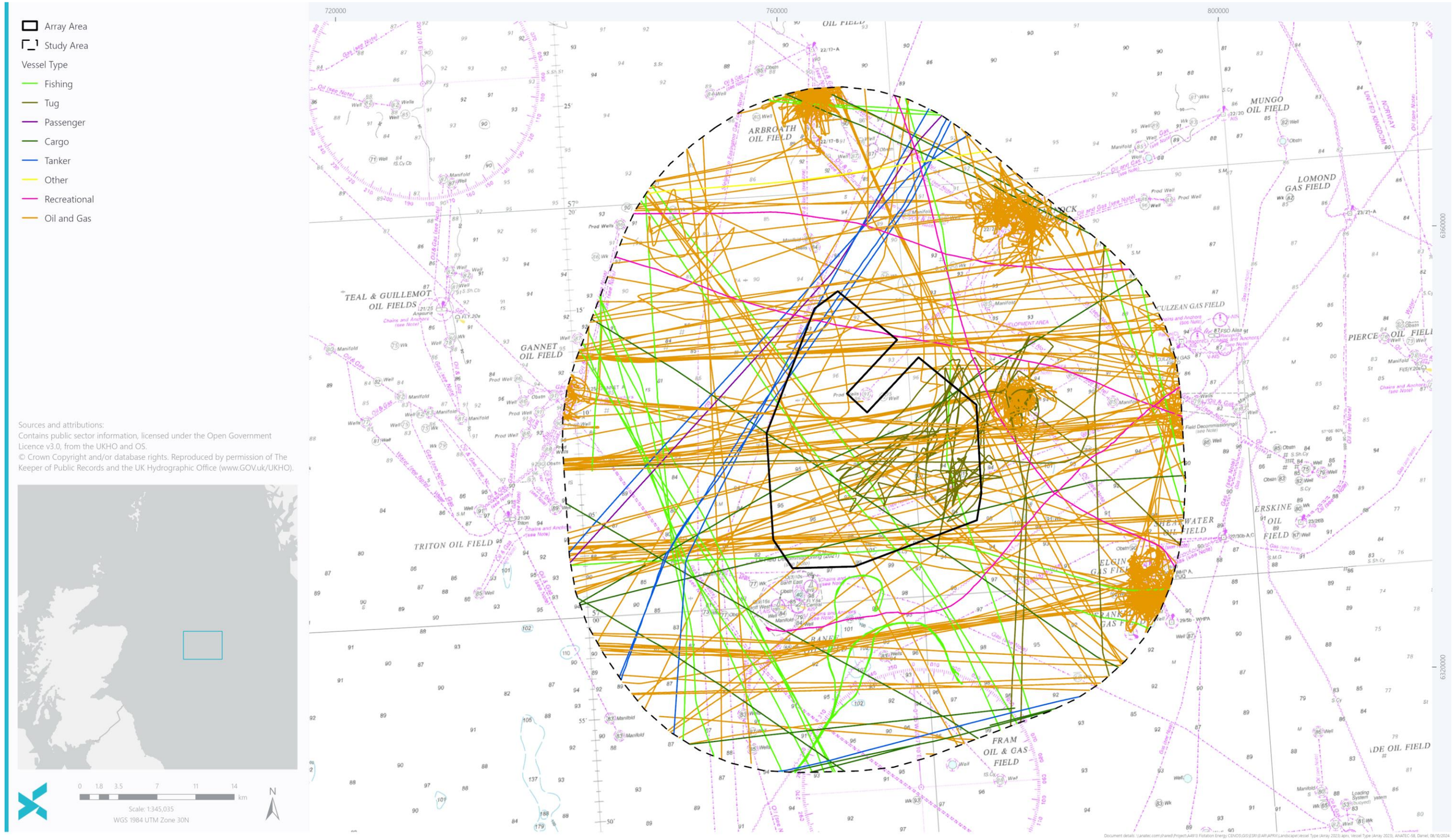

Figure 15.4 Vessels by type (21 days, summer 2023)

The majority of the traffic was composed of oil and gas vessels, accounting for 82% of the total. Overall, an average of 15 to 16 vessels per day was recorded within the Study Area. Overall, 95 vessel intersections with the Array Area were recorded, corresponding to an average of four to five a day; the majority (78%) of these were from oil and gas vessels.

The average length of vessel was 71 m, with the longest vessel being a 279 m tanker. The average vessel draught was 6 m, with the deepest draught being 10 m recorded from the aforementioned tanker. The fastest vessel speed was 15 knots, from a cargo vessel.

No vessels were identified as at anchor within the Study Area.

Three years of fishing vessel AIS data spanning September 2021 to August 2024 was also assessed. There was alignment between this three-year dataset, the long-term dataset and the 21-day survey in terms of the average number of fishing vessels per day, with each dataset indicating an average of one per day.

The main commercial routes were identified using the principles set out in MGN 654 (MGN, 2021). A total of 20 routes were identified within the Study Area. The mean positions of these routes and their 90th percentiles are presented in Figure 15.5. The associated details of these routes including in terms of terminus ports and vessel numbers are provided in Table 15.4. It should be considered when viewing Figure 15.5 and Table 15.4 that vessel numbers on all routes are low (less than one a day on all routes). This is reflective of the traffic composition in the area largely being oil and gas vessels.

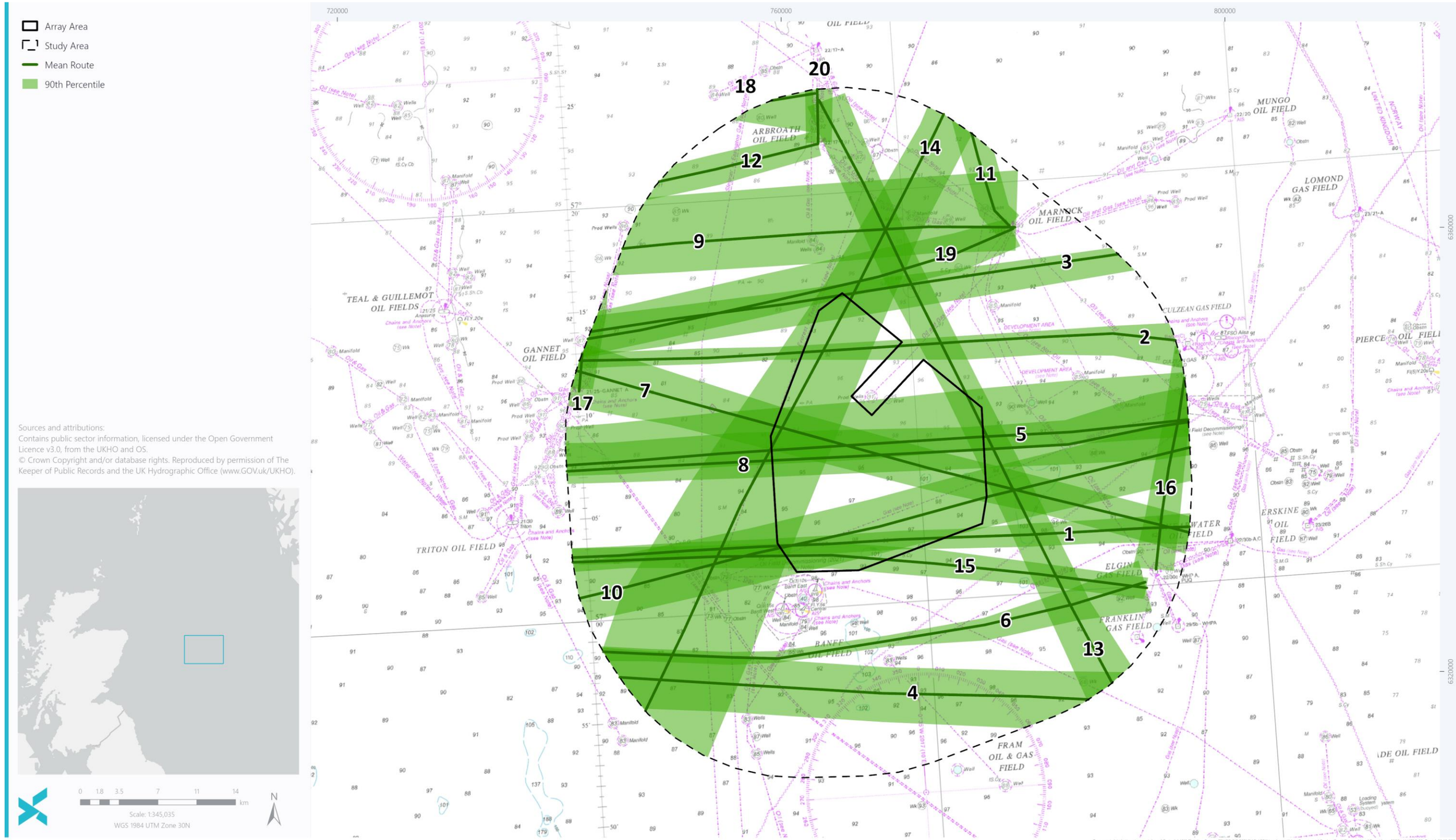

Figure 15.5 Main commercial routes (pre wind farm)

Table 15.4 Main commercial route descriptions

ROUTE NUMBER	AVERAGE VESSELS PER MONTH	DESCRIPTION
1	13-14	Aberdeen – Shearwater/Erskine Fields
2	9-10	Aberdeen – Culzean Field
3	8-9	Aberdeen – Lomond Field
4	8	Aberdeen – Various oil and gas infrastructure
5	8	Aberdeen – Various oil and gas infrastructure
6	6-7	Aberdeen – Elgin Field
7	5-6	Gannet Field – Shearwater Field
8	5-6	Aberdeen – Haewene Brim Floating Production, Storage and Offloading Unit (FPSO)
9	5	Aberdeen – Marnock Field
10	5	Port of Montrose – Sweden
11	4-5	Marnock Field – Andrew Field
12	4-5	Aberdeen – Arbroath Field
13	4	Fulmer/Clyde/Auk Fields – Montrose/Arbroath Fields
14	3-4	Teesport – Norway
15	3-4	Aberdeen – Elgin Field
16	3	Elgin Field – Culzean Field
17	2	Gannet Field – Nelson Field
18	2	Aberdeen – Montrose/Arbroath Fields
19	2	Aberdeen – Marnock Field
20	2	Arbroath Field – Montrose Field

Figure 15.6 presents the vessel traffic recorded within the EICC Study Area during the associated five-week data period, colour-coded by vessel type.

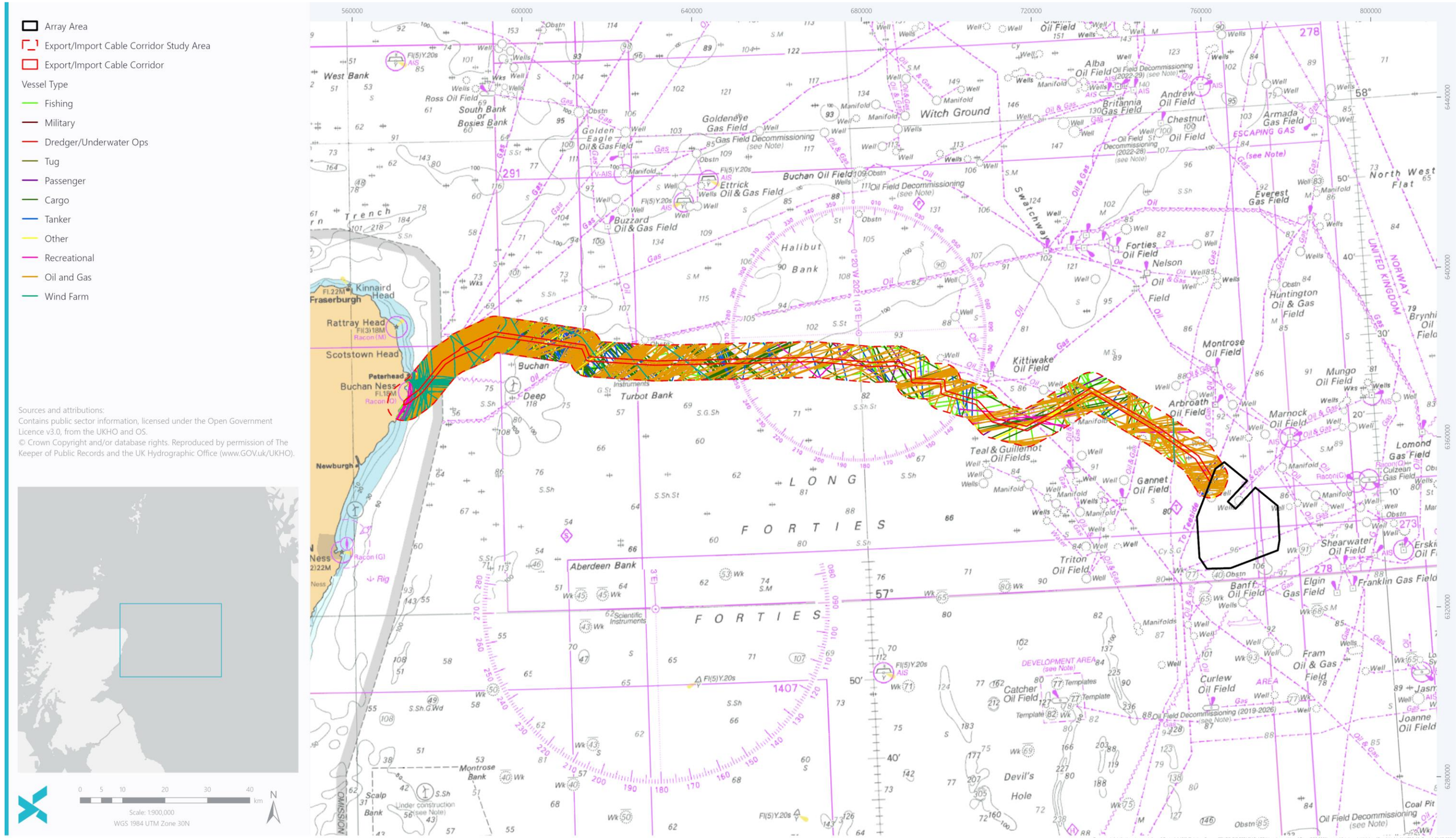

Figure 15.6 Vessels by type (EICC Study Area, 5 weeks, summer and winter 2023)

Traffic density was concentrated within 15 NM of the landfall, corresponding to traffic travelling to/from Peterhead port (which mainly comprised fishing and oil and gas vessels) and north/south routeing of commercial traffic (which mainly comprised cargo vessels).

There was an average of 74 vessels per day recorded within the EICC Study Area during the summer period, with 64 to 65 during the winter period. Within the EICC itself, there was an average of 55 per day during the summer period and 48 per day during the winter period. These differences between the seasons can be mainly attributed to larger amounts of fishing and recreational activity during the summer.

Three cargo vessels were identified as at anchor south of the landfall during the summer period and appeared to be awaiting orders based on the destinations broadcast via AIS.

A review of the RYA Coastal Atlas (RYA, 2019) indicated that recreational vessel traffic density is at its highest in proximity to Peterhead. The closest RYA facilities are also located at Peterhead, where a marina and RYA club are located. There are no "general boating areas"[2] in proximity.

15.4.4.3 Maritime incidents

The NRA presents an analysis of historical maritime incident data using multiple datasets from the RNLI, MAIB and DfT, in terms of incident type and casualty type, within both the Study Area and EICC Study Area. The full details of this analysis can be found within the NRA (EIAR Vol. 4, Appendix 26: Navigational Risk Assessment).

No RNLI incidents were documented within the Study Area during the ten-year period assessed (2013 to 2022), noting the distance offshore of the Array Area. Three incidents were documented by the MAIB within the Study Area during the ten years between 2013 and 2022. Two involved accidents on board oil and gas vessels (one of these incidents occurred within the Array Area itself) and the third involved a fishing vessel experiencing water ingress while undertaking guard duties for an oil rig. A review of the previous 10 years of MAIB data (i.e. 2003 to 2012) indicated the same number of incidents. The DfT helicopter data indicated 15 helicopter taskings within the Study Area over the eight years assessed, corresponding to an average of two per year.

The RNLI data indicated a total of 96 lifeboat responses to 89 unique incidents within the EICC Study Area, corresponding to an average of nine incidents per year. The MAIB data indicated a total of 35 incidents involving 39 casualties within the EICC Study Area, corresponding to an average of three to four per year. The majority of these MAIB incidents were located within 2 NM of the coast, with the furthest offshore being 77 NM from the coast. A review of the previous 10 years of MAIB data indicated that incident rates have slightly decreased over time. The DfT helicopter data indicated a total of 18 taskings within the EICC Study Area over the eight years assessed, corresponding to an average of two per year.

15.4.5 Future baseline

An assessment of future baseline conditions for shipping and navigation has been carried out and is described within this Section. Further information can be found within the NRA (EIAR Vol. 4, Appendix 26: Navigational Risk Assessment).

[2] *A general boating area may indicate non-AIS recreational traffic presence.*

There is uncertainty associated with long-term predictions of vessel traffic growth including the potential for any other new developments in the area, transboundary ports, the long-term effects of Brexit and the expansion of Aberdeen Harbour. Therefore, two independent scenarios of potential growth in commercial vessel movements of 10% and 20% have been estimated throughout the lifetime of the Project. These scenarios have been included in the modelling undertaken for the NRA and are considered conservative. Commercial vessel routeing post wind farm has also been estimated using conservative assumptions (such as assuming mean route positions will deviate to 1 NM from the Array Area boundary).

There is similar uncertainty associated with long-term predictions for commercial fishing vessel and recreational vessel transits given the limited reliable information on future trends upon which any firm assumption could be made. There are no known major developments which would increase commercial fishing or recreational vessel activity in the region. Therefore, in line with assumptions for commercial vessels, a conservative potential growth in commercial fishing vessel and recreational vessel movements of 10% and 20% has been estimated throughout the lifetime of the Project.

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 operational 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.

15.4.6 Summary and key issues

A summary and key issues for shipping and navigation are presented in Table 15.5.

Table 15.5 Summary and key issues for Shipping and Navigation

	PROJECT AREA
SUMMARY AND KEY ISSUES	• Navigational features within the Project Area are mainly concentrated in the vicinity of the Array Area and landfall. • The majority of navigational features within the Project Area are associated with oil and gas infrastructure, including pipelines, subsea wells, platforms and safety zones. • Around the Array Area, the majority of the traffic comprised oil and gas vessels, accounting for 82% of the total. An average of 15 to 16 vessels per day was recorded. • Three years of fishing vessel AIS data (September 2021 to August 2024) aligned with the long-term dataset and the 21-day survey in terms of the average number of fishing vessels per day, with each dataset indicating an average of one per day. • A total of 20 commercial routes were identified around the Array Area – these were mostly associated with vessels originating in Aberdeen travelling to oil and gas fields/assets. All were low use, with each being used by less than a vessel a day on average. • Nearshore, traffic density was concentrated within 15 NM of the landfall, corresponding to traffic travelling to/from Peterhead port (either fishing or oil and gas vessels) and north/south routeing of commercial traffic (which mainly comprised cargo vessels). • Recreational vessel traffic density is at its highest in proximity to Peterhead, where the closest RYA facilities are located. • Further offshore, a total of three marine incidents were reported within the Shipping and Navigation Study Area between 2023 and 2022 by the MAIB. No RNLI incidents were documented within the Shipping and Navigation Study Area during the ten-year period assessed (2013 to 2022), noting the distance offshore of the Array Area. • Closer to the coast, along the EICC, RNLI data indicated a total of 96 lifeboat responses to 89 unique incidents, corresponding to an average of nine incidents per year. The MAIB data indicated a total of 35 incidents involving 39 casualties, corresponding to an average of three to four per year. The majority of these MAIB incidents were located within 2 NM of the coast.

15.4.7 Data gaps and uncertainties

This Section discusses key data limitations and uncertainties associated with the data sources used to inform the assessment of Shipping and Navigation. The use of multiple data sources and consultation means that these limitations and uncertainties do not compromise the impact assessment.

15.4.7.1 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). It should therefore be considered that certain vessel types (in particular, fishing vessels of less than 15 m in length and recreational vessels) may be underrepresented in the AIS-only datasets such as the data for the EICC and 12 months long-term data. However, additional data sources including the RYA Coastal Atlas and VMS data have also been considered. Further details are presented in the NRA (EIAR Vol. 4, Appendix 26: Navigational Risk Assessment).

It has been assumed that vessels under a legal obligation to broadcast via AIS will do so and that the details broadcast via AIS are accurate (e.g., vessel type, dimensions) unless there is clear evidence to the contrary.

15.4.7.2 Historical Incident Data

Although all UK commercial vessels are required to report accidents to the MAIB, this is not mandatory for non-UK vessels unless they are in a UK port, within 12 NM (22.2 km) of territorial waters (noting that the Array Area and the associated Study Area are entirely located outside 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 Study Area. Although hoaxes and false alarms are excluded, any incident to which an RNLI resource was not mobilised has not been accounted for in this dataset.

15.4.7.3 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. Only charted navigational features are presented and considered.

During consultation, input has been sought from relevant stakeholders regarding the navigational features baseline. Navigational features are based upon the most recently available UKHO Admiralty Charts and Sailing Directions at the time of writing (October 2024).

15.5 Impact assessment methodology

15.5.1 Impacts requiring assessment

The impacts identified as requiring consideration for Shipping and Navigation are listed in Table 15.6. Information on the nature of impact (i.e. direct or indirect) is also described. This list of impacts has been identified through the NRA process which considers various inputs including consultation (including a Hazard Workshop), quantitative modelling, and the baseline assessment.

Table 15.6 Impacts requiring assessment for Shipping and Navigation

POTENTIAL IMPACT	NATURE OF IMPACT
Construction and decommissioning*	
Displacement of vessels	Direct
Collision risk (third-party to third-party)	Indirect
Collision risk (project to third-party)	Direct
Allision risk	Direct
Floating structure loses station	Direct
Under keel clearance reduction	Direct
Potential impacts to emergency response capability	Direct
Reduced access to local ports and harbours	Direct
Operation and maintenance	
Displacement of vessels	Direct
Collision risk (third-party to third-party)	Indirect
Collision risk (project to third-party)	Direct
Allision risk	Direct
Anchor snagging risk	Direct

POTENTIAL IMPACT	NATURE OF IMPACT
Floating structure loses station	Direct
Under keel clearance reduction	Direct
Potential impacts to emergency response capability	Direct
Reduced access to local ports and harbours	Direct
EMF impacts on Compass Deviation	Direct

**** In the absence of detailed information regarding decommissioning works, and unless otherwise stated, the impacts during the decommissioning are considered analogous with, or likely less than, those of the construction phase.***

15.5.2 Impacts scoped out of the assessment

No impacts have been scoped out of the assessment as a whole i.e. all impacts identified during scoping are assessed either in this Chapter or in EIAR Vol. 4, Appendix 26: Navigational Risk Assessment. Impacts assessed in EIAR Vol. 4, Appendix 26: Navigational Risk Assessment and subsequently screened out of further assessment in the chapter are shown in Table 15.7.

Table 15.7 Impacts screened out for Shipping and Navigation Chapter

IMPACT SCOPED OUT	JUSTIFICATION
Construction	
Potential impacts to aids to navigation	This is assessed in EIAR Vol. 4, Appendix 26: Navigational Risk Assessment. Based on the assessment the impact has been screened out of further assessment in the chapter on the grounds that no significant impacts on aids to navigation are anticipated.
Operation and maintenance	

IMPACT SCOPED OUT	JUSTIFICATION
Potential impacts to aids to navigation	This is assessed in EIAR Vol. 4, Appendix 26: Navigational Risk Assessment. Based on the assessment the impact has been screened out of further assessment in the chapter on the grounds that no significant impacts on aids to navigation are anticipated.
Potential impacts to vessels navigation, communication, and position fixing equipment	This is assessed in EIAR Vol. 4, Appendix 26: Navigational Risk Assessment. Based on the assessment the impact has been screened out of further assessment in the chapter with the exception of impact from EMF on vessel compasses.
Decommissioning	
Potential impacts to aids to navigation	This is assessed in EIAR Vol. 4, Appendix 26: Navigational Risk Assessment. Based on the assessment the impact has been screened out of further assessment in the chapter on the grounds that no significant impacts on aids to navigation are anticipated.

15.5.3 Assessment methodology

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 EIAR Vol. 2, Chapter 7: EIA Methodology. Impact(s) on shipping and navigation are assessed in terms of the IMO Formal Safety Assessment (FSA) methodology (the internationally recognised approach for assessing shipping and navigation impacts) and is required to be used for Shipping and Navigation assessments under MGN 654 (MCA, 2021).

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 15.8.

Table 15.8 Frequency criteria

FREQUENCY OF OCCURRENCE	DEFINITION
Frequent	Yearly
Reasonably Probable	One occurrence per 1 to 10 years
Remote	One occurrence per 10 to 100 years
Extremely Unlikely	One occurrence per 100 to 10,000 years
Negligible	Less than one occurrence per 10,000 years

Table 15.9 Consequence criteria

SEVERITY OF CONSEQUENCE	DEFINITION
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

The significance of effect is then determined using the matrix provided in Table 15.10. For the purposes of this assessment:

- A level of effect of Unacceptable will be considered a 'significant' effect in terms of the EIA Regulations;
- A level of effect of Broadly Acceptable will be considered 'not significant' in terms of the EIA Regulations; and
- A level of effect of Tolerable will be considered 'not significant' in terms of the EIA Regulations assuming the risks have been reduced to As Low As Reasonably Practicable (ALARP) through application of mitigation.

Table 15.10 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	Tolerable
Serious	Unacceptable	Unacceptable	Tolerable	Tolerable	Broadly Acceptable
Moderate	Unacceptable	Tolerable	Tolerable	Broadly Acceptable	Broadly Acceptable
Minor	Tolerable	Tolerable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable
Negligible	Tolerable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable

15.5.4 Embedded mitigation

As described in EIAR Vol. 2, Chapter 7: EIA Methodology, certain measures (primary and tertiary mitigation) have been adopted as part of the Project development process in order to reduce the potential for impacts to the shipping and navigation receptors, as presented in Table 15.11. 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.

Table 15.11 Embedded mitigation measures relevant to Shipping and Navigation

MITIGATION MEASURE	CODE	TYPE	DESCRIPTION	SECURED BY
Cable Plan (CaP)	MM-008	Tertiary	The CaP will be provided post-consent and will detail the location / route and cable laying techniques of the IAC and Export / Import Cable and detail the methods for cable surveys during the operational life of the cables for the Project. This will be supported by survey results from the geotechnical, geophysical and benthic surveys. The CaP will also detail EMFs of the cables deployed and methods to mitigate against any effects of EMF. A CBRA will also be undertaken and results included within the CaP which will detail cable specifications, cable installation, cable protection, target burial depths / depth of lowering and any hazards the cable will present during the lifespan of the cable. The CaP will also include methodologies of post construction and operational surveys and methodologies for cable inspection with measures to address and report any exposure of cables.	Final cable design will be informed by the CBRA and detailed within the CaP, required under Section 36 Consent and/or Marine Licence conditions.
Marine Pollution Contingency Plan (MPCP)	MM-010	Tertiary	Accidental releases to the marine environment will be limited to the chemical or hydrocarbon inventory on construction vessels. All vessels involved in the Project will be required to comply with best practice management. This includes the application of strict environmental controls through the implementation of the Environmental Management Plan (EMP), which will include a MPCP, to be secured through Section 36 and Marine Licence conditions. These plans will detail procedures in the event of an accidental release, characterise all sources for potential contaminant releases and provide key emergency contact details for use in the event of a release. Measures detailed in the EMP and MPCP will be in accordance with OSPAR Convention and The International Convention for the Prevention of Pollution from Ships (MARPOL) guidelines for preventing pollution at	The production and approval of an MPCP will be required under Section 36 Consent and/or Marine Licence conditions as part of the EMP. An outline EMP is provided as part of the application EIAR Vol. 4 Appendix 32: Outline EMP.

MITIGATION MEASURE	CODE	TYPE	DESCRIPTION	SECURED BY
			sea. Individual vessels will also have a Ship Oil Pollution Emergency Plan (SOPEP) in place. For these reasons, the potential for accidental release of contaminants from vessels is extremely unlikely and any incidents would be responded to quickly, with strict controls to effectively minimise the scale and impact of any accidental release on the marine environment.	
The use of guard vessels and Offshore Fisheries Liaison Officers (OFLOs)	MM-025	Primary	Where required, guard vessels and OFLOs will be in place within the marine environment during the construction phase, major maintenance works and decommissioning works where required. Guard vessels will ensure that effective communication between the Project and other sea users (including commercial fishers) is maintained, therefore reducing the potential for interactions between fishers and Project vessels and activities.	Requirements will be detailed within the Fisheries Management and Mitigation Strategy (FMMS), required under Section 36 Consent and/or Marine Licence conditions. An outline FMMS is provided as part of the application **EIAR Vol. 4 Appendix 34: Outline FMMS**.
Promulgation of information, such as Notice to Mariners (NtM), Kingfisher notifications and other navigational warnings	MM-028	Tertiary	Timely and efficient distribution of NtM and Kingfisher notifications will inform third party vessels of the position and nature of works associated with the Project. Information will include but not be limited to vessel routes, timings and locations, safety zones and advisory safe passing distances as required.	Procedures will be detailed within the NSP and the FMMS, required under Section 36 and/or Marine Licence Conditions. An outline FMMS is provided as part of the application **EIAR Vol. 4 Appendix 34: Outline FMMS**.
Compliance from all project vessels with International Regulations for the Prevention of Collision at Sea (COLREGs) and International Regulations for the Safety of Life at Sea (SOLAS)	MM-029	Tertiary	All Project vessels will comply with the provisions of COLREGs and SOLAS, including displaying appropriate lights and shapes to indicate the nature of the work in progress and when vessels are restricted in their ability to manoeuvre. All project vessels will also broadcast via AIS.	Legislative requirement that will be detailed within the EMP, NSP and the FMMS, required under Section 36 Consent and/or Marine Licence conditions. An outline FMMS and EMP is provided as part of the application **EIAR Vol. 4**

MITIGATION MEASURE	CODE	TYPE	DESCRIPTION	SECURED BY
				Appendix 34: Outline FMMS and EIAR Vol. 4 Appendix 32: Outline EMP.
Procedure for accidental deposit of object(s) at sea	MM-030	Tertiary	A procedure will be developed and implemented to manage and mitigate the effects of any accidental deposit of object(s) on the seabed during works associated with the Project. This procedure will align with the Marine Directorate's (2024) Accidental Deposit of an Object at Sea Guidance. Accidental deposit(s) will be reported using published reporting forms (Marine Directorate, November 2024) and relevant parties will be notified at the time of recognition. Recovery will be attempted by the Project for all deposits and confirmed whether successful with the regulator and relevant stakeholders.	Procedures will be detailed within the EMP and FMMS, required under Section 36 and/or Marine Licence conditions. An outline FMMS and EMP is provided as part of the application EIAR Vol. 4 Appendix 34: Outline FMMS and EIAR Vol. 4 Appendix 32: Outline EMP
Lighting and Marking Plan (LMP)	MM-031	Tertiary	The LMP will set out requirements in terms of marine lighting and marking of the WTGs and OSCPs during the construction and operational phases. This will comply with NLB requirements, the IALA G1162 Guidance (IALA, 2022), and MGN 654 (MCA, 2021).	Lighting requirements will be detailed in the LMP, required under Section 36 Consent and/or Marine Licence consent conditions.
Charting of installed infrastructure	MM-033	Tertiary	Notification to the UKHO and Kingfisher of the proposed location and programme of works will facilitate the promulgation of maritime safety information and updating of nautical/admiralty charts and publications. All Project infrastructure (including FTUs, substations, subsea cables and mooring lines) will be marked on appropriately scaled nautical charts. All structures more than 91.4 m in height will be charted on aeronautical charts and reported to the Defence Geographic Centre (Digital Vertical Obstruction File) at least ten weeks prior to construction in line with the LMP.	Charting requirements will be secured under a Marine Licence condition. Details will also be included in the FMMS, LMP, and NSP also required under the Section 36 Consent and/or Marine Licence conditions. An outline FMMS is provided as part of the application EIAR Vol. 4 Appendix 34: Outline FMMS.

MITIGATION MEASURE	CODE	TYPE	DESCRIPTION	SECURED BY
NSP	MM-034	Tertiary	The NSP provides information on navigational safety for the Project. It will provide the required information on navigational safety measures, construction exclusion zones (if relevant), notice to mariners and radio navigation warnings, anchoring areas, temporary construction lighting and marking, buoyage, post construction monitoring and hydrographic surveys taking into account all recommendations in the MGN 654 and its annexes.	Secured through the Section 36 Consent and/or Marine Licence conditions.
Application for and implementation of safety zones	MM-035	Primary	Safety zones will be applied during construction and periods of major maintenance, and either statutory or advisory safety zones during operation (to be agreed during further consultation). Full details will be provided in the safety zone application; however, it is likely that the standard set of safety zones will be applied for: • Statutory 500 m safety zones will be in place on a 'rolling' basis around the edge of FTUs and OSCPs during construction works and during periods of major maintenance; • Safety zones will be reduced to 50 m around any FTUs and OSCPs during the construction phase when construction works are not underway ahead of commissioning; and • Temporary 500 m safety zones around structures where major maintenance is ongoing. Where safety zones do not apply (e.g., around cable installation), use of advisory safe passing distances will be implemented.	An application for safety zones will be made in accordance with Section 95 of the Energy Act 2004 and the Electricity (Offshore Generating Stations) (Safety Zones) (Application Procedures and Control of Access) Regulations 2007. Details will be included within the NSP, required under Section 36 Consent and/or Marine Licence conditions.
Compliance with MGN 654	MM-037	Tertiary	The Project will comply with MGN 654 and its annexes to ensure that impacts on navigational safety and emergency response are considered, assessed and mitigated where necessary. This includes post-consent completion of the SAR Checklist, which includes the completion of an ERCoP. This will include, but is not limited to: • Layout design; • Agreement of SAR checklist and ERCoP with MCA;	Compliance with MGN 654 will be detailed within the NSP and ERCoP required under Section 36 Consent and/or Marine Licence consent conditions.

MITIGATION MEASURE	CODE	TYPE	DESCRIPTION	SECURED BY
			• Hydrographic surveys; and • Maximum 5% reduction in surrounding water depths referenced to Chart Datum unless otherwise agreed with the Scottish Ministers in consultation with MCA.	
Compliance with regulatory expectations on mooring devices for floating wind and marine devices	MM-038	Tertiary	Compliance with the regulatory expectations on mooring devices for floating wind and marine devices (MCA & Health and Safety Executive (HSE) 2017), in particular the requirement to undertake Third Party Verification of the mooring lines and implement appropriate monitoring of the FTUs to provide an alert in case of mooring failure.	Required under Section 36 Consent and/or Marine Licence conditions.
Minimum air gap (in normal operating conditions) of 22 m above MHWS	MM-039	Primary	Compliance with MCA and RYA requirements around a minimum air gap. In particular ensuing a minimum air gap of 22 m is maintained in normal operating conditions, in order to minimise the risk of allision.	Mitigation by design.

15.5.5 Worst-case scenario

As detailed in EIAR Vol. 2, Chapter 7: 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 which 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 15.12 presents the worst-case scenario for potential impacts on Shipping and Navigation during construction, operation and maintenance and decommissioning.

Table 15.12 Worst-case scenario specific to Shipping and Navigation impact assessment

POTENTIAL IMPACT	WORST-CASE SCENARIO	JUSTIFICATION
Construction		
Displacement of vessels	• Maximum duration (six years) of construction phase. • Maximum number (22) of simultaneous construction vessels. • Maximum number (95) of WTGs with maximum extent. • Buoyed construction area encompassing the maximum extent of the Array Area. • Presence of 500 m construction and 50 m pre-commissioning safety zones, and advisory safe passing distances around vessels. • Minimum spacing (928 m) between WTGs. • Semi-submersible structures, with six mooring lines per structure, triangles with 112 m long sides. • Maximum length (350 km) of Inter-Array Cables (IACs) (comprising 280 km buried/static and 70 km dynamic) with subsea cable protection where needed with a height of up to 1 m. • IAC buoyancy modules located at least 20 m below sea surface • Maximum number (two) of Export/Import Cables, each with maximum length (230 km) and cable protection with a height of 1 m, to be laid in a single bundle in a single trench.	Largest possible extent of infrastructure, greatest number of simultaneous vessel activities and greatest duration resulting in the maximum spatial and temporal effect on vessel displacement.
Collision risk (third-party to third-party)		As the pathway for this impact is vessel displacement, worst-case scenario parameters are as above.
Collision risk (project to third-party)		Largest possible extent of infrastructure, greatest number of simultaneous vessel activities and greatest duration resulting in the maximum spatial and temporal effect on project to third-party collision risk.
Floating structure loses station		Largest possible extent of infrastructure and greatest duration resulting in the maximum spatial and temporal effect on loss of station risk.
Under keel clearance reduction		Largest possible extent of infrastructure and greatest duration resulting in the maximum spatial and temporal effect on under keel clearance interaction risk.

POTENTIAL IMPACT	WORST-CASE SCENARIO	JUSTIFICATION
Allision risk		Largest possible extent of infrastructure and greatest duration resulting in the maximum spatial and temporal effect on allision risk.
Potential impacts to emergency response capability		Largest possible extent of infrastructure, greatest number of simultaneous vessel activities and greatest duration resulting in the maximum spatial and temporal effect on emergency response capability.
Reduced access to local ports and harbours		Largest possible extent of infrastructure, greatest number of simultaneous vessel activities and greatest duration resulting in the maximum spatial and temporal effect on access to local ports and harbours.
Operation and maintenance		
Displacement of vessels	• Maximum duration (35 years) of operational phase. • Maximum number (95) of WTGs with maximum extent. • Minimum spacing (928 m) between WTGs. • 500 m safety zones around major maintenance and advisory safe passing distances around vessels. • Semi-submersible structures, with six mooring lines per structure, triangles with 112 m sides. • Maximum length (350 km) of IACs (comprising 280 km buried/static and 70 km dynamic) and cable protection with a height of up to 1 m where needed. • IACs with buoyancy modules located at least 20 m below sea surface.	Largest possible extent of infrastructure, greatest number of simultaneous vessel activities and greatest duration resulting in the maximum spatial and temporal effect on vessel displacement.
Collision risk (third-party to third-party)		As the pathway for this impact is vessel displacement, worst-case scenario parameters are as above.
Collision risk (project to third-party)		Largest possible extent of infrastructure, greatest number of simultaneous vessel activities and greatest duration resulting in the maximum spatial

POTENTIAL IMPACT	WORST-CASE SCENARIO	JUSTIFICATION
	• Maximum number (two) of Export/Import Cables, each with maximum length (230 km) and cable protection with a height of 1 m, to be laid in a single bundle in a single trench. • Maximum number (10) of simultaneous operation and maintenance vessels.	and temporal effect on project to third-party collision risk.
Anchor snagging risk		Largest possible extent of infrastructure and greatest duration resulting in the maximum spatial and temporal effect on anchor snagging risk.
Floating structure loses station		Largest possible extent of infrastructure and greatest duration resulting in the maximum spatial and temporal effect on loss of station risk.
Under keel clearance reduction		Largest possible extent of infrastructure and greatest duration resulting in the maximum spatial and temporal effect on under keel clearance interaction risk.
Allision risk		Largest possible extent of infrastructure and greatest duration resulting in the maximum spatial and temporal effect on allision risk.
Potential impacts to emergency response capability		Largest possible extent of infrastructure, greatest number of simultaneous vessel activities and greatest duration resulting in the maximum spatial and temporal effect on emergency response capability.
Reduced access to local ports and harbours		Largest possible extent of infrastructure, greatest number of simultaneous vessel activities and greatest duration resulting in the maximum spatial and temporal effect on access to local ports and harbours

POTENTIAL IMPACT	WORST-CASE SCENARIO	JUSTIFICATION
EMF impacts on Compass Deviation		Largest possible extent of infrastructure and greatest duration resulting in the maximum spatial and temporal effect on vessel compasses.
Decommissioning		
Displacement of vessels	In the absence of detailed decommissioning activities, the implications are similar, or likely less, to the worst-case scenarios for those outlined during the construction phase. Therefore, the worst-case parameters defined for the construction phase also apply to the decommissioning phase. More details are available on the decommissioning approach in EIAR Vol. 2, Chapter 5: Project Description.	
Collision risk (third-party to third-party)		
Collision risk (project to third-party)		
Floating structure loses station		
Under keel clearance reduction		
Allision risk		
Potential impacts to emergency response capability		
Reduced access to local ports and harbours		

15.6 Assessment of potential effects

15.6.1 Potential effects during construction

15.6.1.1 Displacement of vessels

This Section assesses the impact of third-party vessels being displaced from their routes as a result of the construction of the Project. The focus of this Section is on transiting vessels, with the displacement of active fishing assessed in EIAR Vol. 3, Chapter 14: Commercial Fisheries and the displacement of other types of activities by sea users assessed in EIAR Vol. 3, Chapter 17: Infrastructure and Other Users. This Section assumes the worst-case scenario parameters detailed in Section 15.5.5.

The volume of vessel traffic passing within or in proximity to the Array Area has been primarily established using twelve months of vessel traffic data recorded from offshore receivers and 21 days of vessel traffic data recorded via a dedicated vessel traffic survey, supplemented by Anatec's ShipRoutes database. The main commercial routes of the area were identified within this data using the principles set out in MGN 654 (MCA, 2021).

It is noted that there will be no restrictions on entry into the buoyed construction area (other than through active safety zones). However, based on experience at previously under-construction offshore wind farms (OWFs) it is anticipated that the majority of commercial vessels will choose not to navigate internally within the buoyed construction area and therefore some main route deviations will be required. Tidewater indicated as part of the regular operator outreach, as well as during the Hazard Workshop, that their vessels would likely deviate to avoid the Array Area.

In EIAR Vol. 4, Appendix 26: Navigational Risk Assessment, the main commercial routes that would need to deviate to avoid the Array Area were identified and analysis was undertaken to quantify the level of deviation. Of the 20 main routes identified, 11 were anticipated to require a deviation. When considering the percentage change in the route length for each route within the Study Area, all but three involve a deviation of less than 5%. Three route deviations involve a percentage change of between 10% and 12%, however it is noted that traffic levels on these routes are relatively low, with the busiest route (route 5) having an average of two vessels per week. The findings of this deviation assessment broadly align with consultation input from vessel operators including at the Hazard Workshop, in that while deviations will occur, they are considered manageable when transit frequency and vessel type (predominantly oil and gas vessels) is accounted for.

Based on experience at previously under construction OWFs, it is anticipated that fishing vessels and recreational vessels will choose not to routinely navigate internally within the buoyed construction area. This was confirmed during the Hazard Workshop, where it was commented that fishing vessels would be likely to travel around the Array Area, and also to avoid active fishing within the Array Area to protect their fishing gear. It is noted that displacement of active commercial fishing is assessed separately in EIAR Vol. 3, Chapter 14: Commercial Fisheries. In terms of recreational vessels, the vessel traffic data indicated that volumes were very low, which is as expected given the distance offshore.

Potential adverse weather routeing through the area by Sea Cargo operated vessels was identified, however Sea Cargo did not raise any concerns when they were contacted during the regular operator outreach, stating "will not give [Sea Cargo] any major deviations in [Sea Cargo's] sailing route".

It is considered unlikely that vessel activities associated with cable installation and cable protection installation will lead to any notable displacement or disruption, noting any impact would be localised to the spatial area immediately around the vessel and would be temporary in nature. Impacts on port access are assessed separately in Section 15.6.1.8.

The main consequence of vessel displacement will be increased journey times and distances for affected third-party vessels, over a large spatial extent, particularly as it is assumed that the buoyed construction area will be deployed around the maximum extent of the Array Area. It is noted that the majority of traffic in the area is composed of oil and gas vessels which are less sensitive than other commercial vessel types to increased journey times/distances; passenger vessels in particular accounted for less than 1% of the vessels recorded in the twelve months of AIS data.

Vessels are expected to comply with international and flag state regulations (including COLREGs (IMO, 1972/77) and SOLAS (IMO, 1974)) and will be able to passage plan in advance given the promulgation of information relating to the Project and marking on relevant nautical charts.

15.6.1.1.1 Frequency of occurrence

The frequency of occurrence in relation to displacement of vessel traffic is considered frequent.

15.6.1.1.2 Severity of consequence

The severity of consequence in relation to displacement of vessel traffic is considered negligible in terms of navigational safety.

15.6.1.1.3 Significance of risk

Given that the frequency of occurrence is frequent, and the severity of consequence is negligible, the overall effect of displacement of vessels during the construction phase is considered to be tolerable. No additional mitigation is necessary over the embedded mitigation outlined in Section 15.5.4, and therefore the risk is considered ALARP.

Frequency of occurrence	Severity of consequence	Significance
Frequent	Negligible	Tolerable and ALARP

Impact significance - NOT SIGNIFICANT

15.6.1.2 Collision risk (third-party to third-party)

This Section assesses the impact of third-party vessels being at an increased risk of collision with other third-party vessels as a result of the construction of the Project causing their routes to be displaced (see Section 15.6.1.1). This Section assumes the worst-case scenario parameters detailed in Section 15.5.5.

As mentioned in Section 15.6.1.1, eleven of the main commercial routes in the area are anticipated to be displaced. Under the worst-case assumptions of the deviations (as detailed in EIAR Vol. 4, Appendix 26: Navigational Risk Assessment), multiple routes are estimated to pass within 1 NM of the Array Area which will increase vessel density thereby increasing the rate of encounters and the risk of a collision. This increased risk of collision has been quantified using Anatec's COLLRISK modelling suite.

Based on the pre OWF modelling, the baseline collision risk levels in the Study Area are estimated to be 3.06×10^{-5}, corresponding to a return period of one every 32,712 years. This is low compared to return periods for most other OWF developments and is reflective of very low traffic volumes in the area, compared to areas nearer shore. The post OWF modelling, assuming base case vessel traffic levels, estimates an annual collision frequency of 6.16×10^{-5}, corresponding to a return period of approximately one in 16,231 years. This represents a 102% increase in collision frequency compared to the pre wind farm base case result. Although this is a large relative increase, it is a small increase in absolute terms and the post wind farm result is still considered low compared to other OWF developments. The greatest increase in collision risk was south of the Array Area, where multiple routes are assumed to deviate.

The promulgation of information relating to construction activities, deployment buoys to mark the construction area, and charting of infrastructure will allow vessel Masters to passage plan in advance, minimising any collision risk. Appropriate lighting and marking during construction including the buoyed construction area will be agreed with the NLB. These navigational aids will further maximise mariner awareness when in proximity to the construction area. Additionally, information for fishing vessels will be promulgated through ongoing liaison with fishing fleets via an appointed Fisheries Liaison Officer (FLO). Vessels are expected to comply with international and flag state regulations (including COLREGs (IMO, 1972/77) and SOLAS (IMO, 1974)) and will be able to passage plan in advance given the promulgation of information relating to the Project and marking on relevant nautical charts.

The minimum spacing between WTGs (928 m) is sufficient to ensure the view of other vessels will not be blocked or hindered, again reducing the likelihood of a close quarters encounter occurring in proximity to the Project.

In the event that an encounter does occur, it is likely to be localised and occur for only a short duration, with collision avoidance action implemented by the vessels involved, in line with the COLREGs, thus ensuring that the situation does not develop into a collision incident. This is supported by experience at previous under construction OWFs, where no collision incidents involving two third-party vessels have been reported. It should also be noted that the majority of the vessels navigating locally are oil and gas vessels with good familiarity with the area.

Historical collision incident data (see EIAR Vol. 4, Appendix 26: Navigational Risk Assessment) also indicates that the most likely consequences will be low should a collision occur, with minor contact between the vessels resulting in minor damage and no injuries to persons, with both vessels able to resume their respective passages and undertake a full inspection at the next port. As an unlikely worst-case, one or more of the vessels could be foundered resulting in a Potential Loss of Life (PLL) and pollution. If pollution were to occur in proximity to the Project, then the MPCP will be implemented to minimise the environmental risks.

15.6.1.2.1 Frequency of occurrence

The frequency of occurrence is considered extremely unlikely.

15.6.1.2.2 Severity of consequence

The severity of consequence is considered serious.

15.6.1.2.3 Significance of risk

Given that the frequency of occurrence is extremely unlikely, and the severity of consequence is serious, the overall effect of collision risk between third-party vessels during the construction phase is considered to be tolerable. No additional mitigation is necessary over the embedded mitigation outlined in Section 15.5.4, and therefore the risk is considered ALARP.

Frequency of occurrence	Severity of consequence	Significance
Extremely unlikely	Serious	Tolerable and ALARP

Impact significance - NOT SIGNIFICANT

15.6.1.3 Collision risk (project to third-party)

This Section assesses the impact of third-party vessels being at an increased risk of collision with project vessels as a result of the construction of the Project leading to the presence of project construction vessels. This Section assumes the worst-case scenario parameters detailed in Section 15.5.5.

Up to 1,487 return trips by construction vessels may be made throughout the construction stage, noting this will include vessels that are Restricted in the Ability to Manoeuvre (RAM). It is assumed that construction vessels will be on-site throughout the duration of the construction stage. It is noted that vessel movements will include Floating Turbine Unit (FTU) towing operations to site.

Tidewater stated during the regular operator outreach that the avoidance of project vessels involved in construction would "not cause any problems", also expressing that these vessels would be viewed similarly to other vessels that are RAM.

Encounter and collision risk involving project vessels will be managed by marine coordination including the application of traffic management procedures such as the designation of entry and exit points to and from the Array Area and routes to and from construction ports. These measures will be set out in the Vessel Management Plan. Additionally, project vessels will carry AIS and be compliant with Flag State regulations including IMO conventions such as the COLREGs, and information for fishing vessels will also be promulgated through ongoing liaison with fishing fleets via an appointed FLO. Where identified as necessary via dynamic risk assessment, guard vessels will also be used.

All vessels involved in towing operations of FTUs to site from port will be lit and marked as required under COLREGS, with any encounters likely managed via COLREGs implementation with the vessels involved.

An application for safety zones of 500 m will be sought during the construction phase around structures where construction activity is ongoing (i.e., where a construction vessel is present). These will serve to protect against close encounters between project vessels engaged in construction activities and third-party vessels. Minimum advisory passing distances, as defined by risk assessment, may also be applied where safety zones do not apply (e.g., around cable installation vessels), with advanced warning and details of both safety zones and any minimum advisory safe passing distances provided by Notifications to Mariners and Kingfisher Bulletins.

Appropriate marine lighting and marking during construction including the buoyed construction area will be agreed with the NLB. These navigational aids will further maximise mariner awareness when in proximity to ongoing construction works in the Array Area.

Third-party vessels may experience limitations on their ability to visually identify project vessels entering and exiting the Array Area during reduced visibility; however, this hazard will be mitigated by the application of the COLREGs (reduced speeds) in adverse weather conditions and project vessels will mandatorily carry AIS regardless of size.

Based on historical incident data, there has been one instance of a third-party vessel colliding with a project vessel in the UK (see EIAR Vol. 4, Appendix 26: Navigational Risk Assessment for further details). Moderate vessel damage was reported with no harm to persons. It is noted that the incident occurred in 2011, and awareness of offshore wind developments and application of the measures outlined above has improved and been refined considerably in the interim, with no further collision incidents reported since. It is also noted that this incident occurred within a harbour and therefore did not involve the project vessel routeing to/from the OWF or engaged in activities associated with the OWF.

If a close quarters encounter occurs between a third-party vessel and a project vessel, the encounter is likely to be localised and occur for only a short duration. With collision avoidance action implemented in line with the COLREGs, the vessels involved will likely be able to resume their respective passages and/or activities with no long-term consequences.

Should a collision occur, the most likely consequences will be similar to that outlined for the case of a collision between two third-party vessels (see Section 15.6.1.2), namely minor contact between the vessels resulting in minor damage and no injuries to persons with both vessels able safely to make their next port to undertake a full inspection. As an unlikely worst-case, one or more of the vessels could be foundered resulting in a PLL and pollution. If pollution were to occur in proximity to the Project, then the MPCP will be implemented to minimise the environmental risks.

15.6.1.3.1 Frequency of occurrence

The frequency of occurrence is considered to be extremely unlikely.

15.6.1.3.2 Severity of consequence

The severity of consequence is considered to be serious.

15.6.1.3.3 Significance of risk

Given that the frequency of occurrence is extremely unlikely and the severity of consequence is serious, the overall effect of collision risk between third-party vessels and project vessels during the construction phase is considered to be tolerable. No additional mitigation is necessary over the embedded mitigation outlined in Section 15.5.4, and therefore the risk is considered ALARP.

Frequency of occurrence	Severity of consequence	Significance
Extremely unlikely	Serious	Tolerable and ALARP

Impact significance - NOT SIGNIFICANT

15.6.1.4 Allision risk

This Section assesses the impact of allision risk as a result of the project infrastructure (including partially completed) present during the construction of the Project. This Section assumes the worst-case scenario parameters detailed in

Section 15.5.5. Allision is broken down into three types for this Section; powered, drifting and internal. Powered allision refers to an allision involving a vessel under power, drifting allision refers to an allision involving a vessel that is adrift, and internal allision refers to an allision internal to the buoyed construction area. Each allision element is considered in turn in terms of frequency of occurrence and severity of consequence, with the resulting significance of the residual risk across the multiple elements summarised at the end of the assessment.

15.6.1.4.1 Powered allision

Based on quantitative assessment undertaken in the NRA (see **EIAR Vol. 4, Appendix 26: Navigational Risk Assessment**), the base case annual powered vessel to structure allision frequency was estimated to be 2.30×10^{-4}, corresponding to a return period of approximately one in 4,356 years. This risk is below average compared to other modelled OWFs, largely due to relatively low traffic volumes. Note that this includes an estimation of allision risk for every structure within the Array Area, which is conservative given that not all structures will be in place for the initial portion of the construction phase.

Based on historical incident data, there have been two reported instances of a third-party vessel alliding with an OWF structure in the UK (in the Irish Sea and Southern North Sea). Both of these incidents involved fishing vessels, and in both cases the OWF was operational.

Operational lighting and marking will not yet be in place, however temporary marine lighting and marking will be implemented including the buoyed construction area in agreement with the NLB. Promulgation of information and display on charts will ensure vessels can passage plan to minimise risk. Pre-commissioning safety zones of 50 m in radius will also be applied for around structures.

Should an allision occur, the consequences will depend on multiple factors, including the energy of the impact, structural integrity of the vessel and sea state at the time of the impact. Fishing vessels and recreational vessels are considered most vulnerable to the impact given the potential for a non-steel construction (albeit most fishing vessels this far offshore would likely be of steel construction) and possible internal navigation within the Array Area by such vessels (noting that recreational vessel volumes in the vicinity of the Array Area are lower than in nearshore areas and fishing vessels may choose to avoid the Array Area). In such cases, the most likely consequences will be minor damage with the vessel able to resume passage and undertake a full inspection at the next port. As an unlikely worst-case, the vessel could be foundered resulting in a PLL and pollution. If pollution were to occur, then the MPCP will be implemented to minimise the environmental risk.

15.6.1.4.1.1 Frequency of occurrence

The frequency of occurrence in relation to powered allision risk is considered to be **extremely unlikely**.

15.6.1.4.1.2 Severity of consequence

The severity of consequence in relation to powered allision risk is considered to be **serious.**

15.6.1.4.1.3 Significance of risk

Given that the frequency of occurrence is extremely unlikely, and the severity of consequence is serious, the overall effect of powered allision risk during the construction phase is considered to be **tolerable**. No additional mitigation is necessary over the embedded mitigation outlined in Section 15.5.4, and therefore the risk is considered ALARP.

Frequency of occurrence	Severity of consequence	Significance
Extremely unlikely	Serious	Tolerable and ALARP

15.6.1.4.2 Drifting allision

Based on quantitative assessment undertaken in the NRA (see **EIAR Vol. 4, Appendix 26: Navigational Risk Assessment**), the base case annual drifting vessel to structure allision frequency was estimated to be 1.96×10^{-5}, corresponding to a return period of approximately one in 50,893 years. This is comparatively low when compared against the estimated drifting allision frequencies of other UK OWF developments. Note that this includes an estimation of allision risk for every structure within the Array Area, which is conservative given that not all structures will be in place for the initial portion of the construction phase.

As of December 2024, there have been 19 reported cases of an allision between a vessel and a wind turbine (under construction, operational or disused) in the UK, with all but two involving a support vessel for the development. Furthermore, it was seen in a review of historical incident data that incidents in the region of the Array Area are rare, noting that none of the incidents during the period assessed involved a drifting scenario (see Section 15.4.4.3).

A vessel adrift may only develop into an allision situation if in proximity to a OWF structure; this is only the case where the adrift vessel is located within or is in close proximity to the Array Area, and the direction of the wind and/or tide directs the vessel towards a structure. In circumstances where a vessel drifts towards a structure in the Array Area, there are actions which the vessel may take to prevent the drift incident developing into an allision situation. Powered vessels may be able to regain power prior to reaching the Array Area (i.e., by rectifying any fault). Failing this, the vessel's emergency response procedures would be implemented. This may include the use of thrusters (depending on availability and power supply) or attempting to drop anchor (noting water depths mean the latter is less likely to be attempted).

Where the deployment of the anchor is not possible (e.g., for small craft), any project vessels on-site may be able to render assistance in liaison with the MCA and in line with SOLAS obligations (IMO, 1974). This response will be managed via His Majesty's Coastguard's (HMCG's) Maritime Rescue Coordination Centres (MRCCs) and depends on the type and capability of vessels on site. It is noted that if a vessel loses power in close proximity to a structure, then there may be limited time to render assistance. It was noted during the Hazard Workshop that, due to the large amount of oil and gas infrastructure in the area, surface assets nearby may also be able to assist in the case of an incident.

Should an allision occur, the consequences will be similar to those noted for the case of a powered allision including the unlikely worst-case of foundering and pollution; in the highly unlikely scenario of a drifting allision incident resulting in pollution, the implementation of the MPCP will minimise the environmental risk. Additionally, a drifting vessel is likely to transit at a reduced speed compared to a powered vessel, thus reducing the energy of the impact.

15.6.1.4.2.1 Frequency of occurrence

The frequency of occurrence in relation to drifting allision risk is considered to be **extremely unlikely**.

15.6.1.4.2.2 Severity of consequence

The severity of consequence in relation to drifting allision risk are considered to be **serious**.

15.6.1.4.2.3 Significance of risk

Given that the frequency of occurrence is extremely unlikely, and the severity of consequence is serious, the overall effect of drifting allision risk during the construction phase is considered to be tolerable. No additional mitigation is necessary over the embedded mitigation outlined in Section 15.5.4, and therefore the risk is considered ALARP

Frequency of occurrence	Severity of consequence	Significance
Extremely unlikely	Serious	Tolerable and ALARP

15.6.1.4.3 Internal allision

As noted previously, based on experience at existing operational OWFs, it is anticipated that commercial vessels will be unlikely to navigate internally within the Array Area (see Section 15.6.1.1). However, fishing and recreational vessels may choose to transit through.

The base case annual fishing vessel to structure allision frequency is estimated to be 6.75×10^{-2}, corresponding to a return period of approximately one in 15 years. This return period is reflective of the highly conservative assumptions made within the modelling process; in particular, that baseline activity in terms of proximity to WTGs will not change whereas in reality it is expected that fishing vessels will account for the presence of the WTGs. Further, as per the NRA, the worst consequences reported for vessels involved in an allision incident involving a UK OWF development has been flooding, with no life-threatening injuries to persons reported (the model is calibrated against known reported incidents). The result aligns with that of other publicly available NRAs; for example, the NRAs for Moray West OWF (Anatec, 2018) and Green Volt OWF (Anatec, 2022), both now consented, each estimated a fishing vessel allision return period of one in seven years. It should also be noted that the return period is especially conservative for the construction phase given that it includes an estimation of allision risk for every structure within the Array Area and that not all structures will be in place for the initial portion of the construction phase.

It was commented during the Hazard Workshop that transiting fishing vessels would be more likely to travel around the Array Area as opposed to transiting internally, and that fishing vessels would also avoid active fishing within the Array Area in order to protect their fishing gear.

The minimum spacing between structures of 928 m is considered sufficient for safe internal navigation i.e. for vessels to keep clear of the OWF structures within the buoyed construction area. It is noted that this spacing is greater than that associated with many other operational OWFs in the UK. Further, the final layout will be agreed with the MCA and NLB to ensure it is safe from a surface navigation perspective.

As with any passage, vessels navigating within the Array Area will be expected to implement a passage plan in accordance with SOLAS Chapter V (IMO, 1974) and promulgation of information including through ongoing liaison with fishing fleets via an appointed FLO to ensure that such vessels have good awareness of the Project. Pre-commissioning safety zones of 50 m in radius will also be applied for around structures. Operational lighting and marking will not yet be in place, however temporary marine lighting and marking will be implemented in agreement with the NLB.

Should a recreational vessel under sail enter the proximity of a WTG, there is also potential for effects such as wind shear, masking and turbulence to occur. From previous studies of offshore wind developments, it has been concluded

that WTGs do reduce wind velocity downwind of a WTG (MCA, 2022). However, no negative effects on recreational craft have been reported on the basis of the limited spatial extent of the effect and its similarity to that experienced when passing a large vessel or close to other large structures (such as bridges) or the coastline. In addition, no practical issues have been raised by recreational users to date when operating in proximity to existing offshore wind developments. For recreational vessels with a mast there is an additional allision risk associated with the WTG blades. However, the minimum blade tip clearance is 22 m which is aligned with the minimum clearance the RYA recommend for minimising allision risk (RYA, 2019) and which is also noted in MGN 654.

Should an allision occur, the consequences will depend on multiple factors, including the energy of the impact, structural integrity of the vessel and sea state at the time of the impact. Fishing vessels and recreational vessels, which may be more likely to transit through the Array Area than other vessel types, are also considered more vulnerable to allision given the potential for a non-steel construction (albeit most fishing vessels this far offshore would likely be of steel construction). However, it is noted that fishing vessels engaged in active fishing would likely be travelling at relatively low average speeds. The most likely consequences will be minor damage with the vessel able to resume passage and undertake a full inspection at the next port. As an unlikely worst-case, the vessel could be foundered resulting in a PLL and pollution. If pollution were to occur, then the MPCP will be implemented to minimise the environmental risk.

15.6.1.4.3.1 Frequency of occurrence

The frequency of occurrence in relation to internal allision risk is considered to be remote.

15.6.1.4.3.2 Severity of consequence

The severity of consequence in relation to internal allision risk is considered to be serious.

15.6.1.4.3.3 Significance of risk

Given that the frequency of occurrence is remote and the severity of consequence is serious, the overall effect of internal allision risk during the construction phase is considered to be tolerable. No additional mitigation is necessary over the embedded mitigation outlined in Section 15.5.4, and therefore the risk is considered ALARP.

Frequency of occurrence	Severity of consequence	Significance
Remote	Serious	Tolerable and ALARP

15.6.1.4.4 Significance of risk

The rankings of frequency of occurrence, severity of consequence and significance of risk for each type of allision incident area summarised below.

Component	Frequency of Occurrence	Severity of Consequence	Significance of Risk
Powered allision risk	Extremely unlikely	Serious	Tolerable and ALARP
Drifting allision risk	Extremely unlikely	Serious	Tolerable and ALARP
Internal allision risk	Remote	Serious	Tolerable and ALARP
Impact significance - NOT SIGNIFICANT			

Overall, the significance of risk associated with the allision risk impact is of tolerable significance. No additional mitigation is necessary over the embedded mitigation outlined in Section 15.5.4, and therefore the risk is considered ALARP.

15.6.1.5 Floating structure loses station

This Section assesses the impact of an FTU breaking free as a result of mooring line failure. This Section assumes the worst-case scenario parameters detailed in Section 15.5.5.

The MCA, under their Regulatory Expectations on Moorings for Floating Wind and Marine Devices (MCA & HSE, 2017), require that developers arrange Third Party Verification (TPV) of the mooring systems by an independent and competent person / body. The Regulatory Expectations state that TPV is a "continuous activity", and that if any modifications to a system occur or if new information becomes available with regard to its reliability, additional TPV would be required. 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 each WTG continuously monitored, and with capability of being tracked in the event of a loss of station as detailed in MGN 654.

It is also noted that each WTG is anticipated to have up to six mooring lines and that all moorings would be required to fail for a total loss of station. There have been no reports to date of loss of stations from floating UK OWFs. A loss of station is therefore considered unlikely when considering the implementation of TPV, noting the inspection and maintenance program will also ensure the mooring lines are kept in good condition, reducing the risk of them parting.

There is also a risk of loss of tow during towing operations. However, the following mitigating measures will be in place to minimise risk of loss of tow of the substructure:

- The offshore fleet supporting hook-up and station keeping will have the similar capabilities as the towing vessels and can respond to support the tow;
- The tow will be equipped with an emergency towing line which can be retrieved by the responding vessel;
- Prior to the commencement of the tow – a suitable weather window is required to safely perform the tow; and
- The survival limits of the towed structure allow for the tow to weather harsh offshore conditions.

The most likely consequences for loss of station of a FTU is failure of a single mooring line leading to a larger excursion zone than typical. As a worst-case, total mooring line failure could lead to a drifting structure leading to a collision. In this unlikely scenario, it is noted that vessels in the area may be able to intervene. Similarly, worst-case

consequences of a loss of tow are a collision between a third party vessel and the FTU, however frequency of such a scenario is considered low based on the mitigations outlined above.

15.6.1.5.1 Frequency of occurrence

The frequency of occurrence is considered to be extremely unlikely.

15.6.1.5.2 Severity of consequence

The severity of consequence is considered to be serious.

15.6.1.5.3 Significance of risk

Given that the frequency of occurrence is extremely unlikely and the severity of consequence is serious, the overall effect of loss of station during the construction phase is considered to be tolerable. No additional mitigation is necessary over the embedded mitigation outlined in Section 15.5.4, and therefore the risk is considered ALARP.

Frequency of Occurrence	Severity of Consequence	Significance of Risk
Extremely Unlikely	Serious	Tolerable and ALARP

Impact significance – NOT SIGNIFICANT

15.6.1.6 Under keel clearance reduction

This Section assesses the impact of vessels being at a risk of interacting with subsea infrastructure associated with the Project due to reduced under keel clearance. This Section assumes the worst-case scenario parameters detailed in Section 15.5.5.

The components of Project infrastructure that could lead to interaction with vessels due to reduced under keel clearance are the subsea cables and associated external protection measures (rock berms), mooring lines and dynamic Inter Array Cables (IACs).

The presence of protection over subsea cables may reduce charted water depths leading to increased risk of grounding for passing vessels. Depth of Lowering (DoL) will be determined via the CBRA process which will be undertaken post consent (indicatively, a minimum burial depth of 0.4 m is assumed). Where cable trenching is not possible, alternative cable protection methods may be deployed which will be determined via the CaP including rock berms and concrete mattresses.

The requirements of MGN 654 in relation to cable protection will apply, namely cable protection will not reduce the charted water depth by more than 5% unless agreed with the MCA. This 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). This will ensure any impact from reductions in water depth on under keel clearance are managed, noting that based on the worst-case assumption of protection height of 1 m, changes of more than 5% are only likely in the area near landfall (the charted 30 m water depth contour within the EICC is located less than 1 NM from shore, with depths of around 35 m approximately 3 NM from shore).

Given that charted water depths within the Array Area range from 92 m to 101 m, the reduction in under keel clearance resulting from subsea cables within the Array Area is considered negligible, noting the same 5% assumption will apply in terms of agreement being required with the MCA.

EIAR Vol. 4, Appendix 26: Navigational Risk Assessment provides detailed analysis on average and maximum vessel draughts compared to the subsea infrastructure under worst-case assumptions, which indicated that a vessel of average draught would not interact with the mooring line of an FTU regardless of distance from the substructure, and that the maximum draught recorded would require the vessel to pass within 35 m of the FTUs, which is considered unlikely. It was also indicated that a vessel with the maximum draught recorded would not interact with the buoyant section of the IACs, regardless of position. The IACs will be closer to the sea surface at the connection point, however as above vessels would be expected to maintain suitable distances from the FTUs, and in particular the largest vessels (with the largest draughts) are very unlikely to be navigating in the Array Area. Final design of the mooring lines will be confirmed via the DSLP which will be approved by MD-LOT in consultation with the MCA and NLB (i.e. the DSLP will confirm that the final design of the mooring lines will maintain suitable underkeel clearances).

Should an underwater allision occur, minor damage incurred is the most likely consequence, and foundering of the vessel resulting in a PLL and pollution the unlikely worst-case consequences, with the environmental risks of the latter minimised by the implementation of the MPCP where appropriate.

15.6.1.6.1 Frequency of occurrence

The frequency of occurrence for changes in under keel clearance is considered to be extremely unlikely.

15.6.1.6.2 Severity of consequence

The severity of consequence for changes in under keel clearance is considered to be serious.

15.6.1.6.3 Significance of risk

Given that the frequency of occurrence is extremely unlikely and the severity of consequence is serious, the overall effect of risk of under keel clearance interaction during the construction phase is considered to be tolerable. No additional mitigation is necessary over the embedded mitigation outlined in Section 15.5.4, and therefore the risk is considered ALARP.

Frequency of Occurrence	Severity of Consequence	Significance of Risk
Extremely Unlikely	Serious	Tolerable and ALARP
Impact significance – NOT SIGNIFICANT		

15.6.1.7 Potential impacts to emergency response capability

This Section assesses the impact of reduced emergency response capability. This can result from the presence of structures and increased vessel activity leading to reduced access to incidents, and/or an increased number of incidents associated with the Project leading to greater strain on emergency resources. This Section assumes the worst-case scenario parameters detailed in Section 15.5.5.

Given the distance of the Array Area offshore (approximately 109 NM from Aberdeen), RNLI assets are unlikely to respond to incidents in its vicinity (as confirmed in a review of the data). However, incidents in the region are rare, with only three incidents in the Study Area documented by the MAIB within the 10-year period between 2013 and 2022 (noting that the same number of incidents was documented within the previous 10 years). A larger number of helicopter taskings were documented by the DfT within the Study Area, averaging two a year, however none were documented within the Array Area itself and any searches within the Array Area for any future incidents that do occur within the Array Area will be facilitated by a layout design as agreed with the MCA.

It should be noted, as commented during the Hazard Workshop, that the nearby oil and gas infrastructure of the area could have assets to assist should an incident occur. With this noted and given the low rate of incidents in vicinity of the Array Area, the effect of the Array Area on emergency response capability is considered low.

Up to 1,487 return trips by construction vessels may be made throughout the construction phase. It is assumed that construction vessels will be on-site throughout the majority of the construction phase, where weather conditions allow. The presence of such vessels will increase the likelihood of an incident and subsequently increase the likelihood of multiple incidents occurring simultaneously, diminishing emergency response capability. As an unlikely worst-case, the consequences of such a situation could include a failure of emergency response to an incident resulting in a PLL and pollution.

However, with Project vessels to be managed through marine coordination and compliance with Flag State regulations, the likelihood of an incident is minimised. Additionally, should an incident occur, Project vessels would likely be well equipped to assist, either through self-help capability or through SOLAS obligations (IMO, 1974), noting this would be undertaken in liaison with the MCA. The MPCP will also be implemented to minimise the environmental risks of any incident involving pollution.

The layout will be agreed with the MCA and in line with MGN 654 requirements to ensure any SAR operations are facilitated. Additionally, an ERCoP will be submitted to the MCA in line with the requirements of MGN 654 (MCA, 2021), and a SAR checklist will be completed and agreed with the MCA.

15.6.1.7.1 Frequency of occurrence

The frequency of occurrence is considered extremely unlikely.

15.6.1.7.2 Severity of consequence

The severity of consequence is considered serious.

15.6.1.7.3 Significance of risk

Given that the frequency of occurrence is extremely unlikely, and the severity of consequence is serious, the overall effect of risk of reduction in emergency response capability during the construction phase is considered to be tolerable. No additional mitigation is necessary over the embedded mitigation outlined in Section 15.5.4, and therefore the risk is considered ALARP.

Frequency of Occurrence	Severity of Consequence	Significance of Risk
Extremely unlikely	Serious	Tolerable and ALARP

Impact significance – NOT SIGNIFICANT

15.6.1.8 Reduced access to local ports and harbours

This Section assesses the impact of reduced access to local ports and harbours. This can result from the presence of structures and increased vessel activity. This Section assumes the worst-case scenario parameters detailed in Section 15.5.5.

The closest port or harbour to the Project is Peterhead Port, located approximately 102 NM (188.9 km) to the west of the Array Area. Given the distance from the Array Area to Peterhead Port Authority (and any other ports or harbours), it is not anticipated that there will be any substantial effect on vessel approaches to and from the local ports beyond the deviations already outlined for impacts on vessel displacement (see Section 15.6.1.1).

Peterhead Port is 2 NM (3.7 km) from the EICC. Its statutory harbour limits intersect the EICC, and its pilot boarding station is also located within the EICC (as is the recommended approach from the pilot boarding station). There may be some minor and temporary impact on pilot boarding operations, however Peterhead Port Authority were consulted, and stated "no concerns", assuming forward planning and communication (see Section 15.3). The Applicant will therefore ensure that appropriate communication and liaison procedures are in place with Peterhead Port Authority.

Up to 1,487 return trips by construction vessels (excluding site preparation activities) may be made throughout the construction phase and will include vessels which are RAM. Project vessels will be managed by marine coordination, including the use of traffic management procedures such as the designation of entry and exit points to and from the buoyed construction area, and designated routes to and from construction ports. Project vessels will also carry AIS and be compliant with Flag State regulations including the COLREGs. These measures will ensure any impact from project vessels accessing or departing ports is managed.

15.6.1.8.1 Frequency of occurrence

The frequency of occurrence is considered reasonably probable.

15.6.1.8.2 Severity of consequence

The severity of consequence is considered minor in terms of navigational safety.

15.6.1.8.3 Significance of risk

Given that the frequency of occurrence is reasonably probable, and the severity of consequence is minor, the overall effect of risk of reduction in access to local ports and harbours during the construction phase is considered to be tolerable. Assuming the introduction of additional mitigation in the form of communication and liaison procedures in place with Peterhead Port Authority the risk is considered ALARP.

Frequency of Occurrence	Severity of Consequence	Significance of Risk
Reasonably probable	Minor	Tolerable and ALARP (with mitigation)

Impact significance – NOT SIGNIFICANT

15.6.2 Potential effects during operation and maintenance

15.6.2.1 Displacement of vessels

This Section assesses the impact of third-party vessels being displaced from their routes as a result of the presence of the Project. The focus of this Section is on transiting vessels, with the displacement of active fishing assessed in EIAR Vol. 3, Chapter 14: Commercial Fisheries and the displacement of other types of activities by sea users assessed in EIAR Vol. 3, Chapter 17: Infrastructure and Other Users. This Section assumes the worst-case scenario parameters detailed in Section 15.5.5.

Based on experience at existing operational OWFs, it is anticipated that commercial vessels will choose not to navigate internally within the Array Area and therefore the main route deviations established for the equivalent construction phase impact are again considered. As per Section 15.6.1.1, 11 of 20 routes were anticipated to require a deviation. When considering the percentage change in the route length for each route within the Study Area, all but three involve a deviation of less than 5%. Three route deviations involve a percentage change of between 10% and 12%, however it is noted that traffic levels on these routes are relatively low, with the busiest route (route 5) having an average of two vessels per week. The findings of this deviation assessment broadly align with consultation input from vessel operators including at the Hazard Workshop, in that while deviations will occur, they are considered manageable when transit frequency and vessel type (predominantly oil and gas vessels) is accounted for. It is noted that these deviations would likely be well established by the time of the operational phase, with mariners familiar with deviating around the Project during the construction phase.

Minimum spacing in the Array Area of 928 m is considered sufficient to accommodate transits of any smaller vessels that chose to transit through, noting there will be no restrictions on entry into the Array Area for any vessel other than through any active 500 m major maintenance safety zones. However, it was noted during the Hazard Workshop that fishing vessels would be likely to travel around the Array Area, and also to avoid active fishing within the Array Area to protect their fishing gear. Displacement of active commercial fishing is assessed separately in EIAR Vol. 3, Chapter 14: Commercial Fisheries.

Any cable maintenance within the EICC will be unlikely to lead to any notable displacement or disruption, noting any impact would be infrequent, localised to the spatial area immediately around the vessel, and be temporary in nature. See Section 15.6.1.8 for assessment of reduced port access.

With the main route deviations matching those established for the equivalent construction stage impact (see Section 15.6.1.1), the main consequences of vessel displacement during the operational stage are also considered to be equivalent, in particular potential for increased journey times and distances.

As for the construction stage, promulgation of information relating to the Project and relevant nautical charts will allow vessels to passage plan in advance and vessels are expected to comply with international and flag state regulations (including COLREGs (IMO, 1972/77) and SOLAS (IMO, 1974)).

15.6.2.1.1 Frequency of occurrence

The frequency of occurrence in relation to displacement of vessel traffic is considered **reasonably probable**.

15.6.2.1.2 Severity of consequence

The severity of consequence in relation to displacement of vessel traffic is considered **negligible** in terms of navigational safety.

15.6.2.1.3 Significance of risk

Given that the frequency of occurrence is reasonably probable, and the severity of consequence is negligible, the overall effect of displacement of vessels during the operation and maintenance phase is considered to be **broadly acceptable**.

Frequency of occurrence	Severity of consequence	Significance
Reasonably probable	Negligible	Broadly acceptable

Impact significance - **NOT SIGNIFICANT**

15.6.2.2 Collision risk (third-party to third-party)

This Section assesses the impact of third-party vessels being at an increased risk of collision with other third-party vessels as a result of the presence of the Project causing their routes to be displaced (see Section 15.6.2.1). This Section assumes the worst-case scenario parameters detailed in Section 15.5.5.

Given the main route deviations are anticipated to remain as per those established for the equivalent construction phase impact (Section 15.6.1.2), the likelihood of an encounter occurring is also likely to be similar. As discussed in Section 15.6.1.2, the annual collision frequency for the post OWF scenario (one in 16,231 years) is relatively low and aligns well with the incident datasets assessed (see Section 15.4.4.3).

In the event that a close quarters encounter or collision does occur, the respective consequences are expected to be the same as for the equivalent construction phase impact, 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. If pollution were to occur in proximity to the Project, then the MPCP will be implemented where appropriate to minimise the environmental risks.

As with the equivalent construction phase impact, 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 stage, mariner awareness will be further maximised by promulgation of information to fishing vessels via an FLO and deployment of lighting and marking. Vessels will also be expected to comply with international and flag state regulations (including COLREGs (IMO, 1972/77) and SOLAS (IMO, 1974)).

15.6.2.2.1 Frequency of occurrence

The frequency of occurrence is considered extremely unlikely.

15.6.2.2.2 Severity of consequence

The severity of consequence is considered serious.

15.6.2.2.3 Significance of risk

Given that the frequency of occurrence is extremely unlikely, and the severity of consequence is serious, the overall effect of collision risk between third-party vessels during the operation and maintenance phase is considered to be tolerable. No additional mitigation is necessary over the embedded mitigation outlined in Section 15.5.4, and therefore the risk is considered ALARP.

Frequency of occurrence	Severity of consequence	Significance
Extremely unlikely	Serious	Tolerable and ALARP

Impact significance - NOT SIGNIFICANT

15.6.2.3 Collision risk (project to third-party)

This Section assesses the impact of third-party vessels being at an increased risk of collision with project vessels as a result of the presence of the Project leading to the presence of project vessels. This Section assumes the worst-case scenario parameters detailed in Section 15.5.5.

Up to 383 return trips per year by operation and maintenance vessels may be made throughout the operation and maintenance phase, including RAM vessels, noting that this is a lower level of project vessel traffic compared to the construction phase (see Section 15.6.1.3).

As with the equivalent construction phase impact (see Section 15.6.1.3), close quarter 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 for safety zones of 500 m radius will be sought during the operation and maintenance phase around structures where major maintenance is ongoing. These will serve to protect against encounters between project vessels engaged in major maintenance activities and third-party vessels. Minimum advisory passing distances, as defined by risk assessment, may also be implemented where safety zones do not apply (e.g. for maintenance of subsea cables), 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.

All vessels involved in towing operations of FTUs for maintenance will be lit and marked as required under COLREGS, with any encounters likely managed via COLREGs implementation with the vessels involved.

As with the equivalent construction phase impact, third party vessels may experience limitations on visually identifying project vessels entering and exiting the Array Area during reduced visibility; however, this impact will be mitigated by

the application of the COLREGs (reduced speeds) in adverse weather conditions and project vessels mandatorily will carry AIS regardless of size.

As stated for the equivalent construction phase impact, based on historical incident data, there has been one instance of a third-party vessel colliding with a project vessel in the UK (see EIAR Vol. 4, Appendix 26: Navigational Risk Assessment for full details). Moderate vessel damage was reported with no harm to persons. It is noted that the incident occurred in 2011, and awareness of offshore wind developments and application of the measures outlined above has improved and been refined considerably in the interim, with no further collision incidents reported since. It is also noted that this incident occurred within a harbour and therefore did not involve the project vessel routeing to/from the OWF or engaged in activities associated with the OWF.

The structures within the Array Area 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 impact, with the most likely consequences being moderate damage incurred and no injuries to persons based on historical incident data (see EIAR Vol. 4, Appendix 26: Navigational Risk Assessment). 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.

15.6.2.3.1 Frequency of occurrence

The frequency of occurrence is considered to be extremely unlikely.

15.6.2.3.2 Severity of consequence

The severity of consequence is considered to be serious.

15.6.2.3.3 Significance of risk

Given that the frequency of occurrence is extremely unlikely and the severity of consequence is serious, the overall effect of collision risk between third-party vessels and project vessels during the operation and maintenance phase is considered to be tolerable. No additional mitigation is necessary over the embedded mitigation outlined in Section 15.5.4, and therefore the risk is considered ALARP.

Frequency of occurrence	Severity of consequence	Significance
Extremely unlikely	Serious	Tolerable and ALARP

Impact significance - NOT SIGNIFICANT

15.6.2.4 Allision risk

This Section assesses the impact of allision risk as a result of the project infrastructure present during the operation and maintenance phase of the Project. This Section assumes the worst-case scenario parameters detailed in Section 15.5.5. Allision is broken down into three types for this Section; powered, drifting and internal. Powered allision refers

to an allision involving a vessel under power, drifting allision refers to an allision involving a vessel that is adrift, and internal allision refers to an allision internal to the Array Area. Each allision element is considered in turn in terms of frequency of occurrence and severity of consequence, with the resulting significance of the residual risk across the multiple elements summarised at the end of the assessment.

15.6.2.4.1 Powered allision

Based on quantitative assessment undertaken in the NRA (see EIAR Vol. 4, Appendix 26: Navigational Risk Assessment), the base case annual powered vessel to structure allision frequency was estimated to be 2.30×10^{-4}, corresponding to a return period of approximately one in 4,356 years. This risk is below average compared to other modelled OWFs, largely due to relatively low traffic volumes. Based on historical incident data, there have been two reported instances of a third-party vessel alliding with an OWF structure in the UK (in the Irish Sea and Southern North Sea). Both of these incidents involved fishing vessels, and in both cases the OWF was operational.

Vessels are expected to comply with national and international flag state regulations (including the COLREGs and SOLAS) and will be able to passage plan a route that minimises risk given the promulgation of information relating to the Project, including the charting of infrastructure on relevant nautical charts. On approach, the operational marine lighting and marking on the structures (which will be agreed with the MCA and NLB) will also assist in maximising awareness. Further, the final layout will be agreed with the MCA and NLB to ensure it is safe from a surface navigation perspective.

In the event that WTGs displaying marine aids to navigation are towed away for maintenance, procedures will be in place to ensure that the overall wind farm lighting and marking is not impacted. This may include the use of temporary buoyage in the WTG position, or the inclusion of additional marine lighting on all periphery WTGs that can be switched on if needed. Suitable procedures will be agreed with the NLB as part of the LMP process.

Should an allision occur, the consequences will depend on multiple factors including the energy of the impact, structural integrity of the vessel and sea state at the time of the impact. Fishing vessels and recreational vessels are considered most vulnerable to the impact given the potential for a non-steel construction (albeit most fishing vessels this far offshore would likely be of steel construction) and possible internal navigation within the Array Area by such vessels. In such cases, the most likely consequences will be minor damage with the vessel able to resume passage and undertake a full inspection at the next port. As an unlikely worst-case, the vessel could be foundered resulting in a PLL and pollution. If pollution were to occur, then the MPCP will be implemented where appropriate to minimise the environmental risk.

15.6.2.4.1.1 Frequency of occurrence

The frequency of occurrence in relation to powered allision risk is considered to be extremely unlikely.

15.6.2.4.1.2 Severity of consequence

The severity of consequence in relation to powered allision risk is considered to be serious.

15.6.2.4.1.3 Significance of risk

Given that the frequency of occurrence is extremely unlikely and the severity of consequence is serious, the overall effect of powered allision risk during the operation and maintenance phase is considered to be tolerable. No additional mitigation is necessary over the embedded mitigation outlined in Section 15.5.4, and therefore the risk is considered ALARP.

Frequency of occurrence	Severity of consequence	Significance
Extremely unlikely	Serious	Tolerable and ALARP

15.6.2.4.2 Drifting allision

Based on quantitative assessment undertaken in the NRA (see **EIAR Vol. 4, Appendix 26: Navigational Risk Assessment**), the base case annual drifting vessel to structure allision frequency was estimated to be 1.96×10^{-5}, corresponding to a return period of approximately one in 50,893 years. This is comparatively low when compared against the estimated drifting allision frequencies of other UK OWF developments.

As of December 2024, there have been 19 reported cases of an allision between a vessel and a wind turbine (under construction, operational or disused) in the UK, with all but two involving a support vessel for the development. Furthermore, it was seen in a review of historical incident data that incidents in the region of the Array Area are rare (see Section 15.4.4.3), with none of the incidents during the period assessed involving a drifting scenario (see Section 15.4.4.3).

A vessel adrift may only develop into an allision situation if in proximity to a OWF structure; this is only the case where the adrift vessel is located internally within or in close proximity to the Array Area and the direction of the wind and/or tide directs the vessel towards a structure. In circumstances where a vessel drifts towards a structure in the Array Area, there are actions which the vessel may take to prevent the drift incident developing into an allision situation. Powered vessels may be able to regain power prior to reaching the Array Area (i.e., by rectifying any fault). Failing this, the vessel's emergency response procedures would be implemented which may include the use of thrusters (depending on availability and power supply) or use of anchor (noting water depths mean the latter is less likely).

Where the deployment of the anchor is not possible (noting water depths), any project vessels on-site may be able to render assistance in liaison with the MCA and in line with SOLAS obligations (IMO, 1974), noting that it may be less likely to be project vessels on site than during construction. This response will be managed via HMCG's MRCCs and depends on the type and capability of vessels on site. It is noted that if the vessel becomes adrift in close proximity to a structure, then there may be limited time to render assistance. It was noted during the Hazard Workshop that, due to the large amount of oil and gas infrastructure in the area, assets nearby may be able to assist in the case of an incident.

Should an allision occur, the consequences will be similar to those noted for the case of a powered allision including the unlikely worst-case of foundering and pollution; in the highly unlikely scenario of a drifting allision incident resulting in pollution, the implementation of the MPCP (where appropriate) will minimise the environmental risk. Additionally, a drifting vessel is likely to transit at a reduced speed compared to a powered vessel, thus reducing the energy of the impact.

15.6.2.4.2.1 Frequency of occurrence

The frequency of occurrence in relation to drifting allision risk is considered to be **extremely unlikely**.

15.6.2.4.2.2 Severity of consequence

The severity of consequence in relation to drifting allision risk are considered to be **serious**.

15.6.2.4.2.3 Significance of risk

Given that the frequency of occurrence is extremely unlikely, and the severity of consequence is serious, the overall effect of drifting allision risk during the operation and maintenance phase is considered to be **tolerable**. No additional mitigation is necessary over the embedded mitigation outlined in Section 15.5.4, and therefore the risk is considered ALARP.

Frequency of occurrence	Severity of consequence	Significance
Extremely unlikely	Serious	Tolerable and ALARP

15.6.2.4.3 Internal allision

As noted previously, based on experience at existing operational OWFs, it is anticipated that commercial vessels will be unlikely to navigate internally within the Array Area (see Section 15.6.2.1). Fishing and recreational vessels may be more likely to transit through, noting volumes of both will likely be less than areas nearshore.

The base case annual fishing vessel to structure allision frequency is estimated to be 6.75×10^{-2}, corresponding to a return period of approximately one in 15 years. This return period is reflective of the highly conservative assumptions made within the modelling process; in particular, that baseline activity in terms of proximity to WTGs will not change whereas in reality it is expected that fishing vessels will account for the presence of the WTGs. Further, as per the NRA, the worst consequences reported for vessels involved in an allision incident involving a UK OWF development has been flooding, with no life-threatening injuries to persons reported (the model is calibrated against known reported incidents). The result aligns with that of other publicly available NRAs; for example, the NRAs for Moray West OWF (Anatec, 2018) and Green Volt OWF (Anatec, 2022), both now consented, each estimated a fishing vessel allision return period of one in seven years.

It was commented during the Hazard Workshop that transiting fishing vessels would be more likely to travel around the Array Area as opposed to transiting internally, and that fishing vessels would also avoid active fishing within the Array Area in order to protect their fishing gear.

The minimum spacing between structures of 928 m is considered sufficient for safe internal navigation i.e. for vessels to keep clear of the OWF structures within the Array Area. It is noted that this spacing is greater than that associated with many other operational OWFs in the UK. Further, the final layout will be agreed with the MCA and NLB to ensure it is safe from a surface navigation perspective.

As with any passage, any vessel navigating within the Array Area is expected to passage plan in accordance with SOLAS Chapter V (IMO, 1974) and promulgation of information. Operational marine lighting and marking will be in place as required by and agreed with the NLB. This will include unique identification marking of each OWF structure in an easily understandable pattern to minimise the risk of a mariner navigating internally within the Array Area becoming disoriented.

Should a recreational vessel under sail enter the proximity of a WTG, there is also potential for effects such as wind shear, masking and turbulence to occur. From previous studies of offshore wind developments, it has been concluded that WTGs do reduce wind velocity downwind of a WTG (MCA, 2022) but that no negative effects on recreational craft have been reported. This is on the basis of the limited spatial extent of the effect and its similarity to that experienced when passing a large vessel or close to other large structures (such as bridges) or the coastline. In

addition, no practical issues have been raised by recreational users to date when operating in proximity to existing offshore wind developments. For recreational vessels with a mast there is an additional allision risk associated with the WTG blades. However, the minimum blade tip clearance is 22 m which is aligned with the minimum clearance the RYA recommend for minimising allision risk (RYA, 2019) and which is also noted in MGN 654.

Should an allision occur, the consequences will depend on multiple factors, including the energy of the impact, structural integrity of the vessel and sea state at the time of the impact. Fishing vessels and recreational vessels, which are more likely to transit through the Array Area than other vessel types, are also considered more vulnerable to allision given the potential for a non-steel construction (albeit most fishing vessels this far offshore would likely be of steel construction). However, it is noted that fishing vessels engaged in active fishing would likely be travelling at relatively low average speeds. The most likely consequences will be minor damage with the vessel able to resume passage and undertake a full inspection at the next port. As an unlikely worst-case, the vessel could be foundered resulting in a PLL and pollution. If pollution were to occur, then the MPCP will be implemented to minimise the environmental risk.

15.6.2.4.3.1 Frequency of occurrence

The frequency of occurrence in relation to internal allision risk is considered to be remote.

15.6.2.4.3.2 Severity of consequence

The severity of consequence in relation to internal allision risk is considered to be serious.

15.6.2.4.3.3 Significance of risk

Given that the frequency of occurrence is remote, and the severity of consequence is serious, the overall effect of internal allision risk during the operation and maintenance phase is considered to be tolerable. No additional mitigation is necessary over the embedded mitigation outlined in Section 15.5.4, and therefore the risk is considered ALARP.

Frequency of occurrence	Severity of consequence	Significance
Remote	Serious	Tolerable and ALARP

15.6.2.4.4 Significance of risk

The rankings of frequency of occurrence, severity of consequence and significance of risk for each type of allision incident area summarised below.

Component	Frequency of Occurrence	Severity of Consequence	Significance of Risk
Powered allision risk	Extremely unlikely	Serious	Tolerable and ALARP
Drifting allision risk	Extremely unlikely	Serious	Tolerable and ALARP
Internal allision risk	Remote	Serious	Tolerable and ALARP

Impact significance - NOT SIGNIFICANT

Overall, the significance of risk associated with the allision risk impact is of tolerable significance. No additional mitigation is necessary over the embedded mitigation outlined in Section 15.5.4, and therefore the risk is considered ALARP.

15.6.2.5 Anchor snagging risk

This Section assesses the impact of vessels being at a risk of snagging their anchors on infrastructure associated with the Project. This Section assumes the worst-case scenario parameters detailed in Section 15.5.5.

The spatial extent of the impact is small given that a vessel must be in close proximity to a subsea cable for an interaction to occur.

There are three anchoring scenarios which are considered for this impact:

- Planned anchoring – most likely as a vessel awaits a berth to enter port but may also result from adverse weather conditions, machinery failure or sub-sea operations;
- Unplanned anchoring – generally resulting from an emergency situation where the vessel has experienced steering failure; and
- Anchor dragging – caused by anchor failure.

Although the second of these scenarios may involve limited decision-making time if drifting towards a hazard, in all three scenarios it is anticipated that the charting of infrastructure, including the subsea cables, will inform the decision to anchor, as per Regulation 34 of SOLAS (IMO, 1974) and MGN 661 (MCA, 2021b).

Due to the high water depths in vicinity to the Array Area (the shallowest charted depth within the Array Area is 92 m), it can be expected that anchoring is infrequent and unlikely which has been validated by a review of the data sources. Navigation status, speeds and track behaviour were inspected within the summer vessel traffic survey data and no vessels were identified as anchored in vicinity to the Array Area. Additionally, no vessels were broadcasting as at anchor in vicinity to the Array Area within the twelve-months data. There are no charted or reported anchorage locations in vicinity to the Array Area. Risk of interaction from planned anchoring in vicinity to the Array Area is therefore estimated to be low. Unplanned anchoring may be more likely given the presence of FTUs may represent a hazard to vessels NUC, however this would still be expected to be a very low frequency event near the Array Area given water depths.

There are no charted anchorages nearby to the EICC, with the nearest reported anchorage location 3.0 NM south of the landfall within the Bay of Cruden. However, within the five-week EICC dataset, three cargo vessels were identified as at anchor south of the landfall (the closest to the EICC being approximately 0.7 NM from its boundary, each awaiting orders based on destinations broadcast via AIS); given the presence of multiple anchored vessels in proximity to the landfall within the data, the region of the landfall is considered to be the area where anchor interaction from planned anchoring could be most likely. The vessel density near the approach to Peterhead Port mean there is also potential for unplanned anchoring.

The likelihood of anchor interaction with a subsea cable is managed by the burial of the cables and use of external cable protection where required, which will be informed by the CBRA process, which will account for traffic volumes and sizes, and baseline activity.

It is noted that fishing vessels and recreational vessels have smaller anchors and therefore there is lower potential for a penetration to the depth needed for an interaction. This aligns with the input RYA Scotland provided during the Hazard Workshop, stating that the EICC is not a concern.

Should an anchor interaction incident occur, the most likely consequences will be low based on historical anchor interaction incidents, with no damage incurred to the cable or the vessel. As an unlikely worst-case, a snagging incident could occur and/or the vessel's anchor and the cable could be damaged, and lead to risk of loss of stability of a small vessel. However, with the mitigation measures above in place, this risk will be minimised.

15.6.2.5.1 Frequency of occurrence

The frequency of occurrence is considered to be extremely unlikely.

15.6.2.5.2 Severity of consequence

The severity of consequence is considered to be minor.

15.6.2.5.3 Significance of risk

Given that the frequency of occurrence is extremely unlikely, and the severity of consequence is minor, the overall effect of risk of anchor snagging during the operation and maintenance phase is considered to be broadly acceptable.

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

15.6.2.6 Floating structure loses station

This Section assesses the impact of an FTU breaking free as a result of mooring line failure. This Section assumes the worst-case scenario parameters detailed in Section 15.5.5.

The MCA, under their Regulatory Expectations on Moorings for Floating Wind and Marine Devices (MCA & HSE, 2017), require that developers arrange TPV of the mooring systems by an independent and competent person / body. The Regulatory Expectations state that TPV is a "continuous activity", and that if any modifications to a system occur or if new information becomes available with regard to its reliability, additional TPV would be required. The Regulatory Expectations also require the provision of continuous monitoring either by GPS or other suitable means. The Applicant will put such a system in place, with each WTG continuously monitored, and with capability of being tracked in the event of a loss of station as detailed in MGN 654.

It is also noted that each WTG is anticipated to have up to six mooring lines and that all moorings would be required to fail for a total loss of station. There have been no reports to date of loss of stations from floating UK OWFs. A loss

of station is therefore considered unlikely when considering the implementation of TPV, noting the inspection and maintenance program will also ensure the mooring lines are kept in good condition, reducing the risk of them parting.

There is also a risk of loss of tow during any towing operations (i.e., towing FTUs for maintenance purposes). However, the following mitigating measures will be in place to minimise risk of loss of tow of the substructure:

- The offshore fleet supporting hook-up and station keeping will have the similar capabilities as the towing vessels and can respond to support the tow;
- The tow will be equipped with an emergency towing line which can be retrieved by the responding vessel;
- Prior to the commencement of the tow – a suitable weather window is required for the tow to achieve sea room; and
- The survival limits of the towed structure allow for the tow to weather harsh offshore conditions.

The most likely consequences for loss of station of a are failure of a single mooring line leading to a larger excursion zone than typical. As a worst-case, total mooring line failure could lead to a drifting structure leading to a collision. However, in such a scenario, the FTU would be tracked and recovered, with suitable promulgation of information in the interim. Similarly, worst-case consequences of a loss of tow are a collision between a third party vessel and the FTU, however frequency of such a scenario is considered low based on the mitigations outlined above.

15.6.2.6.1 Frequency of occurrence

The frequency of occurrence is considered to be extremely unlikely.

15.6.2.6.2 Severity of consequence

The severity of consequence is considered to be serious.

15.6.2.6.3 Significance of risk

Given that the frequency of occurrence is extremely unlikely and the severity of consequence is serious, the overall effect of loss of station during the operation and maintenance phase is considered to be tolerable. No additional mitigation is necessary over the embedded mitigation outlined in Section 15.5.4, and therefore the risk is considered ALARP.

Frequency of Occurrence	Severity of Consequence	Significance of Risk
Extremely Unlikely	Serious	Tolerable and ALARP

Impact significance – NOT SIGNIFICANT

15.6.2.7 Under keel clearance reduction

This Section assesses the impact of vessels being at a risk of interacting with subsea infrastructure associated with the Project due to reduced under keel clearance. This Section assumes the worst-case scenario parameters detailed in Section 15.5.5.

The components of Project infrastructure that could lead to interaction with vessels due to reduced under keel clearance are the subsea cables and associated external protection measures (rock berms), mooring lines and dynamic IACs.

The presence of protection over subsea cables may reduce charted water depths leading to increased risk of grounding for passing vessels. Target DoL will be determined via the CBRA process which will be undertaken post consent (indicatively, a minimum burial depth of 0.4 m is assumed). Where cable trenching is not possible, alternative cable protection methods may be deployed which be determined by the CaP, including rock berms and concrete mattresses.

The requirements of MGN 654 in relation to cable protection will apply, namely cable protection will not reduce the charted water depth by more than 5% unless agreed with the MCA. This 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). This will ensure any impact from reductions in water depth on under keel clearance are managed, noting that based on the worst-case assumption of protection height of 1 m, changes of more than 5% are only likely in the area near landfall (the charted 30 m water depth contour within the EICC is located less than 1 NM from shore, with depths of around 35 m approximately 3 NM from shore).

Given that charted water depths within the Array Area range from 92 m to 101 m, the reduction in under keel clearance resulting from subsea cables within the Array Area is considered negligible.

EIAR Vol. 4, Appendix 26: Navigational Risk Assessment provides detailed analysis on average and maximum vessel draughts compared to the subsea infrastructure under worst-case assumptions, which indicated that a vessel of average draught would not interact with the mooring line of an FTU regardless of distance from the substructure, and that the maximum draught recorded would require the vessel to pass within 35 m of the FTUs, which is considered unlikely. The buoyant sections of the dynamic cables will also be at least 20 m below the surface which exceeds the maximum vessel draught recorded in the area (17.7 m). The IACs will be closer to the sea surface at the connection point, however as above vessels would be expected to maintain suitable distances from the FTUs, and in particular the largest vessels (with the largest draughts) are very unlikely to be navigating in the Array Area.

Final design of the mooring lines and IACs will be confirmed via the DSLP which will be approved by MD-LOT in consultation with the MCA and NLB (i.e. the DSLP will confirm that the final design of the mooring lines will maintain suitable under keel clearances).

Should an underwater allision occur, minor damage incurred is the most likely consequence, and foundering of the vessel resulting in a PLL and pollution the unlikely worst-case consequences, with the environmental risks of the latter minimised by the implementation of the MPCP where appropriate.

15.6.2.7.1 Frequency of occurrence

The frequency of occurrence for changes in under keel clearance is considered to be extremely unlikely.

15.6.2.7.2 Severity of consequence

The severity of consequence for changes in under keel clearance is considered to be serious.

15.6.2.7.3 Significance of risk

Given that the frequency of occurrence is extremely unlikely, and the severity of consequence is serious, the overall effect of risk of under keel clearance interaction during the operation and maintenance phase is considered to be tolerable. No additional mitigation is necessary over the embedded mitigation outlined in Section 15.5.4, and therefore the risk is considered ALARP.

Frequency of Occurrence	Severity of Consequence	Significance of Risk
Extremely unlikely	Serious	Tolerable and ALARP
Impact significance – NOT SIGNIFICANT		

15.6.2.8 Potential impacts to emergency response capability

This Section assesses the impact of reduced emergency response capability. This can result from the presence of structures and increased vessel activity leading to reduced access to incidents, and/or an increased number of incidents associated with the Project leading to greater strain on emergency resources. This Section assumes the worst-case scenario parameters detailed in Section 15.5.5.

Given the distance offshore of the Array Area (approximately 109 NM from Aberdeen), RNLI assets are unlikely to respond to incidents in its vicinity (as confirmed in a review of the data). However, incidents in the region are rare, with only three incidents in the Study Area documented by the MAIB within the 10-year period between 2013 and 2022 (noting that the same number of incidents was documented within the previous 10 years). A larger number of helicopter taskings were documented by the DfT within the Study Area, averaging two a year, however none were documented within the Array Area itself and any searches within the Array Area for any future incidents that do occur within the Array Area will be facilitated by a layout design as agreed with the MCA.

It should be noted, as commented during the Hazard Workshop, that the nearby oil and gas infrastructure of the area could have assets to assist should an incident occur. With this noted and given the low rate of incidents in vicinity of the Array Area, the effect of the Array Area on emergency response capability is considered low.

Up to 383 return trips per year by operation and maintenance vessels may be made throughout the operation and maintenance phase. It is assumed that operation and maintenance vessels will be on-site throughout the majority of the operation and maintenance phase, although it is noted that there may be instances of severe weather conditions where they may be withdrawn. The presence of such vessels will increase the likelihood of an incident and subsequently increase the likelihood of multiple incidents occurring simultaneously, diminishing emergency response capability. As an unlikely worst-case, the consequences of such a situation could include a failure of emergency response to an incident resulting in a PLL and pollution.

However, with Project vessels to be managed through marine coordination and compliance with Flag State regulations, the likelihood of an incident is minimised. Additionally, should an incident occur when pro Project vessels were on site, they would likely be well equipped to assist, either through self-help capability or through SOLAS obligations (IMO, 1974), noting this would be undertaken in liaison with the MCA. The MPCP will also be implemented to minimise the environmental risks of any incident involving pollution where appropriate.

The layout will be agreed with the MCA and in line with MGN 654 requirements to ensure any SAR operations are facilitated. Additionally, an ERCoP will be submitted to the MCA in line with the requirements of MGN 654 (MCA, 2021), and a SAR checklist will be completed and agreed with the MCA.

15.6.2.8.1 Frequency of occurrence

The frequency of occurrence is considered extremely unlikely.

15.6.2.8.2 Severity of consequence

The severity of consequence is considered serious.

15.6.2.8.3 Significance of risk

Given that the frequency of occurrence is extremely unlikely and the severity of consequence is serious, the overall effect of risk of reduction in emergency response capability during the operation and maintenance phase is considered to be tolerable. No additional mitigation is necessary over the embedded mitigation outlined in Section 15.5.4, and therefore the risk is considered ALARP.

Frequency of Occurrence	Severity of Consequence	Significance of Risk
Extremely unlikely	Serious	Tolerable and ALARP
Impact significance – NOT SIGNIFICANT		

15.6.2.9 Reduced access to local ports and harbours

This Section assesses the impact of reduced access to local ports and harbours. This can result from the presence of structures and increased vessel activity. This Section assumes the worst-case scenario parameters detailed in Section 15.5.5. As per Section 15.6.2.1, it is anticipated that commercial vessels will generally choose to deviate around the Array Area.

As noted for the equivalent construction phase impact (see Section 15.6.1.8), the closest port or harbour to the Project is Peterhead Port, located approximately 102 NM (188.9 km) to the west of the Array Area. Similar to the construction phase impact, it is not anticipated that there will be any substantial effect on vessel approaches to and from the local ports beyond the deviations already outlined for impacts on vessel displacement (see Section 15.6.2.1).

Peterhead Port Authority is 2 NM (3.7 km) from the EICC. Its statutory harbour limits intersect the EICC, and its pilot boarding station is also located within the EICC (as is the recommended approach from the pilot boarding station). There may be some minor and temporary impact on pilot boarding operations resulting from maintenance, however Peterhead Port Authority were consulted, and stated "no concerns", assuming forward planning and communication (see Section 15.3). There will be no impact on port access from the laid cables, and any maintenance requiring surface activity is likely to be an infrequent occurrence.

Up to 383 return trips by operation and maintenance vessels may be made throughout the operation and maintenance phase and will include vessels which are RAM. This is less activity than during construction. As per the equivalent construction phase impact (see Section 15.6.1.8), Project vessels will be managed by marine coordination,

carry AIS and be compliant with relevant Flag State regulations. These measures will ensure impacts on port access from project vessels accessing or departing port are managed.

15.6.2.9.1 Frequency of occurrence

The frequency of occurrence is considered **extremely unlikely,** noting lower vessel movement numbers than during construction, and the likely infrequent nature of cable maintenance.

15.6.2.9.2 Severity of consequence

The severity of consequence is considered **minor** in terms of navigational safety.

15.6.2.9.3 Significance of risk

Given that the frequency of occurrence is extremely unlikely, and the severity of consequence is minor, the overall effect of risk of reduction in access to local ports and harbours during the operation and maintenance phase is considered to be **broadly acceptable.**

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

15.6.2.10 EMF Impact on Compass Deviation

Transmission of electrical power through a cable generates an EMF, an electric field and an induced electric field, which is produced with movement through the magnetic field. This can cause deviation vessel compasses. As the compass still serves as an essential means of navigation in the event of power loss or as a secondary source, it is important that potential impacts from EMF should be minimised to ensure continued safe navigation. The vast majority of commercial traffic uses non-magnetic gyrocompasses as the primary means of navigation, which are unaffected by EMF. Therefore, it is considered highly unlikely that any interference from EMF as a result of the presence of cables associated with the Project will have a significant impact on commercial vessel navigation. However, some smaller craft (fishing or leisure) may rely on magnetic compasses as their sole means of navigation.

A study into potential EMF impacts from the Export / Import Cables has been undertaken and is provided in **EIAR Vol. 4 Appendix 14A**. The outputs were that all compass deviations were calculated at below three degrees for the entire subsea cable route. This is within deviations accepted by the MCA, who stated in their Scoping Response they would accept a three degree deviation for 95% of the cable route, and for the remaining 5% of the cable route no more than five degrees should be attained.

Any compass deviation will therefore be low. Given the impact will also be spatially limited to the area around the cables, it is not considered that navigational safety will be impacted, with the most likely consequences being a small and temporary compass deviation which does not inhibit the vessel's ability to navigate.

15.6.2.10.1 Frequency of occurrence

The frequency of occurrence is considered **extremely unlikely** based on consideration of the small spatial area affected and the number of vessels likely to be impacted.

15.6.2.10.2 Severity of consequence

The severity of consequence is considered **negligible** based on the outputs of the Compass Deviation Study (**EIAR Vol. 4 Appendix 14C**).

15.6.2.10.3 Significance of risk

Given that the frequency of occurrence is extremely unlikely and the severity of consequence is negligible, the overall effect of EMF on compass deviation during the operation and maintenance phase is considered to be **broadly acceptable.**

Frequency of Occurrence	Severity of Consequence	Significance of Risk
Extremely Unlikely	Negligible	Broadly Acceptable

Impact significance – **NOT SIGNIFICANT**

15.6.3 Potential effects during decommissioning

Effects on Shipping and Navigation receptors associated with decommissioning are anticipated to result from the full removal of the Project components. Decommissioning activities will be subject to consultations and further assessments closer to the time of decommissioning to understand technical feasibility, safety and risk, and environmental considerations in detail. These details will be included in a Decommissioning Programme which will be developed post-consent and updated over the life of the Project.

The decommissioning of the Project intends to complete the full removal of offshore infrastructure to below the mudline (where safe/practicable to do so), in line with the OSPAR Convention and forthcoming guidance from OSPAR's North-East Atlantic Environmental Strategy 2030. The majority of decommissioning works are likely to be undertaken in reverse to the sequence of construction works and involve similar or lesser levels of effects to construction. A Decommissioning Programme will be prepared prior to construction, in line with the requirements of Section 105 of the Energy Act 2004 (as amended) and any applicable guidance available at the time. Currently it is assumed that:

- FTU substructure and WTG components will be removed and towed to port;
- Mooring lines will be removed, and where possible piles will be removed or cut to a suitable distance below the mudline such that the upper portion is removed;
- Cables no longer required will be removed where safe to do so; where they cross live third-party assets, they may be cut and left in situ to prevent damage to third-party operations; and
- The OSCP(s) will be decommissioned and the jacket and topside(s) will be towed to shore. The piles will be cut a suitable distance below the mudline.

The sensitivities and effect magnitudes for decommissioning are considered to be comparable to those identified for the construction phase. Therefore, in the absence of detailed information regarding decommissioning works, the effects during the decommissioning of the Project are considered analogous with, or likely less than, those of the construction phase.

15.6.4 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 15.13.

Table 15.13 Summary of potential effects

POTENTIAL EFFECT	RECEPTOR	FREQUENCY OF OCCURRENCE	SEVERITY OF CONSEQUENCE	CONSEQUENCE (SIGNIFICANCE OF EFFECT)	SECONDARY MITIGATION REQUIREMENTS	RESIDUAL CONSEQUENCE (SIGNIFICANCE OF EFFECT)
Construction						
Displacement of vessels	Commercial, fishing, and recreational vessels	Frequent	Negligible	Tolerable and ALARP	None required above existing embedded mitigation measures.	Tolerable and ALARP
Collision risk (third-party to third-party)	Commercial, fishing, and recreational vessels	Extremely unlikely	Serious	Tolerable and ALARP	None required above existing embedded mitigation measures.	Tolerable and ALARP
Collision risk (project to third-party)	Commercial, fishing, and recreational vessels	Extremely unlikely	Serious	Tolerable and ALARP	None required above existing embedded mitigation measures.	Tolerable and ALARP

POTENTIAL EFFECT	RECEPTOR	FREQUENCY OF OCCURRENCE	SEVERITY OF CONSEQUENCE	CONSEQUENCE (SIGNIFICANCE OF EFFECT)	SECONDARY MITIGATION REQUIREMENTS	RESIDUAL CONSEQUENCE (SIGNIFICANCE OF EFFECT)
Allision risk	Commercial, fishing, and recreational vessels	Remote	Serious	Tolerable and ALARP	None required above existing embedded mitigation measures.	Tolerable and ALARP
Floating structure loses station	Commercial, fishing, and recreational vessels	Extremely Unlikely	Serious	Tolerable and ALARP	None required above existing embedded mitigation measures.	Tolerable and ALARP
Under keel clearance reduction	Commercial, fishing, and recreational vessels	Extremely Unlikely	Serious	Tolerable and ALARP	None required above existing embedded mitigation measures.	Tolerable and ALARP
Potential impacts to emergency response capability	Commercial, fishing, recreational and emergency	Extremely unlikely	Serious	Tolerable and ALARP	None required above existing embedded mitigation measures.	Tolerable and ALARP

POTENTIAL EFFECT	RECEPTOR	FREQUENCY OF OCCURRENCE	SEVERITY OF CONSEQUENCE	CONSEQUENCE (SIGNIFICANCE OF EFFECT)	SECONDARY MITIGATION REQUIREMENTS	RESIDUAL CONSEQUENCE (SIGNIFICANCE OF EFFECT)
	response vessels					
Reduced access to local ports and harbours	Commercial, fishing, and recreational vessels	Reasonably probable	Minor	Tolerable with mitigation	Communication and liaison with Peterhead Port Authority.	Tolerable and ALARP
Operation and maintenance						
Displacement of vessels	Commercial, fishing, and recreational vessels	Reasonably probable	Negligible	Broadly acceptable	None required above existing embedded mitigation measures.	Broadly acceptable
Collision risk (third-party to third-party)	Commercial, fishing, and recreational vessels	Extremely unlikely	Serious	Tolerable and ALARP	None required above existing embedded mitigation measures.	Tolerable and ALARP

POTENTIAL EFFECT	RECEPTOR	FREQUENCY OF OCCURRENCE	SEVERITY OF CONSEQUENCE	CONSEQUENCE (SIGNIFICANCE OF EFFECT)	SECONDARY MITIGATION REQUIREMENTS	RESIDUAL CONSEQUENCE (SIGNIFICANCE OF EFFECT)
Collision risk (project to third-party)	Commercial, fishing, and recreational vessels	Extremely unlikely	Serious	Tolerable and ALARP	None required above existing embedded mitigation measures.	Tolerable and ALARP
Allision risk	Commercial, fishing, and recreational vessels	Remote	Serious	Tolerable and ALARP	None required above existing embedded mitigation measures.	Tolerable and ALARP
Anchor snagging risk	Commercial, fishing, and recreational vessels	Extremely unlikely	Minor	Broadly Acceptable	None required above existing embedded mitigation measures.	Broadly Acceptable
Floating structure loses station	Commercial, fishing, and recreational vessels	Extremely unlikely	Serious	Tolerable and ALARP	None required above existing embedded mitigation measures.	Tolerable and ALARP

POTENTIAL EFFECT	RECEPTOR	FREQUENCY OF OCCURRENCE	SEVERITY OF CONSEQUENCE	CONSEQUENCE (SIGNIFICANCE OF EFFECT)	SECONDARY MITIGATION REQUIREMENTS	RESIDUAL CONSEQUENCE (SIGNIFICANCE OF EFFECT)
Under keel clearance reduction	Commercial, fishing, and recreational vessels	Extremely Unlikely	Serious	Tolerable and ALARP	None required above existing embedded mitigation measures.	Tolerable and ALARP
Potential impacts to emergency response capability	Commercial, fishing, recreational and emergency response vessels	Extremely unlikely	Serious	Tolerable and ALARP	None required above existing embedded mitigation measures.	Tolerable and ALARP
Reduced access to local ports and harbours	Commercial, fishing, and recreational vessels	Extremely unlikely	Minor	Broadly acceptable	None required above existing embedded mitigation measures.	Broadly acceptable
EMF impact on compass deviation	Commercial, fishing, and	Extremely unlikely	Negligible	Broadly acceptable	None required above existing embedded	Broadly acceptable

POTENTIAL EFFECT	RECEPTOR	FREQUENCY OF OCCURRENCE	SEVERITY OF CONSEQUENCE	CONSEQUENCE (SIGNIFICANCE OF EFFECT)	SECONDARY MITIGATION REQUIREMENTS	RESIDUAL CONSEQUENCE (SIGNIFICANCE OF EFFECT)
	recreational vessels				mitigation measures.	
Decommissioning						
As per construction						

15.7 Assessment of cumulative effects

15.7.1 Introduction

The general approach to cumulative effects assessment adopted for the Project is outlined within EIAR Vol. 2, Chapter 7: EIA Methodology and in EIAR Vol. 4, Appendix 31: Cumulative Effects Assessment Methodology. As part of the cumulative process, a long list of plans, activities and projects (developments) is first defined. Upon review of this long list, the construction period of some of the identified developments did not overlap with the construction phase of the Project, so these plans, activities and projects (developments) will not be considered further in this cumulative assessment.

A staged approach was undertaken to identify relevant developments and activities for consideration within the EIA. First, a 'long list' of cumulative projects was collated using publicly accessible databases and in consultation with MD-LOT during October 2024, based on defined areas of search specific to different types of developments / activities.

For Shipping and Navigation, the Zone of Influence (ZoI) used for the identification of projects involving surface development was 50 NM. The 50 NM ZoI around the Array Area was selected in order to ensure other relevant projects that may impact cumulative routeing also impacted by the Array Area were captured. Subsea cables have also been screened in if within 2 NM of the Project Area. Further details of the cumulative screening process for shipping and navigation are provided in the NRA (EIAR Vol. 4 Appendix 26).

The long list was centred around the proposed Project construction timeline (from 2030 to 2035), ±1 year either side to capture any uncertainty in other development / activity schedules. This long list was then reduced to a 'short list' by taking receptor-specific potential pathways of effect (e.g. temporal and spatial overlap of effects) into account through various 'screening tests'. Where developments / activities identified in the long list pass these screening tests, they have been included within the short list of developments / activities.

The short list of relevant projects for inclusion within the cumulative effects assessment is outlined in Table 15.14 and an overview of their location is provided in the NRA (EIAR Vol. 4 Appendix 26).

Table 15.14 List of projects considered for the Shipping and Navigation cumulative impact assessment

LOCATION	DISTANCE TO PROJECT (KM)	PROJECT TYPE	PROJECT NAME	STATUS	CONFIDENCE [3]
UK	16.71	Offshore windfarm	Culzean Floating Offshore Wind Turbine Pilot Project	Consented	Medium
UK	59.64	Offshore windfarm	Bellrock Offshore Wind Farm	Pre-Application (Scoping)	Low
UK	89.03	Offshore windfarm	Ossian Offshore Wind Farm Array	Application	Low
UK	29.28	Offshore windfarm	Cedar (North Sea Renewables Grid (NSRG))	Pre-Application (Early Development)	Low
UK	56.71	Offshore windfarm	CampionWind	Pre-Application (Early Development)	Low
UK	53.26	Offshore windfarm	Judy Electrification	Pre-Application (Early Development)	Low
UK	59.64	Offshore windfarm	Beech (North Sea Renewables Grid (NSRG))	Pre-Application (Early Development)	Low
UK	66.63	Offshore windfarm	Floating Offshore Wind Farm Harbour Energy	Pre-Application (Early Development)	Low
UK	164.68	Subsea cable	Eastern Green Link 2	Consented	Medium

[3] 'Low' = pre-application or application, 'Medium' = consented and 'High' = under construction or operational

LOCATION	DISTANCE TO PROJECT (KM)	PROJECT TYPE	PROJECT NAME	STATUS	CONFIDENCE [3]
UK	163.47	Subsea cable	Eastern Green Link 3	Pre-Application (Scoping)	Low
UK	0.0	Subsea cable	Central North Sea Electrification Project	Pre-Application (Scoping)	Low
UK	127.92	Subsea cable	Green Volt export cable	Consented	Medium
UK	145.66	Subsea cable	Salamander export cable	Application	Low
UK	132.45	Subsea cable	MarramWind Cable	Pre-Application (Early Development)	Low
UK	102.71	Subsea cable	Muir Mhor Cable	Application	Low

The impacts considered for cumulative assessment are those with potential cumulative effect. Impacts in relation to underkeel clearance, loss of station, anchor interaction and port access have been screened out cumulatively. The following impacts have therefore been screened in:

- Displacement of vessels;
- Collision risk (third party to third party);
- Collision risk (project to third party);
- Allision; and
- Potential impacts to emergency response capability.

15.7.2 Cumulative effects

15.7.2.1 Displacement of vessels

Based on the cumulative assessment of vessel routeing undertaken in EIAR Vol. 4, Appendix 26: Navigational Risk Assessment, 14 routes are expected to deviate due to the presence of cumulative OWFs.

Of these 14, three are expected to deviate due to the presence of a tier 1 project i.e. Culzean, Bellrock or Ossian. Route 2 and route 16 are anticipated to interact with Culzean; however, given that Culzean consists of only a single WTG, any displacement will be low in magnitude. Route 10 is anticipated to interact with both Bellrock and Ossian;

this route could deviate north to avoid both projects, noting that there is enough searoom available for such a deviation and that this route is low use (five vessels per month).

The remaining 11 routes are anticipated to interact with either Cedar or Campion, noting that neither project is scoped and therefore have low data confidence. The routes interacting with Cedar will likely either pass between Cedar and Campion or between Cedar and Bellrock. The option chosen would likely impact whether vessels then passed north or south of the Array Area. The routes interacting with Campion could deviate north of Campion or deviate south, noting that the latter option would also require vessels to pass through the gap between Campion and Cedar.

See Section 15.6.1.1 for an assessment of the deviations around the Array Area itself, which were concluded to be manageable. Due to the distances of the cumulative projects from the Array Area (meaning that vessels have time to readjust course), and the fact that the in-isolation deviations were considered to be manageable, there are not considered to be significant cumulative deviations occurring as a result of the Array Area in addition to those assessed in Section 15.6.1.1. This aligns with feedback received from operators stated during the Hazard Workshop (see Section 15.3).

Displacement of vessels could potentially occur as a result of screened in subsea cable projects, however such displacement would be limited to instances where construction/decommissioning or maintenance is being undertaken and therefore would be localised to the location of the project vessels undertaking the work and also temporary in nature.

The main consequence of vessel displacement will be increased journey times and distances for affected third-party vessels, over a large spatial extent. It is noted that the majority of traffic in the area is composed of oil and gas vessels which are less sensitive than other commercial vessel types to increased journey times/distances; passenger vessels in particular accounted for less than 1% of the twelve months of data.

15.7.2.1.1 Frequency of occurrence

The frequency of occurrence in relation to displacement of vessel traffic is considered **frequent**.

15.7.2.1.2 Severity of consequence

The severity of consequence in relation to displacement of vessel traffic is considered **negligible** in terms of navigational safety.

15.7.2.1.3 Significance of risk

Given that the frequency of occurrence is frequent and the severity of consequence is negligible, the overall effect of displacement of vessels on a cumulative basis is considered to be **tolerable**. No additional mitigation is necessary over the embedded mitigation outlined in Section 15.5.4, and therefore the risk is considered ALARP.

Frequency of occurrence	Severity of consequence	Significance
Frequent	Negligible	Tolerable and ALARP

Impact significance - **NOT SIGNIFICANT**

15.7.2.2 Collision risk (third-party to third-party)

As per Section 15.7.2.1, some cumulative deviations are expected in addition to those resulting from the Array Area; however, it was concluded that there would be no significant cumulative deviations occurring as a result of the Array Area in addition to those assessed in Section 15.6.1.1. As this is considered the pathway for third-party to third-party collision risk, there is therefore not considered to be significant increases to third-party to third-party collision risk on a cumulative basis.

15.7.2.2.1 Frequency of occurrence

The frequency of occurrence is considered extremely unlikely.

15.7.2.2.2 Severity of consequence

The severity of consequence is considered serious.

15.7.2.2.3 Significance of risk

Given that the frequency of occurrence is extremely unlikely and the severity of consequence is serious, the overall effect of collision risk between third-party vessels on a cumulative basis is considered to be tolerable. No additional mitigation is necessary over the embedded mitigation outlined in Section 15.5.4, and therefore the risk is considered ALARP.

Frequency of occurrence	Severity of consequence	Significance
Extremely unlikely	Serious	Tolerable and ALARP

Impact significance - NOT SIGNIFICANT

15.7.2.3 Collision risk (project to third-party)

There is the potential that the same ports or similarly located ports could be used by cumulative projects in terms of base ports for construction, maintenance vessels, and / or decommissioning vessels. On this basis, there may be an overall cumulative increase in project vessel presence as they transit to / from their respective projects, and as such the potential for increased encounters and collision risk with third-party traffic. However, the same mitigations discussed in Section 15.6.1.3 apply and are considered effective at reducing this risk even with increased project vessel traffic; all developers should be establishing appropriate vessel management systems including through marine coordination, and as such any encounters will be managed, including by COLREGS and SOLAS.

There may be an increase in Project vessel to third-party vessel collision risk associated with cable installation or maintenance, however this would be limited to instances where surface activity was required and therefore would be localised to the location of the project vessels undertaking the work and also temporary in nature. Any encounters that did occur would likely be managed via the mitigations discussed above.

15.7.2.3.1 Frequency of occurrence

The frequency of occurrence is considered to be extremely unlikely.

15.7.2.3.2 Severity of consequence

The severity of consequence is considered to be serious.

15.7.2.3.3 Significance of risk

Given that the frequency of occurrence is extremely unlikely and the severity of consequence is serious, the overall effect of collision risk between third-party vessels and project vessels on a cumulative basis is considered to be tolerable. No additional mitigation is necessary over the embedded mitigation outlined in Section 15.5.4, and therefore the risk is considered ALARP.

Frequency of occurrence	Severity of consequence	Significance
Extremely unlikely	Serious	Tolerable and ALARP

Impact significance - NOT SIGNIFICANT

15.7.2.4 Allision risk

The nearest screened in cumulative project is the Culzean, located 9 NM from the Array Area. This project consists of a single floating WTG, meaning allision risk is minimal and comparable to the allision risk for the other isolated structures in the area associated with oil and gas projects. All other screened-in cumulative projects are at least 16 NM from the Array Area; given these distances, it is unlikely that vessels will experience increased allision risk beyond the localised risk when passing any given project.

All developments will be required to implement marine lighting and marking in agreement with NLB and in compliance with IALA G1162 (IALA, 2022), meaning the localised risk is managed.

15.7.2.4.1 Frequency of occurrence

The frequency of occurrence is considered to be extremely unlikely.

15.7.2.4.2 Severity of consequence

The severity of consequence is considered to be serious.

15.7.2.4.3 Significance of risk

Given that the frequency of occurrence is extremely unlikely and the severity of consequence is serious, the overall effect of allision risk on a cumulative basis is considered to be tolerable. No additional mitigation is necessary over the embedded mitigation outlined in Section 15.5.4, and therefore the risk is considered ALARP.

Frequency of occurrence	Severity of consequence	Significance
Extremely unlikely	Serious	Tolerable and ALARP

Impact significance - NOT SIGNIFICANT

15.7.2.5 Potential impacts to emergency response capability

Given baseline incident rates and noting the additional resources that would be available for the Project, given its proximity to oil and gas assets, it is not considered likely for there to be a notable effect on emergency response

resources on a cumulative level. This takes account of historical data showing that allisions and collisions caused by OWFs do not occur at a high frequency (further details are provided in the NRA).

SAR operations are likely to be localised to individual areas. As the nearest OWF to the Array Area (excluding Culzean, which consists of a single WTG) is at a distance of 16 NM, no cumulative impact on SAR access is anticipated. It is also noted that, under MGN 654, all OWF developments will be required to agree a layout with the MCA to ensure suitable SAR access is available, and produce ERCoPs and SAR checklist in liaison with the MCA.

15.7.2.5.1 Frequency of occurrence

The frequency of occurrence is considered extremely unlikely.

15.7.2.5.2 Severity of consequence

The severity of consequence is considered serious.

15.7.2.5.3 Significance of risk

Given that the frequency of occurrence is extremely unlikely and the severity of consequence is serious, the overall effect of risk of reduction in emergency response capability on a cumulative basis is considered to be tolerable. No additional mitigation is necessary over the embedded mitigation outlined in Section 15.5.4, and therefore the risk is considered ALARP.

Frequency of Occurrence	Severity of Consequence	Significance of Risk
Extremely unlikely	Serious	Tolerable and ALARP
Impact significance – NOT SIGNIFICANT		

15.7.3 Summary of cumulative effects

A summary of the outcomes of the assessment of cumulative effects for the Project is provided in Table 15.15.

Table 15.15 Summary of assessment of cumulative effects

POTENTIAL IMPACT	RECEPTOR	FREQUENCY OF OCCURRENCE	SEVERITY OF CONSEQUENCE	CONSEQUENCE (SIGNIFICANCE OF EFFECT)	SECONDARY MITIGATION REQUIREMENTS	RESIDUAL CONSEQUENCE (SIGNIFICANCE OF EFFECT)
Displacement of vessels	Commercial, fishing, and recreational vessels	Frequent	Negligible	Tolerable and ALARP	None required above existing embedded mitigation measures.	Tolerable and ALARP
Collision risk (third-party to third-party)	Commercial, fishing, and recreational vessels	Extremely unlikely	Serious	Tolerable and ALARP	None required above existing embedded mitigation measures.	Tolerable and ALARP
Collision risk (project to third-party)	Commercial, fishing, and recreational vessels	Extremely unlikely	Serious	Tolerable and ALARP	None required above existing embedded mitigation measures.	Tolerable and ALARP
Allision risk	Commercial, fishing, and recreational vessels	Extremely unlikely	Serious	Tolerable and ALARP	None required above existing embedded mitigation measures.	Tolerable and ALARP

POTENTIAL IMPACT	RECEPTOR	FREQUENCY OF OCCURRENCE	SEVERITY OF CONSEQUENCE	CONSEQUENCE (SIGNIFICANCE OF EFFECT)	SECONDARY MITIGATION REQUIREMENTS	RESIDUAL CONSEQUENCE (SIGNIFICANCE OF EFFECT)
Potential impacts to emergency response capability	Commercial, fishing, recreational and emergency response vessels	Extremely unlikely	Serious	Tolerable and ALARP	None required above existing embedded mitigation measures.	Tolerable and ALARP

15.8 Inter-related effects

Inter-related effects are the potential effects of multiple impacts, affecting one receptor or a group of receptors. Inter-related effects include interactions between the impacts of the different phases of the Project (i.e. interaction of impacts across construction, operation and maintenance and decommissioning), as well as the interaction between impacts on a receptor within a Project phase. The potential inter-related effects for Shipping and Navigation receptors are described below.

15.8.1 Inter-related effects between Project phases

No inter-related effects (Project lifetime effects) are predicted to arise between the construction, operation and maintenance, and decommissioning of the Project for Shipping and Navigation given the risks during each are managed by the phase-specific mitigations applied. For example, temporary lighting and the buoyed construction area during the construction stage are only removed once the operational marine lighting and marking implemented during the operational stage has been commissioned and approved by NLB.

15.8.2 Inter-related effects within a Project phase

For Shipping and Navigation, it is not anticipated that any inter-related effects will be produced that are of greater significance than the individual assessments noting that all impacts are not significant under the FSA (IMO, 2018).

15.8.3 Inter-relationships

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 Shipping and Navigation are provided in Table 15.16.

Table 15.16 Shipping and Navigation inter-relationships

CHAPTER	IMPACT	DESCRIPTION
EIAR Vol. 3, Chapter 14: Commercial Fisheries	*Impacts on fishing vessels including displacement*	*Impacts on commercial fishing activities could influence where fishing vessels transit..*
EIAR Vol. 3, Chapter 18: Military and Civil Aviation	*Impact on military low flying and UK SAR helicopter operations due to the presence of obstacles*	*WTG aviation lighting and potential use of flashing lights could create confusion to mariners.*
EIAR Vol. 3, Chapter 17: Infrastructure and Other Users	*Impacts on existing oil and gas infrastructure*	*Deviations required to oil and gas vessels on transit to or from assets.*

15.8.4 Onward connections

The Onward Development Connections for oil and gas decarbonisation will be defined and brought forward by third-party oil and gas operators, subject to separate marine licensing and permitting requirements. At this very early stage in the process, the information available about these Onward Development Connections is limited and cannot be confirmed by the Project. In accordance with standard practice and relevant industry guidance, the level of information available means there is insufficient detail to enable inclusion within a cumulative effects assessment. However, recognising industry feedback and a keen interest in this topic from stakeholders, the Applicant has voluntarily provided an assessment of the combined impact of the Project and the potential onward connections. Please refer to EIAR Vol. 3, Chapter 22: Statement of Combined Effect for further details.

It is noted that where applicable, it is expected that equivalents to any relevant mitigation measures detailed in Section 15.5.4 would also apply to any future Onward Development Connections, including the CaP (MM-008), charting of installed infrastructure (MM-033), and Compliance with MGN 654 (MM-037), and these will be secured through separate licensing which will be applied for by third party operators.

15.9 Whole Project Assessment

Please refer to EIAR Vol. 2, Chapter 7: EIA Methodology for the full description of the Whole Project assessment. The onshore aspects of the Project (i.e., those landwards of Mean Low Water Springs), including the onshore HDD entry point and the Export/Import Cable pull through, have been consented through the NorthConnect HVDC Cable Planning Consent. Details of the onshore Project infrastructure which has been acquired through NorthConnect is presented within EIAR Vol. 2, Chapter 5: Project Description. It is not anticipated that there will be any additional impacts from the onshore Project on shipping and navigation receptors.

15.10 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, transboundary effects on commercial vessels undertaking international voyages have been identified. The Array Area is in a central location of the North Sea where such traffic can be seen and, although the large majority of commercial traffic within the Study Area transits between the UK and offshore oil and gas infrastructure, a proportion of the main commercial routeing was seen transiting to/from Norway and Sweden. 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 considered suitable for identifying relevant other EEAs.

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.

15.11 Summary of mitigation and monitoring

For reduced access to local ports and harbours during construction, assessed in Section 15.6.1.8, the additional mitigation of communication and liaison procedures with Peterhead Port Authority is proposed; assuming this mitigation, the risk will be considered ALARP. No other secondary mitigation, over and above the embedded mitigation measures proposed in Section 15.5.4, is either required or proposed in relation to the potential effects of the Project on Shipping and Navigation.

15.12 References

Anatec (2018). Moray West OWF NRA. Aberdeen: Anatec.

Anatec (2022). Green Volt OWF NRA. Aberdeen: Anatec.

DECC (2011). Standard Marking Schedule for Offshore Installations. London: DECC.

HM Government (2011). UK Marine Policy Statement. London: The Stationary Office.

IALA (2022). IALA Guideline G1162 The Marking of Offshore Man-Made Structures. Edition 1.1. Saint Germain en Laye, France: IALA.

IMO (1972/77). Convention on International Regulations for Preventing Collisions at Sea (COLREGs) – Annex 3. London: IMO.

IMO (1974). International Convention for the Safety of Life at Sea (SOLAS). London: IMO.

IMO (2018). Revised Guidelines for FSA for Use in the International Maritime Organization Rule-Making Process. London: IMO.

MCA and HSE (2017). Regulatory expectations on moorings for floating wind and marine devices. Southampton: MCA. Bootle: HSE.

MCA (2021). Marine Guidance Note 654 (Merchant and Fishing) Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response. Southampton: MCA.

MCA (2021a). Marine Guidance Note 661 Navigation (Merchant and Fishing) - Safe and Responsible Anchoring and Fishing Practices. Southampton: MCA.

MCA (2022). Marine Guidance Note 372 Amendment 1 (Merchant and Fishing) Offshore Renewable Energy Installations (OREIs): Guidance to Mariners Operating in the Vicinity of UK OREIs. Southampton: MCA.

NorthConnect (2018). NorthConnect High Voltage Direct Current Cable Infrastructure UK Environmental Impact Assessment Report.

Peterhead Port Authority (2024). Information for Ship Masters, Owners and Agents. Peterhead: Peterhead Port Authority.

RYA (2019). The RYA's Position on Offshore Renewable Energy Developments: Paper 1 (of 4) – Wind Energy. 5th revision. Southampton: RYA.

RYA (2019). UK Coastal Atlas of Recreational Boating 2.1. Southampton: RYA.

Salamander Offshore Wind Farm, 2024. *Salamander Offshore EIA Report*.

Scottish Government (2015). Scotland's National Marine Plan. Edinburgh: Scottish Government.

Scottish Government (2020). Sectoral Marine Plane for Offshore Wind Energy. Edinburgh: Scottish Government.

UN (1982). United Nations Convention on the Law of the Sea.