Muir Mhòr Offshore Wind Farm

Environmental Impact Assessment Report

Volume 2, Chapter 14: Shipping and Navigation

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Glossary

Term	Definition
Allision	The act of striking or collision of a moving vessel against a stationary object.
Array Area	The area in which the generation infrastructure (including Wind Turbine Generators and associated foundations and inter-array cables), Offshore Electrical Platform(s), and an interconnector cable will be located.
Automatic Identification System (AIS)	A system by which vessels automatically broadcast their identity, key statistics including location, destination, length, speed, and current status, e.g., under power. Most commercial vessels and United Kingdom (UK)/European Union (EU) fishing vessels over 15 metre (m) length are required to carry AIS.
Collision	The act or process of colliding (crashing) between two moving objects.
Developer	Muir Mhòr Offshore Wind Farm Limited.
EIA Regulations	Collectively the term used to refer to The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, The Marine Works (Environmental Impact Assessment) Regulations 2007, and The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017.
Embedded Commitment	Mitigation measures to avoid or reduce environmental effects that are directly incorporated into the design for the Proposed Development.
Formal Safety Assessment (FSA)	A structured and systematic process for assessing the risks and costs (if applicable) associated with shipping activity.
Floating Foundations	The floating structures on which the Wind Turbine Generators are installed.
Foundation anchors	The structures which anchor the Floating Foundations to the seabed, connected to the foundation mooring.
Foundation mooring	The mooring structures which connect the Floating Foundations to the anchors.
Future Case	The assessment of risk based on the predicted growth in future shipping densities and traffic types as well as foreseeable changes in the marine environment.
Inter-array cable	Cables which link the Wind Turbines Generators to each other and the Offshore Electrical Platform(s).
Interconnector cable	Cable which links the Offshore Electrical Platform(s) to one another, allowing for power to be transferred between the platforms.
Landfall	The area between Mean High Water Springs (MHWS) and Mean Low Water Springs (MLWS) where the offshore export cables are brought onshore.
Main Commercial Route	Defined transit route (mean position) of commercial vessels identified within each study area.
Marine Guidance Note (MGN)	A system of guidance notes issued by the Maritime and Coastguard Agency (MCA) which provide significant advice relating to the improvement of the safety of shipping at sea, and to prevent or minimise pollution from shipping.
Navigational Risk Assessment (NRA)	A document which assesses the hazards to Shipping and Navigation of a proposed Offshore Renewable Energy Installation (OREI) based upon Formal Safety Assessment (FSA).
Offshore Electrical Platform (OEP)	Offshore platform consisting of High Voltage Alternating Current (HVAC) equipment, details depending on the final electrical set up of the Project.
Offshore Export Cable Corridor (ECC)	The area within which the offshore export cables will be installed.

Term	Definition
Offshore export cables	The subsea electricity cable circuits running from the Offshore Electrical Platform(s) to the landfall which will transmit the electricity generated by the offshore wind farm to the onshore export cables for transmission onwards to the onshore substation and the national electrical transmission system along with auxiliary cables such as fibre optic cables.
Project	Muir Mhòr Offshore Wind Farm – comprises the wind farm and all associated offshore and onshore components.
Proposed Development	The offshore Muir Mhòr Offshore Wind Farm project elements to which this Offshore EIA Report relates.
Radio Detection and Ranging (Radar)	An object-detection system which uses radio waves to determine the range, altitude, direction, or speed of objects.
Regular Operator	Commercial operator whose vessel(s) are observed to transit through a particular region on a regular basis.
Safety Zone	A statutory marine zone demarcated for the purposes of safety around a possibly hazardous installation or works/construction area.
Unique Vessel	An individual vessel identified on any particular calendar day, irrespective of how many tracks were recorded for that vessel on that day. This prevents vessels being over counted. Individual vessels are identified using their Maritime Mobile Service Identity (MMSI).
Wind Turbine Generator (WTG)	The wind turbines that generate electricity consisting of tubular towers and blades attached to a nacelle housing mechanical and electrical generating equipment.

Acronyms

Term	Definition
AHTS	Anchor Handling Tug Supply
AIS	Automatic Identification System
ALARP	As Low as Reasonably Practicable
ARPA	Automatic Radar Plotting Aid
AtoN	Aid to Navigation
CAA	Civil Aviation Authority
CaP	Cable Plan
CD	Chart Datum
CEA	Cumulative Effects Assessment
CMS	Construction Method Statement
COLREGs	Convention on the International Regulations for Preventing Collisions at Sea
DECC	Department of Energy and Climate Change
DfT	Department for Transport
DGC	Defence Geographic Centre
DP	Decommissioning Programme
DSLP	Development Specification and Layout Plan
ECC	Export Cable Corridor
EEA	European Economic Area
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMP	Environmental Management Plan
ERCoP	Emergency Response Co-operation Plan
FLiDAR	Floating Light Detection and Ranging
FLO	Fisheries Liaison Officer
FLS	Floating Light Detection and Ranging System
FMMS	Fisheries Management and Mitigation Strategy
FSA	Formal Safety Assessment
GT	Gross Tonnage
HSE	Health and Safety Executive
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IMO	International Maritime Organization
LMP	Lighting and Marking Plan
LOA	Length Overall
LSE	Likely Significant Effect
MAIB	Marine Accident Investigation Branch
MCA	Maritime and Coastguard Agency
MD-LOT	Marine Directorate-Licensing Operations Team
MGN	Marine Guidance Note
MoD	Ministry of Defence

Term	Definition
MSL	Mean Sea Level
NLB	Northern Lighthouse Board
NMP	National Marine Plan
NRA	Navigational Risk Assessment
NUC	Not Under Command
O&M	Operation and Maintenance
OEP	Offshore Electrical Platform
OREI	Offshore Renewable Energy Installation
OWF	Offshore Wind Farm
PEXA	Practice and Exercise Areas
PLL	Potential Loss of Life
PSV	Platform Supply Vessel
Radar	Radio Detection and Ranging
RIAA	Report to Inform Assessment
RNLI	Royal National Lifeboat Institution
RYA	Royal Yachting Association
SAR	Search and Rescue
SOLAS	International Convention for the Safety of Life at Sea
SOV	Service Operation Vessel
SWFPA	Scottish White Fish Producers Association
TPV	Third-Party Verification
UK	United Kingdom
UKHO	United Kingdom Hydrographic Office
UNCLOS	United Nations Convention on the Law of the Sea
UNCLOS	United Nations
VMNSP	Vessel Management Navigation Safety Plan
VTS	Vessel Traffic Service
WSP	Wet Storage Plan
WTG	Wind Turbine Generator

14. SHIPPING AND NAVIGATION

14.1. INTRODUCTION

14.1.1. This Chapter of the Offshore Environmental Impact Assessment Report (EIAR) presents an assessment of the potential impacts and associated Likely Significant Effects (LSE) to Shipping and Navigation from the Muir Mhòr Offshore Wind Farm offshore infrastructure (hereafter referred to as 'Proposed Development') and discusses appropriate mitigation and monitoring as required to address any significant effects.

14.1.2. This Chapter should be read alongside the following other Chapters and technical Appendices:

- Volume 1, Chapter 6 (Environmental Impact Assessment (EIA) Methodology);
- Volume 2, Chapter 13 (Commercial Fisheries); and
- Volume 2, Chapter 19 (Infrastructure and Other Users).

14.1.3. This Chapter includes a summary of information contained in Volume 3, Appendix 14.1 (Navigational Risk Assessment (NRA)), hereafter the 'NRA'. The NRA provides the technical assessment of risks associated with Shipping and Navigation used to inform this Chapter.

14.1.4. This Chapter refers to the design of the Proposed Development as described in Volume 1, Chapter 3 (Project Description) of the EIAR.

14.1.5. This Chapter has been prepared by Anatec Ltd.

14.2. PURPOSE OF THE CHAPTER

14.2.1. The primary purpose of the EIAR is defined in Volume 1, Chapter 1 (Introduction).

14.2.2. The key objective of this Chapter is to provide Scottish Ministers and statutory and non-statutory stakeholders, the information required to assess for LSE on Shipping and Navigation. This assessment will consider those effects from the Proposed Development in isolation, and also cumulative effects (the effects of the Proposed Development combined with the effects from other plans and projects).

14.2.3. This Chapter presents the following:

- A detailed description of current environmental baseline conditions relevant to Shipping and Navigation. These have been established from: literature review, desk studies, Project specific surveys, numerical modelling studies, and consultation with stakeholders;
- Discussion of assumptions and any limitations with respect to the information used to define the baseline;
- Identification of potential impacts and any resulting LSE on Shipping and Navigation related to Proposed Development activities. This process is informed by the application of embedded commitments, see Volume 3, Appendix 6.1 (Commitments Register).
- Consideration of the need for any 'secondary' mitigation measures (in addition to embedded commitments) to avoid, minimise, reduce, or offset LSE on Shipping and Navigation from the Proposed Development;
- Consideration of any residual effects following application of secondary mitigation; and
- Identification of monitoring measures to support proposed mitigation.

14.2.4. Modelling undertaken in support of the Chapter and associated technical report has been presented in the NRA.

14.3. LEGISLATION AND POLICY CONTEXT

14.3.1. Overarching legislation, policy, and guidance in relation to the EIAR for the Proposed Development is provided in Volume 1, Chapter 2 (Legislation and Policy Context) of the EIAR. Below is provided a summary of legislation, policy, and guidance directly relevant to Shipping and Navigation.

LEGISLATION AND POLICY

14.3.2. All legislation directly applicable to Shipping and Navigation is illustrated in Table 14-1.

14.3.3. All policy directly applicable to Shipping and Navigation is illustrated in Table 14-2.

Table 14-1 Legislation and Policy relevant to Shipping and Navigation

Legislation	Summary	How Chapter has considered this
United Nations Convention on the Law of the Sea (UNCLOS) (United Nations (UN), 1982)	Establishes rules governing all uses of oceans and seas. Article 61 Part 7 states that "Artificial islands, installations and structures and the safety zones around them may not be established where interference may be caused to the use of recognised sea lanes essential to international navigation."	There are no International Maritime Organization (IMO) routing measures in proximity to the Proposed Development as detailed in the NRA (Section 7). Baseline routing has been identified as per Section 14.5.
Convention on the International Regulations for Preventing Collisions at Sea (COLREGs) (IMO, 1972/77)	Dictates the manner by which all sea going vessels should navigate. Rule 8 Part (a) states that "Any action taken to avoid collision shall be taken in accordance with the Rules of this Part and shall, if the circumstances of the case admit, be positive, made in ample time and with due regard to the observance of good seamanship." Rule 19 Part (b) states that "Every vessel shall proceed at a safe speed adapted to the prevailing circumstances and conditions of restricted visibility. A power-driven vessel shall have her engines ready for immediate manoeuvre."	COLREGs provisions have been considered where relevant throughout the NRA and this Chapter. In particular, collision avoidance provisions have been considered where relevant in the assessment of LSE (Section 14.7).
International Convention for the Safety of Life at Sea (SOLAS) (IMO, 1974)	Chapter V identifies provisions relating to safety of navigation applicable to all vessels. Regulation 33 states that "The master of a ship at sea which is in a position to be able to provide assistance on receiving information from any source that persons are in distress at sea, is bound to proceed with all speed to their assistance." Regulation 34 "Prior to proceeding to sea, the master shall ensure that the intended voyage has been planned to use the appropriate nautical charts and nautical publications for the area concerned."	SOLAS provisions have been considered where relevant throughout the NRA and this Chapter. In particular, the provisions associated with passage planning and obligations to render assistance have been considered where relevant in the assessment of LSE (Section 14.7).

Table 14-2 Policy relevant to Shipping and Navigation

Policy	Summary	How/Where Chapter has considered this
Scotland's National Marine Plan (NMP) 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 UNCLOS. 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	Impacts to vessel traffic, routeing and ports (where relevant) have been assessed in Sections 14.7 and 14.8.

Policy	Summary	How/Where Chapter has considered this
	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)."	
United Kingdom (UK) Marine Policy Statement (MPS) (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. Paragraph 3.4.7 states that "Increased competition for marine resources may affect the sea space available for the safe navigation of ships. 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. Marine Plan development and individual decisions should also take account of environmental, social, and economic effects and be in compliance with international maritime law. Marine plan authorities will also need take account of the need to protect the efficiency and resilience of continuing port operations, as well as further port development."	Impacts to vessel traffic, routeing and ports (where relevant) have been assessed in Sections 14.7 and 14.8. This includes assessment of vessel displacement to all vessel types identified within the vessel traffic survey data. Passenger vessel traffic including ferries was observed to be very limited in the area based on the data studied. Embedded commitments are detailed in Section 14.6, no secondary mitigations were identified as assessed during the Formal Safety Assessment (FSA) in Sections 14.7 and 14.8.

GUIDANCE

14.3.4. All guidance directly applicable to Shipping and Navigation includes the following guidance documents:

- Marine Guidance Note (MGN) 654 (Merchant and Fishing) Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response and Annexes (Maritime and Coastguard Agency (MCA), 2021);
- Revised Guidelines for Formal Safety Assessment (FSA) for Use in the International Maritime Organization Rule-Making Process (IMO, 2018);
- MGN 372 Amendment 1 (Merchant and Fishing) Offshore Renewable Energy Installations (OREIs): Guidance to Mariners Operating in the Vicinity of UK OREIs (MCA, 2022);
- International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Guideline G1162 Guidance on the Marking of Offshore Man-Made Structures (IALA, 2021a);
- IALA Recommendations O-139 on The Marking of Man-Made Offshore Structures (IALA, 2021b);
- Regulatory Expectations on Moorings for Floating Wind and Marine Devices (MCA and Health and Safety Executive (HSE), 2017);
- The Royal Yachting Associations (RYA) Position on Offshore Renewable Energy Developments: Paper 1 (of 4) – Wind Energy (RYA, 2019);
- Standard Marking Schedule for Offshore Installations (Department of Energy and Climate Change (DECC), 2011); and
- Sectoral Marine Plan for Offshore Wind Energy (Scottish Government, 2020).

14.4. CONSULTATION

14.4.1. Ongoing statutory and non-statutory consultation and incorporation of feedback is an integral part of developing a robust EIAR. The Offshore Scoping Report for the Proposed Development (Volume 3, Appendix 5.1 (Offshore Scoping Report)) for the Proposed Development was submitted to Marine Directorate-Licensing Operations Team (MD-LOT) in June 2023. A detailed response to the Scoping Report's content and questions was provided from MD-LOT, and multiple additional consultees in the September 2023 Scoping Opinion (Volume 3, Appendix 5.2 (Offshore Scoping Opinion).

14.4.2. Consultation was carried out through dedicated meeting, the Hazard Workshop held on 22 April 2024, and via Regular Operator outreach, a Regular Operator being defined as a commercial operator whose vessel(s) were observed transiting in proximity to the Project on a regular basis. These are detailed further below with Table 14-3 providing a summary of the stakeholder consultation activities specific to Shipping and Navigation. The issues raised and actions to address and incorporate this feedback into the EIAR are outlined.

14.4.3. Key Shipping and Navigation stakeholders have been consulted in the EIAR process and a full list of attendees at the Hazard Workshop is detailed in Section 4.3 of the NRA. In addition to the Hazard Workshop, the following stakeholders have been consulted via dedicated meetings:

- MCA;
- Northern Lighthouse Board (NLB); and
- UK Chamber of Shipping.

14.4.4. As well as consulting with the organisations outlined above, 46 Regular Operators identified from the vessel traffic surveys and the long-term data analysis were provided with an overview of the Proposed Development and offered the opportunity to provide comment. The full Regular Operator letter is presented in Annex D of the NRA and a list of all operators identified is provided in Section 4.2 of the NRA. These Regular Operators were provided with an opportunity to provide feedback and participate in the Hazard Workshop.

14.4.5. A key element of the consultation phase was the Hazard Workshop, a meeting of local and national marine stakeholders to identify and discuss the LSE from Shipping and Navigation. Using the information gathered from the Hazard Workshop, a hazard log was produced (Annex B in the NRA). The hazard log was then provided to stakeholders (including those which did not attend) for comment with feedback before being incorporated into the NRA and used as input into the assessment on LSE in Section 14.7.

14.4.6. Further details on the Proposed Development's overall EIA stakeholder consultation process and actions are presented in Volume 1, Chapter 5 (Consultation) of the EIAR.

Table 14-3 Consultation Relevant to Shipping and Navigation

Date	Consultee and Type of Consultation	Description/ Issues Raised	How this has been considered in this Chapter
7 February 2023	MCA and NLB, dedicated meeting	Both MCA and NLB are content with the vessel traffic survey dates as well as the methodologies.	Vessel traffic survey dates and methodologies are detailed and presented in Section 14.5.
		MCA noted the cumulative impacts of the Proposed Development in additional with other projects in the area is a significant issue and although the standard approach to cumulative assessment is suitable, this will be an area they will be paying particular attention to. NLB highlights Green Volt which is in proximity to the Proposed Development.	The cumulative risk assessment methodology and assessment is detailed in Section 14.8. The full description of the development screening process, including consideration of Green Volt, is detailed within the NRA (Section 13).
		NLB noted the various ports and harbours in the area need to be considered.	Various commercial ports have been reached out to during the consultation phase and invited to the Hazard Workshop with Peterhead Port Authority attending. Reduced access to local ports, harbours, and marinas is assessed in the assessment of LSE in Section 14.7.
19 May 2023	UK Chamber of Shipping, dedicated meeting	Loss of station should be considered within the risk assessment during the construction and decommissioning phases also, in particular when the structures are in transit.	Loss of station is assessed for all phases of the Proposed Development in the assessment of LSE in Section 14.7.
		Agree with the relevant study areas used to detail the Shipping and Navigation assessment.	Shipping and Navigation study areas are detailed in Section 14.5.
		Consultation with Cruise Britain is advised.	Cruise Britain was contacted as part of the Regular Operator outreach (Section 14.4)
18 July 2023	UK Chamber of Shipping, Scoping Response	Chamber welcomes the 20-year Marine Accident Investigation Branch (MAIB) data analysis at NRA.	20-years of MAIB incident data is analysed in Section 9.4 of the NRA.
		Given impacts scoped out of the decommissioning phase, it is assumed that the Developer is committing to remove all surface and sub-surface infrastructure, including cabling, a commitment the Chamber supports and should be required.	A Decommissioning Programme (DP) will be developed prior to the start of decommissioning works, with the nature of the works determined by legislation and guidance at the time (Section 14.6).

Date	Consultee and Type of Consultation	Description/ Issues Raised	How this has been considered in this Chapter
		The Developer should consider a Navigation Management Plan to manage interactions between third party vessels and project vessels to reduce navigational risk.	A Vessel Management and Navigation Safety Plan (VMNSP) will be created post consent and is included as an embedded commitment in the NRA (Section 14.6).
		Accept the assessment of LSE in isolation covers transboundary effects but this should be extended to cumulative as well.	Cumulative risk assessment undertaken in the NRA will include consideration of transboundary effects where appropriate (Section 14.8).
		Disappointing not to see a figure showing the cumulative wider picture of other developments and Proposed Developments in the area given upward of 16 other OWF are proposed within a 50 nautical mile (nm) (92.6 km) area.	A cumulative development screening exercise is undertaken in Section 14.8 with cumulative offshore wind farm developments considered up to 50 nm (92.6 km) from the Array Area in line with the cumulative methodology outlined in Section 14.8. Cumulative post wind farm routeing within this 50 nm (92.6 km) buffer is illustrated in Section 14.6 of the NRA.
8 August 2023	MCA, Scoping Response	There should be as much detail as possible in relation to the possible impact on navigational issues for both commercial and recreational craft, specifically: • Collision risk; • Navigational safety; • Visual intrusion and noise; • Risk management and emergency response; • Marking and lighting of site and information to mariners; • Effect on small craft navigational and communication equipment; • The risk to drifting recreational craft in adverse weather or tidal conditions; and • The likely squeeze of small craft into the routes of larger commercial vessels.	Navigational issues outlined by the MCA have been addressed throughout the NRA and within the assessment of LSE in Section 14.7.
		NRA to be submitted in accordance with MGN 654 and the MCA's methodology document. Should be accompanied by a detailed MGN Checklist.	The NRA is compliant with MGN 654 and the MGN 654 Checklist is included in Annex A of the NRA.

Date	Consultee and Type of Consultation	Description/ Issues Raised	How this has been considered in this Chapter
		It is suggested that vessel traffic data collection should be from a vessel-based survey using Automatic Identification System (AIS), Radio Detection and Ranging (Radar) and visual observations to capture all vessels navigating in the study area.	Two 14-day vessel traffic surveys were undertaken in 2023 using AIS, Radar, and visual observations (Section 14.5).
		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 (SAR) aircraft operating within the site. Any additional navigation safety and/or Search and Rescue requirements, as per MGN 654 Annex 5, will be agreed at the approval stage.	The final array layout will be agreed with MCA, and NLB post consent and will comply with the requirements of MGN 654, noting that compliance with MGN 654 is considered as an embedded commitment (Section 14.6).
		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 (CD).	A cable burial risk assessment will be undertaken to determine suitable burial depths and is considered as an embedded commitment in the NRA (Section 14.6). As part of compliance with MGN 654, the MCA's advice on reduction in under keel clearance will be adhered to, noting that compliance with MGN 654 is also considered as an embedded commitment.
		Regulatory mooring expectations should be identified as a potential mitigation and MCA can confirm this guidance should be followed and that a third-party verification of the mooring arrangements will be required.	The Regulatory Expectations document is included as an embedded commitment in the NRA (Section 14.6), noting that this guidance requires third-party verification of the mooring system.
		Particular consideration will need to be given to SAR including Emergency Response Co-operation Plans (ERCoP) and various technical requirements as covered in Annex 5 to MGN 654. A SAR Checklist will also need to be completed in consultation with the MCA.	Navigation, communication, and position fixing equipment is detailed in Section 15 of the NRA. The NRA is fully compliant with MGN 654 including commitment to the completion of a SAR Checklist post consent in consultation with the MCA.
		Considering all the potential developments in the area, MCA is concerned regarding the general loss of navigable sea room, and we would request the Developer to factor in cumulative impacts into their NRA specifically with consideration of Bellrock, Morven,	The cumulative risk assessment methodology is detailed in Section 14.8 along with the development screening process including consideration of Bellrock, Morven, Ossian, and

Date	Consultee and Type of Consultation	Description/ Issues Raised	How this has been considered in this Chapter
		Ossian, and CampionWind.	Campion. Cumulative projects are included in the assessment of LSE where relevant.
		As this project progress, we would welcome engagement with the Developer, and early discussion on the points raised above.	The MCA was consulted as part of the NRA process including via the Hazard Workshop (Section 14.4).
		MCA agree with the embedded commitment measure specified in the Scoping Report, we believe all the commitments are covered here, and if any bespoke commitments are required those will be agreed at the application stage.	Embedded commitments are detailed in Section 14.6 and reflect those specified in the Scoping Report.
25 July 2023	RYA Scotland, Scoping Response	RYA Scotland agree that Shipping and Navigation should be scoped in and would wish to be involved with the NRA.	The RYA were consulted as part of the NRA Process at the Hazard Workshop (Section 14.4).
		Although the coverage of the UK Coastal Atlas of Recreational Boating published by the RYA does not extend as far as the site it does cover most of the offshore ECC. Sailing Directions for the East Coast of Scotland have recently been published by the Forth Yacht Clubs Association.	The UK Coastal Atlas of Recreational Boating and East Coast of Scotland Sailing Directions have been used as secondary sources to inform recreational vessel movements in Section 10 of the NRA.
		Details of the scheme should be forwarded to the Forth Yacht Clubs Association once it has been consented so that the information can be included in updates to the Sailing Directions.	Promulgation of information has been considered as an embedded commitment (Section 14.6) and dissemination of project details to the Forth Yacht Clubs Association will be ensured as part of this.
19 July, 2023	NLB, Scoping Response	NLB have no objection to the content of the Scoping Report, and no suggestions for additional content.	Noted.
24 November 2023	Tidewater Marine Ltd, Regular Operator Outreach	All Tidewater vessels passage plan before departing from port or departing the offshore installation 500 metre (m) zone. These plans take into account all relevant navigational information including chart corrections. Navigational notices will be published/issued relating to the Project.	Promulgation of information has been considered as an embedded commitment (Section 14.6).
		Tidewater vessels working out of Peterhead and operating in the Central North Sea, and vessels operating out of Aberdeen working in the Central and Northern sector of the North Sea will	Promulgation of information has been considered as an embedded commitment (Section 14.6).

Date	Consultee and Type of Consultation	Description/ Issues Raised	How this has been considered in this Chapter
		have to avoid the Proposed Development. This will be done with due regard to clearing distances required, Notifications to Mariners, and the COLREGs.	
		Tidewater does not consider the Proposed Development will impact their vessels greatly as they are constantly adjusting their passage plans to meet new requirements and are used to the North Sea being comprised of, and routeing within, offshore permanent Installations, semi submersibles, Jack Ups, survey vessels, fishing vessels, other platform supply vessels (PSV), anchor handling tug supply (AHTS), projects, diving vessels, and general everyday shipping traffic.	Acknowledged in the assessment of LSE in Section 14.7.
		Tidewater vessels are constantly adjusting course and/or speeds to ensure the safety of crew and or cargo, as they are relatively small vessels with the majority of the cargo being carried on an open deck. This is particularly pertinent in the winter months in rough weather, but as long as they can safely pass between the Array Area and land maintaining the correct safe distance as required in the Notification to Mariners there would not be a problem.	Adverse weather routeing is detailed in Section 12 of the NRA with further details of adverse weather transits provided by Tidewater Marine UK outlined in Section 14.4.
		There is no cumulative effect to Tidewater vessels from cumulative developments.	Acknowledged in the cumulative risk assessment included in Section 14.8.
		If there was sufficient sea room to make safe passage whilst maintaining a safe distance from any hazard, then it is a possibility for vessels to transit through the Array Area.	Acknowledged in the assessment of vessel displacement and internal allision risk in the assessment of LSE in Section 14.7
22 April, 2024	MCA, Hazard Workshop	On a cumulative level, the MCA noted there is no concern over the gap between the Array Area and CampionWind and that commercial routes would still use this gap.	Commercial routeing in a cumulative scenario is detailed in Section 14.6 of the NRA.
		MCA requested context for the list of plans within the embedded commitments for how each one is relevant to Shipping and Navigation.	Embedded commitments are detailed in Section 14.6 and include detailed descriptions of what each entail. Mitigation is also noted where appropriate in the assessment of LSE in Section 14.7.
		There have been challenges with wet storage and it is queried whether there is any consideration of areas out with port limits.	Following discussion with NatureScot on 24th of October 2024, and MD-LOT on the 31st of

Date	Consultee and Type of Consultation	Description/ Issues Raised	How this has been considered in this Chapter
			October 2024, it was confirmed that as the Developer is not applying for the consent and/or licensing of wet storage facilities for the Proposed Development, the EIAR is not required to include Wet Storage assessment. A Wet Storage Plan (WSP) will be developed to provide details on requirements (if applicable) for assembled WTGs and cabling.
		Emergency towage and recovery are also important to address as well as wreck status if the structure was to be sank.	This will be addressed through emergency response protocols as acknowledged in the assessment of LSE in Section 14.7.
	NLB, Hazard Workshop	NLB highlighted the need for and location of Operation and Maintenance (O&M) monitoring of the Proposed Development as the Array Area is out with the range of VHF and so there is increased risk.	A VMNSP will be created post consent and is included as an embedded commitment (Section 14.6).
		Consideration is needed of management of float-offs or failings of a significant structure including those that may have an Aid to Navigation (AtoN) and also moorings if a structure needs to be removed. This is also the case if a vessel were to get in trouble within the array and become a potential wreck.	Acknowledged in the assessment of LSE in Section 14.7.
		Any recreational vessels recorded as far offshore as the Array Area, including from out with UK waters, are expected to be experienced and undergo due diligence of the intended route.	Acknowledged in the assessment of LSE in Section 14.7.
	RYA, Hazard Workshop	RYA Scotland noted there is a significant lag in provided information to the United Kingdom Hydrographic Office (UKHO) being updated on relevant nautical charts and most recreational users do not update charts often due to costs. There are various channels though to get this information across to recreational users.	Promulgation of information, including the issue of Notifications to Mariners, is considered as an embedded commitment (Section 14.6). Notifications to Mariners will be issued through Kingfisher.
		Further actions need to be implemented in regard to lighting and marking failure in the instance something goes wrong and a backup is available.	An AtoN Management plan is included as an embedded commitment (Section 14.6).
		Vessel displacement should also consider increased voyages for	Vessel displacement is broken down per vessel type within the Hazard Log (Annex B of the

Date	Consultee and Type of Consultation	Description/ Issues Raised	How this has been considered in this Chapter
		recreational users which includes tiredness.	NRA) and this has been considered in the assessment of LSE in Section 14.7.
		The sparse recreational vessel traffic within the Array Area from the vessel traffic survey data is representative given the distance offshore and no further data collection is required.	Acknowledged in the baseline characterisation of recreational traffic in Section 10.1.2.5 of the NRA.
		Peterhead Bay marina is a popular stop for transiting recreational vessels and vessels tend to transit closer to ports and shore to avoid commercial vessels further offshore.	Acknowledged in the baseline characterisation of recreational traffic in Section 10.1.2.5 of the NRA.
		Some recreational vessels may transit within the array during operation, including in adverse weather. They may also do so to avoid larger commercial vessels. However, internal transits are not expected at the distance offshore during winter periods.	Adverse weather transits by recreational vessels are considered in the identification of adverse weather routeing (Section 12 of the NRA) and the potential for internal navigation is addressed in the assessment of LSE in Section 14.7.
		It may be worthwhile assessing Royal National Lifeboat Institution (RNLI) maritime incident data to identify any incidents which may be involved in loss of power and entanglement of creel ropes, but the situations have improved since the regulation regarding gear marking.	RNLI incident data is assessed in Section 14.5 including consideration of such incidents included in more detail in Section 9.2 of the NRA.
		Potential export cable routes and interconnector cables will also have a cumulative impact.	Cables are included in the cumulative development screening process in Section 14.8 where data is available, and the cumulative effect assessment (CEA) assesses reduction in under keel clearance in Section 14.8.
		A high level of recreational vessels inshore will not be picked up via AIS. Current assumptions are that less than 50% of recreational vessels broadcast on AIS, however a greater number can receive AIS.	Acknowledged in the summary of data limitations for AIS in Section 14.5.
		Cable installation does not pose many problems for recreational vessels as the COLREGs will apply and vessels will work around any ongoing project works.	Acknowledged in the assessment of LSE in Section 14.7.
	Scottish White Fish Producers	At a cumulative level, commercial vessels filtering into gaps between developments will affect fishing vessels and fishing	Commercial routeing in a cumulative scenario is detailed in Section 14.6 of the NRA. Fishing

Date	Consultee and Type of Consultation	Description/ Issues Raised	How this has been considered in this Chapter
	Association (SWFPA), Hazard Workshop	grounds in the area, especially with vessels numbers increasing over time.	vessels displacement is detailed in the assessment of LSE in Section 14.7, and in the CEA in Section 14.8.
		The location of construction ports as this will also increase vessel traffic in the area.	The NRA has identified both options of project vessel routeing from the north and the south as O&M ports have not yet been defined. A VMNSP will be created post consent and is included as an embedded commitment in the NRA (Section 14.6).
		Large pelagic vessels (50-60 m) may transit within the operational array with smaller vessel internal transits dependent on weather conditions, time of day, and skipper preference.	Acknowledged in the assessment of vessel displacement and internal collision risk in the assessment of LSE in Section 14.7.
		The level of transiting vessels is correct within the data shown for the Array Area, but levels of active fishing vessels are underrepresented.	Acknowledged in the baseline characterisation of fishing traffic in Section 10.1.2.3 of the NRA.
		There is a high volume of static fishing gear within 4 nautical miles (nm) (7.4 km) of the shore and so the impact of fishing vessels being displaced will impact this static gear which in turn could also impact other vessel type as this gear will need to be relocated during construction to another site.	Acknowledged in the baseline characterisation of fishing traffic in Section 10.2.2.2 of the NRA and the assessment of vessel displacement in the assessment of LSE in Section 14.7 but will be assessed under the cable burial risk assessment which is included as an embedded commitment within the NRA (Section 14.6).
		A lot of fishing traffic may be vessels coming into land in Peterhead Port and then transit back to their home port of Fraserburgh.	Acknowledged in the baseline characterisation of fishing traffic in Section 10.2.2.2 of the NRA.
9 May, 2024	UK Chamber of Shipping, dedicated meeting	Concern was raised over safe Wind Turbine Generator (WTG) removal for maintenance given the 1,000 m spacing between structures and if this spacing is sufficient.	Acknowledged in the assessment of LSE in Section 14.7, noting that a dedicated risk assessment will be undertaken at the time of towage operations.
		Under keel risks are relevant for project vessels in addition to third-party vessels	Indicative transit route planning will be included as part of the Vessel Management Plan (VMP) (forming part of the Vessel Management and Navigational Safety Plan (VMNSP)) which is included as an embedded commitment

Date	Consultee and Type of Consultation	Description/ Issues Raised	How this has been considered in this Chapter
			(Section 14.6).
		Note the repurposing of oil and gas vessels and indicated that an increase in Service Operation Vessels (SOV) across the offshore wind industry will balance some of the reduction in oil and gas movements.	Future case vessel traffic for commercial vessels is summarized in Section 14.1 of the NRA with the repurposing of oil and gas vessels considered.
		Loss of station being considered for construction and decommissioning phases in the impact assessment should be associated with loss of tow specifically.	Although acknowledged in the assessment of LSE in Section 14.7, a separate impact assessment process at the time will be undertaken.
		The Chamber queried the near miss MAIB incident within the Array Area regarding the Project Floating Light Detection and Ranging (FLiDAR) System (FLS).	The near miss incident occurred in 2016 whereas the FLS was deployed in 2023, i.e., no temporal overlap. This is detailed further in Section 9.4 of the NRA.

14.5. BASELINE ENVIRONMENT

14.5.1. This Section presents a summary of the Shipping and Navigation study area, methodology, baseline environment, future conditions, and limitations and assumptions of the data used. The supporting analysis undertaken to develop this baseline is provided in the NRA.

STUDY AREA

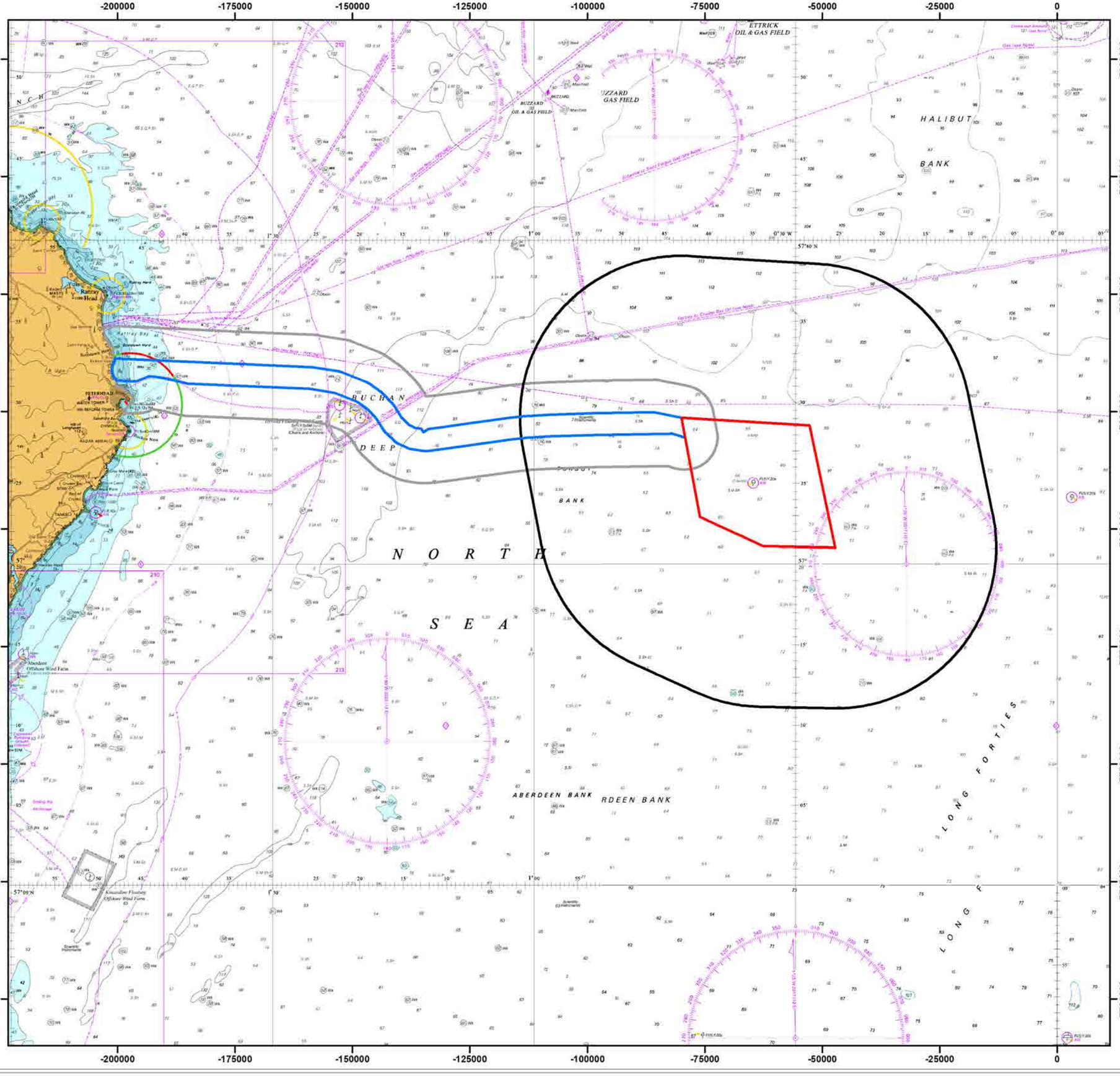
14.5.2. Figure 14-1 shows the Shipping and Navigation study areas. This includes the following:

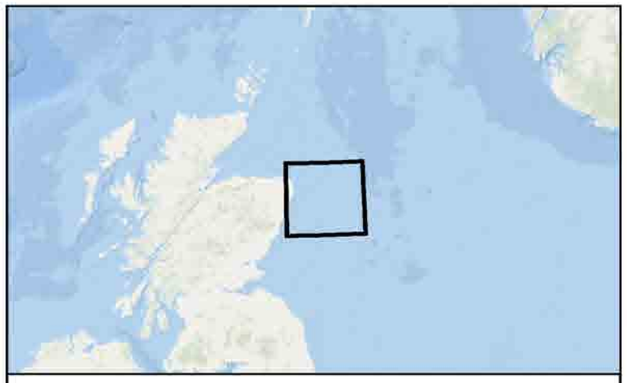
- Proposed Development Array Area;
- Offshore Export Cable Corridor (ECC);
- Shipping and Navigation study area; and
- Shipping and Navigation offshore ECC study area.

14.5.3. A 10 nm (18.5 km) buffer has been applied around the Array Area (hereafter referred to as the Shipping and Navigation 'study area') as shown in Figure 14-1. The 10 nm (18.5 km) buffer is standard for shipping and navigation assessment as it captures relevant routeing in the region whilst still remaining site-specific and providing local context to the analysis of risks.

14.5.4. It is noted that the NRA also includes detailed assessment of vessel traffic within a 2 nm (3.7 km) buffer of the offshore ECC (hereafter referred to as the 'Shipping and Navigation offshore ECC study area'). As with the Shipping and Navigation study area, this has been defined to capture relevant receptors and their movements within, and near, the offshore ECC. Full details of this assessment are provided in the NRA (Section 10.2).

14.5.5. It is acknowledged that features of the baseline environment are considered outside of the study areas where considered relevant to the assessment of LSE particularly those which may impact the overall routeing of vessels recorded within the study area.





Legend:

- Array Area
- Offshore Export Cable Corridor
- Shipping and Navigation Study Area
- Shipping and Navigation Offshore Export Cable Corridor Study Area

Project: Muir Mhòr	Report: Environmental Impact Assessment Report

Shipping and Navigation Study Areas

Figure: 14.1	Drawing No: ANA-EIAR-S&N-001		
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Map scale 1:808,532 @ A3

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MUIR MHÒR OFFSHORE WIND FARM

A joint venture between Fred.Olsen Seawind & Vattenfall

Service Layer Credits: Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

METHODOLOGY

14.5.6. Baseline data to inform the Shipping and Navigation assessment was collected using the following methods:

DESKTOP STUDY

14.5.7. For the purposes of this Shipping and Navigation Chapter, a desk-based review was undertaken using relevant spatial and scientific data sources including Anatec's in-house ShipRoutes database (2024), AIS datasets, maritime incidents datasets, UKHO Admiralty charts and relevant Admiralty Sailing Directions.

14.5.8. These existing data sets and literature encompassing the Shipping and Navigation study areas, are presented in more detail in Table 14-4.

SITE-SPECIFIC SURVEYS

14.5.9. Project specific surveys were also carried out to collect data to inform assessment of Shipping and Navigation and are provided in Table 14-5. Vessel traffic surveys were carried out by a dedicated on-site vessel and were undertaken in agreement with the MCA and NLB. Each survey consisted of 14 full days of vessel traffic data collection via AIS, Radar, and visual observation which combined comply with MGN 654 requirements. The dataset from each survey was supplemented with AIS collected from alternate AIS receivers to ensure optimal coverage. These surveys were undertaken:

- 10 to 26 February 2023 (14 days, winter); and
- 23 July to 6 August 2023 (14 days, summer).

MODELLING

14.5.10. The impacts associated with the Proposed Development have been primarily assessed on a qualitative basis. However, numerical modelling was conducted in support of the NRA and this Chapter using Anatec's suite of collision and allision risk models. The modelling process is designed to inform the qualitative assessment via providing quantitative estimates on potential frequencies at which impacts may occur. The assessment of LSE considers these quantitative estimates, noting that intelligent interpretation including of potential associated consequences is applied.

14.5.11. These models have each been used in many successful offshore wind applications within the UK. The models are refined and improved on a continuous basis. Key models within this suite include:

- Encounters – identifies instances of vessel encounters within an AIS dataset;
- COLLRISK vessel to vessel collision – estimates the frequency at which two passing vessels (head on, crossing, or overtaking encounters) may collide within a pre-defined area;
- COLLRISK vessel to structure allision (powered) – estimates the frequency at which a passing vessel may allide with a wind farm structure while under power;
- COLLRISK vessel to structure allision (drifting) – estimates the frequency at which a passing vessel may allide with a wind farm structure while Not Under Command (NUC); and
- COLLRISK fishing vessel to structure allision – estimates the frequency at which a fishing vessel either passing or operating internally within an offshore wind farm may allide with a wind farm structure.

14.5.12. Further details pertaining to the inputs and methodology of the models used are provided in Section 16 of the NRA.

Table 14-4 Key Sources of Shipping and Navigation Literature and Data

Source, Author, and Year	Summary	Coverage of Proposed Development Study Area
Offshore ECC AIS Vessel Traffic Data, Anatec Ltd, 2023	AIS only dataset comprising the same data periods as the 2023 vessel traffic surveys (Table 14-5), within the Shipping and Navigation offshore ECC study area, recorded from the same dedicated survey vessel on-site for the Array Area and from coastal receivers. The offshore ECC data includes 17 full days of data to overlap the winter survey data and 15 full days for the summer survey period[1]. Used to characterise vessel traffic movements within and in proximity to the offshore ECC.	Full coverage of the Shipping and Navigation offshore ECC study area.
Long-term AIS Vessel Traffic Data, Anatec, 2022	AIS data for the Shipping and Navigation study area (12 months, entirety of 2022) (hereafter the 'long-term vessel traffic data') recorded from satellite and coastal receivers. Used to validate the vessel traffic surveys and characterising seasonal variations and weather routeing.	Full coverage of the Shipping and Navigation study area.
ShipRoutes database, Anatec Ltd, 2024	Secondary source for characterising vessel traffic movements including cumulatively within and in proximity to the boundary of the Array Area.	Full coverage of the Shipping and Navigation study area.
Maritime Incident Data, MAIB, 2002 to 2021	Review of MAIB maritime incidents within and in proximity to the boundary of the Array Area covering a 20-year period.	Full coverage of the Shipping and Navigation study area and Shipping and Navigation offshore ECC study area
Maritime Incident Data, Royal National Lifeboat Institution (RNLI), 2008 to 2022	Review of MAIB maritime incidents within and in proximity to the boundary of the Array Area covering a 15-year period.	Full coverage of the Shipping and Navigation study area and Shipping and Navigation offshore ECC study area
Department for Transport (DfT) UK civilian SAR helicopter taskings, DfT, 2015 to 2023	Review of DfT helicopter tasking within and in proximity to the boundary of the Array Area covering an eight-year period.	Full coverage of the Shipping and Navigation study area and Shipping and Navigation offshore ECC study area.
UK Coastal Atlas of Recreational Boating	Characterising recreational activity within and in	Full coverage of the Shipping and Navigation offshore

[1] The vessel traffic survey data only included 14 full days per survey period but due to adverse weather and partial days being incorporated into the survey periods, to get a full overlap of vessel traffic, full days have been included for the offshore ECC data and has been analysed as appropriate.

Source, Author, and Year	Summary	Coverage of Proposed Development Study Area
2.1, RYA, 2019	proximity to the Array Area and offshore ECC.	ECC study area.
East Coast of Scotland Sailing Directions, Andy Carnduff; Forth Yacht Clubs Association, 2023	Characterising recreational activity within and in proximity to the Array Area and offshore ECC.	Full coverage of the Shipping and Navigation study area and Shipping and Navigation offshore ECC study area.
Admiralty Charts 115-0, 213-0 ,273-0, 278-0, and 1409-0, UKHO, 2024	Characterising navigational features within and in proximity to the Array Area and offshore ECC.	Full coverage of the Shipping and Navigation study area and Shipping and Navigation offshore ECC study area.
Admiralty Sailing Directions North Sea (West) Pilot NP54, UKHO, 2021	Characterising navigational features within and in proximity to the Array Area and offshore ECC	Full coverage of the Shipping and Navigation study area and Shipping and Navigation offshore ECC study area.
Wind direction data provided by the Developer	Characterising weather conditions in proximity to Array Area for use as input in the collision and allision risk modelling.	Full coverage of the Shipping and Navigation study area.
Significant wave height data provided by Floating Light Detection and Ranging (FLiDAR) System (FLS) within Array Area, 2023	Characterising weather conditions in proximity to Array Area for use as input in the collision and allision risk modelling.	Full coverage of the Shipping and Navigation study area.
Tidal Data provided by Admiralty Chart 278, UKHO, 2024	Characterising weather conditions in proximity to Array Area for use as input in the collision and allision risk modelling.	Full coverage of the Shipping and Navigation study area.
Visibility data provided in Admiralty Sailing Directions North Sea (West) Pilot NP54, UKHO, 2021	Characterising weather conditions in proximity to Array Area for use as input in the collision and allision risk modelling.	Full coverage of the Shipping and Navigation study area.
Case Studies of Past Weather Events, Met Office, 2024	Identifying periods of adverse weather in proximity to the Array Area.	Full coverage of the Shipping and Navigation study area and Shipping and Navigation offshore ECC study area.

Table 14-5 Project Specific Surveys undertaken to inform Shipping and Navigation

Survey	Summary	Coverage of Proposed Development Study Area
Dedicated winter Array Area vessel traffic survey, Anatec Ltd, 2023	A total of 14 days AIS, Radar, and visual observation data collected between 10 to 26 February 2023 which is used to characterise vessel traffic movements within and in proximity to the Array Area, collected via onsite survey vessel, in line with MGN 654 (MCA, 2021) requirements.	Full coverage of the Shipping and Navigation study area.
Dedicated summer Array Area vessel traffic survey, Anatec Ltd, 2023	A total of 14 days AIS, Radar, and visual observation data collected between 23 July to 6 August 2023 which is used to characterise vessel traffic movements within and in proximity to the Array Area, collected via onsite survey vessel, in line with MGN 654 (MCA, 2021) requirements.	Full coverage of the Shipping and Navigation Study Area

DESCRIPTION OF BASELINE ENVIRONMENT

14.5.13. A summary of the Shipping and Navigation baseline environment is provided in the following Sections. Full details of the analysis undertaken to develop the Shipping and Navigation baseline is provided in the NRA.

NAVIGATIONAL FEATURES

14.5.14. The baseline navigational features within, and in proximity to, the Array Area and offshore ECC are presented in Figure 14-2. It is noted that a more detailed illustration of the navigational features in proximity to the landfall location of the offshore ECC is presented in Section 7 of the NRA. Stakeholders confirmed during dedicated meetings, and at the Hazard Workshop, that all expected navigational features in proximity to the Proposed Development were suitably characterised. It is noted that no IMO routeing measures, marine aggregate dredging areas, military practice and exercise areas (PEXA), or anchorage areas were identified in proximity to the Proposed Development.

14.5.15. Navigational features of importance include the operational Hywind Scotland floating OWF which is situated approximately 19 nm (32.5 km) to the west of the Array Area and shares a point of its northern border with the offshore ECC. Hywind's export cable also intersects the offshore ECC approximately 2.5 nm (4.6 km) offshore.

14.5.16. Peterhead Port, the largest fishing port in Europe, is the closest port to the Proposed Development at approximately 34 nm (62.9 km) to the west of the Array Area and 1 nm (1.85 km) south of the offshore ECC. A pilot boarding station is located approximately 2 nm (4.6 km) offshore from the port with pilotage being compulsory depending on various factors (see Section 7.2.1 of the NRA). Peterhead Port Authority operates a vessel traffic service (VTS) with Radar surveillance. Within Peterhead Port is Peterhead Bay Marina which was noted by RYA Scotland at the Hazard Workshop as a common stopping point for transiting recreational vessels (Section 14.4).

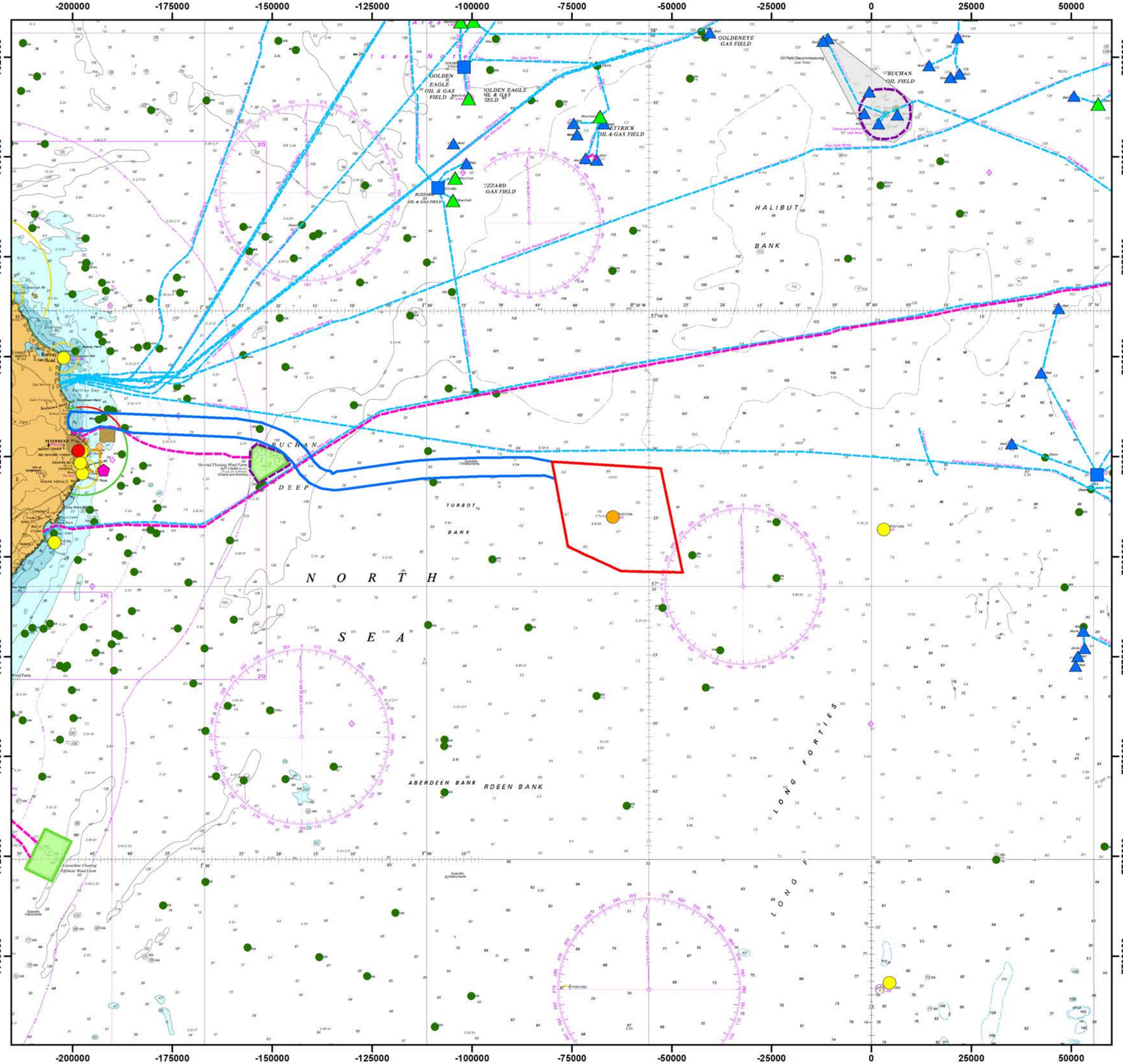
14.5.17. An FLS is located within the Array Area and was deployed by the Developer in February 2023 with anticipated removal in 2025. The FLS is equipped with a special top mark and flashing yellow light with a range of 5 nm (9.26 km) and carries AIS. Excluding this FLS, the closest AtoN to the Array Area is a spherical light buoy located 15 nm (27.8 km) to the east. There are no AtoNs within the offshore ECC, with the closest the significant all round light on the north breakwater on approach to Peterhead Port and the Peterhead Lighthouse on the south breakwater, approximately 1.5 nm (2.78 km) south of the offshore ECC.

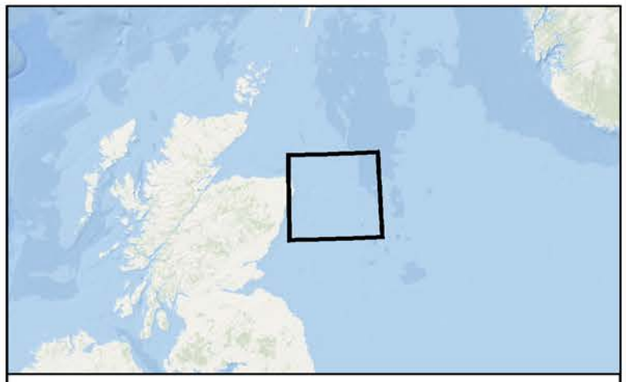
14.5.18. The closest subsea cable to the Array Area is the electrical cable linking the Forties Field to Cruden Bay. This cable passes approximately 5.7 nm (10.5 km) north of the Array Area and intersects the offshore ECC approximately 15 nm (27.8 km) offshore. At the same point in the offshore ECC, the subsea pipeline also linking the Forties Field to Cruden Bay intersects. The closest subsea pipeline connecting the Fulmar Field to St. Fergus Terminal is the closest to the Array Area at approximately 0.8 nm (1.48 km) north and passes 0.4 nm (0.74 km) north of the offshore ECC.

14.5.19. The Buzzard Field and associated surface platforms are situated approximately 20 nm (37.0 km) north of the Proposed Development with the Ettrick Field approximately 22 nm (40.7 km) north, although Ettrick does not contain any surface piercing platforms.

14.5.20. A foul ground is located approximately 0.6 nm (1.11 km) east of Peterhead Port, and a spoil ground is located adjacently north of the foul ground. This spoil ground intersects the offshore ECC.

14.5.21. Four charted wrecks are located within the offshore ECC with the shallowest at 36 m below CD approximately 2 nm (3.70 km) offshore. No charted wrecks were recorded within the Array Area.





Legend:

- Array Area
- Offshore Export Cable Corridor

Navigational Features

- Port of Harbour
- Pilot Boarding Station
- Platform
- Well
- Manifold
- Floating LiDAR System
- Key Aid to Navigation
- Wreck or Obstruction
- Operational OWF
- Oil and Gas Decommissioning Area
- Foul Ground
- Spoil Ground
- Harbour Limit
- Subsea Cable
- Subsea Pipeline
- Chains and Anchors

Project:	Report:
Muir Mhòr	Environmental Impact Assessment Report

Navigational Features

Figure: 14.2	Drawing No: ANA-EIAR-S&N-002		
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Map scale 1:950,000 @ A3 — 0 10 20 nm

Co-ordinate system: WGS 1984 World Mercator **EPSG:** 3395

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MUIR MHÒR OFFSHORE WIND FARM

A joint venture between Fred.Olsen Seawind & Vattenfall

Service Layer Credits: Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

VESSEL TRAFFIC MOVEMENTS

ARRAY AREA

14.5.22. A plot of the vessel traffic recorded via AIS, Radar, and visual observations over the summer and winter survey periods within the Shipping and Navigation study area is colour-coded by vessel type and presented in Figure 14-3.

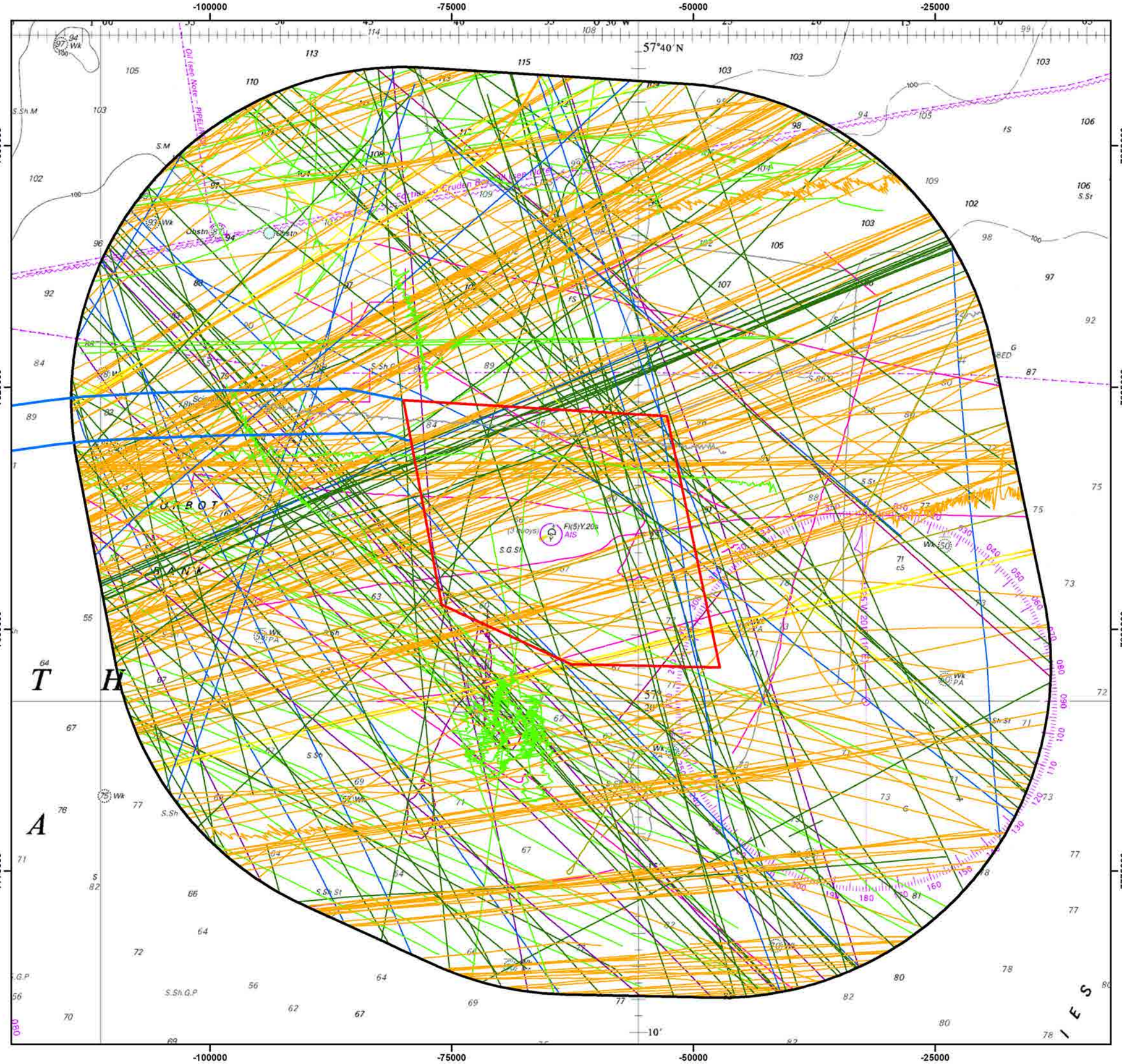
14.5.23. For the 14 days analysed in the winter survey period, there was an average of 12 unique vessels per day recorded within the Shipping and Navigation study area, and three unique vessels every day recorded intersecting the Array Area itself. For the 14 days analysed in the summer survey period, there was an average of 18 unique vessels per day recorded within the Shipping and Navigation study area, and again three unique vessels every day recorded intersecting the Array Area itself. The main vessel types recorded within the Shipping and Navigation study area overall were oil and gas vessels (58%), cargo vessels (17%), and fishing vessels (15%). Both recreational vessels and passenger vessels were seasonal and only recorded during the summer survey period.

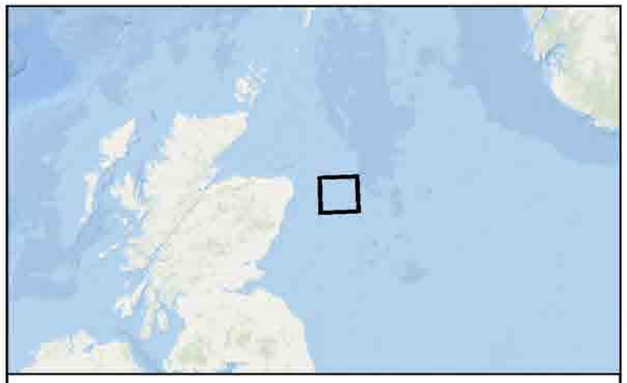
14.5.24. Vessel length was available for 98% of vessels recorded throughout the two surveys periods within the Shipping and Navigation study area and ranged from 10 m for a recreational sailing vessel to 333 m for a cruise liner; this cruise liner intersected the south-west of the Array Area during the summer survey period. Excluding the proportion of vessels for which length was not available, the average length of vessels within the Shipping and Navigation study area throughout both survey periods was 95 m.

14.5.25. Vessel draught was available for 86% of vessels recorded throughout the two survey periods within the Shipping and Navigation study area. Vessel draught ranged from 0.2 m for a fishing vessel to 14.7 m for a shuttle tanker; this tanker intersected the east of the Array Area whilst routeing north south during the winter survey period. Excluding the proportion of vessels for which draught was not available, the average draught of vessels within the Array Area study area throughout both survey periods was 5.7 m.

14.5.26. No vessels were deemed to be at anchor within the Shipping and Navigation study area. Full details of the methodology applied to ascertain this are provided in Section 10.1.2.7 of the NRA.

14.5.27. Main commercial routes have been identified using the principles set out in MGN 654 (MCA, 2021). A total of 18 main commercial routes were identified within the Shipping and Navigation study area. The main commercial routes are shown in Figure 14-4 with descriptions for each of the main routes provided in Table 14-6.





Legend:

- Array Area
- Offshore Export Cable Corridor
- Shipping and Navigation Study Area

Vessel Type

- Unspecified
- Fishing
- Military
- Tug
- Passenger
- Cargo
- Tanker
- Other
- Recreational
- Oil and Gas

Project:	Report:
Muir Mhòr	Environmental Impact Assessment Report

28-Day Vessel Traffic Survey Data by Vessel Type (2023)

Figure: 14.3	Drawing No: ANA-EIAR-S&N-003		
Revision:	Date:	Drawn:	Checked:
01	04/07/24	RR	JM

Map scale 1:392,263 @ A3

0 3 6 nm

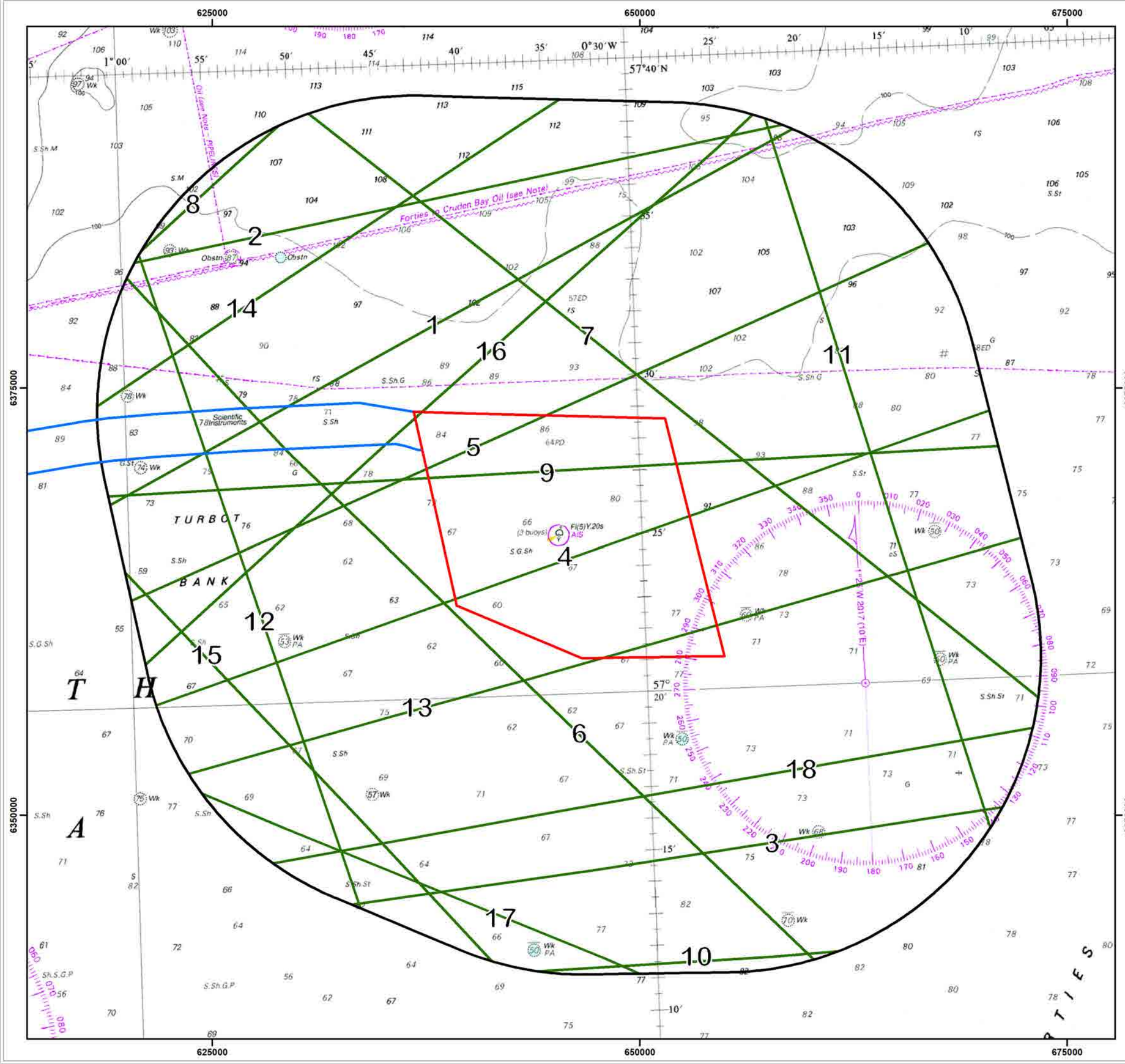
Co-ordinate system: WGS 1984 World Mercator **EPSG:** 3395

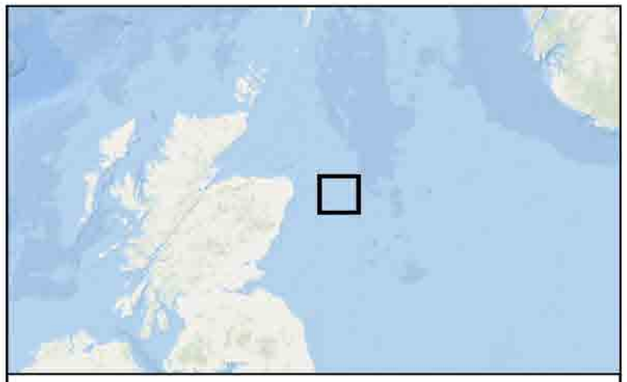
anatec

MUIR MHÒR OFFSHORE WIND FARM

A joint venture between Fred.Olsen Seawind & Vattenfall

Service Layer Credits: Esri, Garmin, GEBCO, NOAA NGDC, and other contributors





Legend:

- Array Area
- Offshore Export Cable Corridor
- Shipping and Navigation Study Area
- Mean Route Position

Project: Muir Mhòr	Report: Environmental Impact Assessment Report

Pre Wind Farm Main Commerical Routes

Figure: 14.4	Drawing No: ANA-EIAR-S&N-004		
Revision:	Date:	Drawn:	Checked:
01	04/07/24	RR	JM

Map scale 1:219,529 @ A3

0 2.5 5 km

Co-ordinate system: ETRS 1989 UTM Zone 30N **EPSG:** 25830

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Table 14-6 Main Commercial Route Details

Route Number	Vessels per Week	Route Details
1	8	Aberdeen – Alba/Britannia/Andrew Fields. Oil and gas vessels (100%).
2	7	Peterhead – Forties Field. Oil and gas vessels (100%).
3	7	Aberdeen/Montrose Ports – Mungo/Seagull/Montrose Fields. Oil and gas vessels (100%).
4	5	Aberdeen – Forties/Nelson/Everest Fields. Oil and gas vessels (100%).
5	4	Aberdeen – Risavika/Aberdeen – Armada Field. Sea Cargo operated Ro-Ro route (45%) and dedicated oil and gas route (55%).
6	4	Germany/Netherlands – USA/Canada/Mexico. Cargo vessels (75%) with infrequent tankers (16%) and seasonal cruise liners (9%).
7	4	Germany – USA/Canada/Mexico. Cargo vessels (83%) with infrequent tankers (13%) and seasonal cruise liners (4%). Used by the Germany – Glensanda (UK) regular cargo route.
8	2 to 3	Aberdeen – Tiffany Field. Oil and gas vessels (100%).
9	2	Peterhead – Kittiwake Field. Oil and gas vessels (100%).
10	2	Aberdeen – Culzean Field/ETAP. Oil and gas vessels (100%).
11	2	Northern Isles – Rotterdam. Tankers (61%) and cargo vessels (35%)
12	1 to 2	Iceland – Humber ports/Rotterdam. Cargo vessels (58%) and tankers (42%).
13	1 to 2	Aberdeen – Kittiwake Field. Oil and gas vessels (100%).
14	1 to 2	Aberdeen – Norway. Oil and gas vessels (100%).
15	1 to 2	Moray Firth – Rotterdam. Cargo vessels (63%), tankers (24%) and seasonal cruise liners (13%).
16	1 to 2	Montrose – Norway. Oil and gas vessels (100%).
17	Less than 1	Peterhead – Curlew Field. Oil and gas vessels (100%).
18	Less than 1	Aberdeen – Baltic Ports. Cargo vessels (84%) and tankers (16%).

OFFSHORE EXPORT CABLE CORRIDOR

14.5.28. A plot of the vessel traffic recorded via AIS over the summer and winter data periods within the Shipping and Navigation offshore ECC study area is colour-coded by vessel type and presented in Figure 14-5.

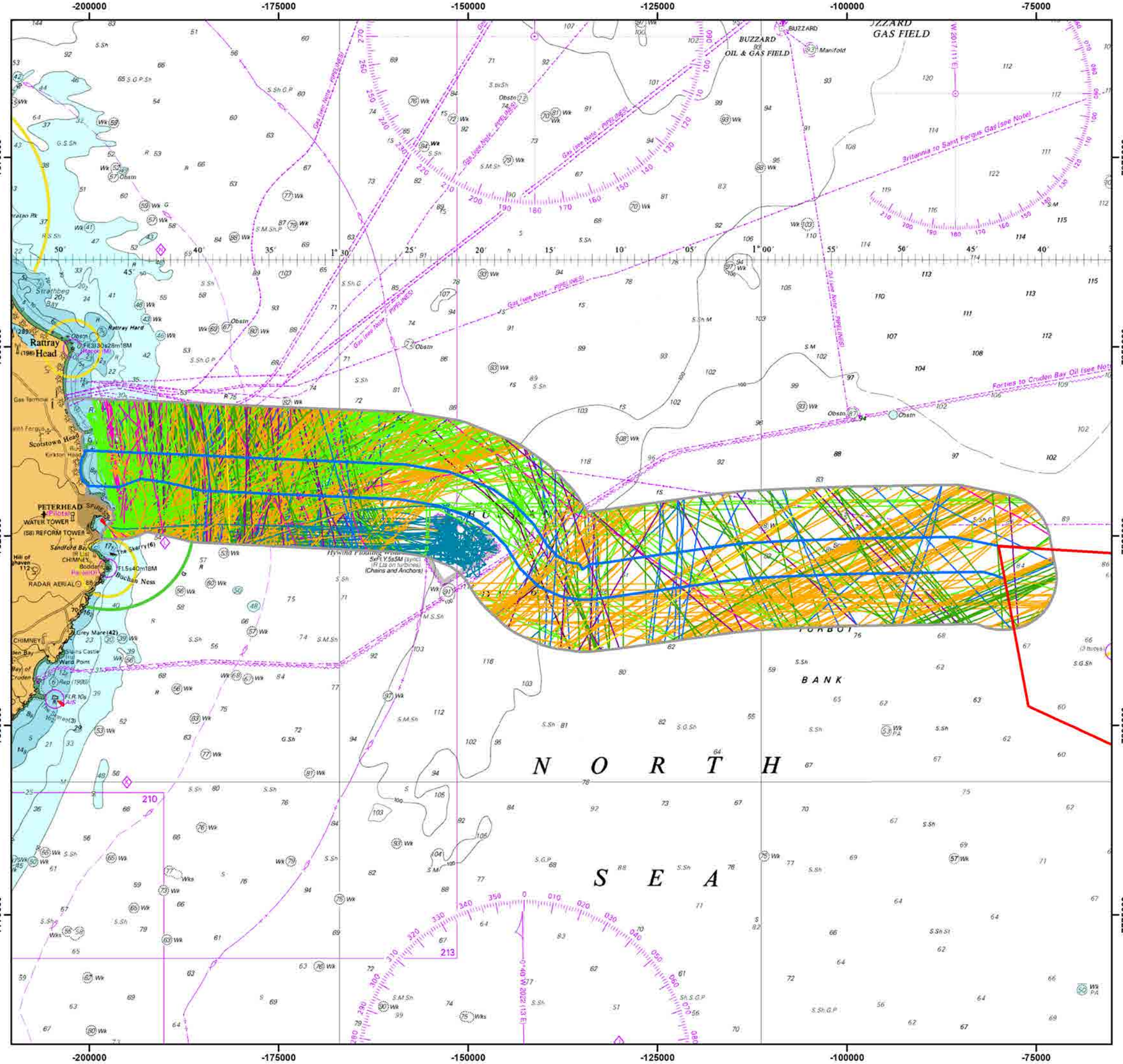
14.5.29. For the 17 days analysed in the winter data period, there was an average of 48 unique vessels per day recorded within the Shipping and Navigation offshore ECC study area, and 39 unique vessels every day recorded crossing the offshore ECC itself. For the 14 days analysed in the summer data period, there was an average of 62 unique vessels per day recorded within the Shipping and Navigation offshore ECC study area, and 45 unique vessels every day recorded crossing the offshore ECC itself. The main vessel types recorded within the Shipping and Navigation offshore ECC study area overall were oil and gas vessels (36%), fishing vessels (31%), and cargo vessels (13%).

14.5.30. Vessel length was available for greater than 99% of vessels recorded throughout the two data periods within the Shipping and Navigation offshore ECC study area and ranged from a 5 m potter to a 333 m cruise liner; this cruise liner crossed the offshore ECC on two occasions in the east of the offshore ECC study area during the summer data period. Excluding the

proportion of vessels for which length was not available, the average length of vessels within the Shipping and Navigation offshore ECC study area throughout both data periods was 70 m.

14.5.31. Vessel draught was available for 78% of vessels recorded throughout the two data periods within the Shipping and Navigation offshore ECC study area. Vessel draught ranged from 0.2 m for various fishing vessels to a 15 m bulk carrier cargo vessel; this cargo vessel crossed the offshore ECC routeing north south, inshore of Hywind, during both the winter and summer data periods. Excluding the proportion of vessels for which draught was not available, the average draught of vessels within the Shipping and Navigation offshore ECC study area throughout both data periods was 5.1 m.

14.5.32. No vessels were deemed to be at anchor within the Shipping and Navigation offshore ECC study area.



Legend:

- Array Area
- Offshore Export Cable Corridor
- Shipping and Navigation Study Area

Vessel Type

- Fishing
- Military
- Tug
- Passenger
- Cargo
- Tanker
- Other
- Recreational
- Oil and Gas
- Wind Farm

Project:	Report:
Muir Mhòr	Environmental Impact Assessment Report

32-Day AIS Vessel Traffic Data by Vessel Type within the Shipping and Navigation Offshore ECC Study Area (2023)

Figure: 14.5	Drawing No: ANA-EIAR-S&N-005		
Revision:	**Date:**	**Drawn:**	**Checked:**
01	04/07/24	RR	JM

Map scale 1:500,985 @ A3

0 5 10 nm

Co-ordinate system: WGS 1984 World Mercator **EPSG:** 3395

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MUIR MHÒR OFFSHORE WIND FARM

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MARITIME INCIDENTS

SEARCH AND RESCUE HELICOPTERS

14.5.33. The SAR helicopter service is currently operated by Bristow Group and the closest operational base to the Proposed Development is Inverness at 108 nm (200 km) to the west.

14.5.34. A total of 10 helicopter taskings were recorded within the combined Shipping and Navigation study areas between April 2015 and March 2023, equating to an average of one tasking per year. Only two taskings occurred within the Shipping and Navigation study area; a "rescue/recovery" and a "support", no taskings were recorded within the Array Area itself.

14.5.35. The base at Inverness responded to 90% of incidents with one incident being responded to by the Stornoway base.

ROYAL NATIONAL LIFEBOAT INSTITUTION

14.5.36. A total of 46 incidents were responded to by the RNLI within the combined Shipping and Navigation study area between 2013 and 2022. This corresponds to an average of approximately four to five incidents per year; however, it is noted that the majority of incidents (approximately 85%) occurred within 5 nm (9.26 km) of the coast whilst the number of incidents further offshore was much lower.

14.5.37. The most frequent station for incident response was Peterhead (78%) which is the closest RNLI station to the Proposed Development. The most common incident types were "unspecified" (46%) and "machinery failure" (26%). The most common casualty types recorded were unspecified vessels (37%) followed by recreational vessels (24%). No incidents were responded to by the RNLI within the Array Area itself.

14.5.38. A more detailed analysis on RNLI incidents including analyses on a further five years of data is provided in Section 9.2 of the NRA.

MARINE ACCIDENT INVESTIGATION BRANCH

14.5.39. A total of 28 unique incidents were reported to the MAIB within the combined Shipping and Navigation study areas between 2012 and 2021. This corresponds to an average of three incidents per year; however, it is noted that the majority of incidents (approximately 71%) occurred within 6 nm (11.1 km) of the coast whilst the number of incidents further offshore was much lower. Only one incident occurred with the Array Area, a near miss collision incident in 2016 involving a dry cargo vessel and a platform under tow but no contact occurred. The most common incident types recorded were "accident to person" (32%) and "machinery failure" (30%). The most common casualty type recorded was fishing vessels (59%).

14.5.40. A more detailed analysis on MAIB incidents including analyses on a further 10 years of data is provided in Section 9.4 of the NRA.

FUTURE BASELINE CONDITIONS

14.5.41. The EIA Regulations are defined as the following:

- Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017
- Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017
- Marine Works (Environmental Impact Assessment) Regulations 2007

14.5.42. In line with the EIA Regulations, this EIAR requires a "description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort, on the basis of the availability of environmental information and scientific knowledge". This reflects how the baseline relevant to Shipping and Navigation is expected to evolve without the Proposed Development.

INCREASES IN COMMERCIAL VESSEL ACTIVITY

14.5.43. Given future commercial traffic trends are dependent on various factors, and are hence difficult to predict, the NRA has assumed potential increases of 10% and 20% within the commercial traffic allision and collision modelling. The consideration of a range of conservative values is considered as covering potential increases over the course of the Project's operational lifespan. These values are conservative and based on expert opinion and were proposed during the Hazard Workshop where no concerns were raised.

14.5.44. These values also consider that oil and gas vessels may decrease over time due to the decommissioning of oil and gas structures in the North Sea but as noted by the UK Chamber of Shipping (Section 14.4) oil and gas vessels may be repurposed across the offshore wind industry and can balance out the reduction in oil and gas movements

INCREASES IN COMMERCIAL FISHING ACTIVITY

14.5.45. In line with the commercial vessel activity, again an indicative 10% and 20% increases in commercial fishing vessel transits have been considered in the modelling undertaken within the NRA (Section 16). These values are used due to there again being limited reliable information on future activity levels upon which any firm assumption can be made. It is noted that additional information on commercial fishing trends is contained within Volume 2, Chapter 13 (Commercial Fisheries).

INCREASES IN RECREATIONAL ACTIVITY

14.5.46. There are no known developments which will increase the activity of recreational vessels within the Shipping and Navigation study area. Therefore, as with commercial fishing activity, given the lack of reliable information relating to future trends, 10% and 20% increases are considered conservative, and have therefore been applied.

INCREASES ASSOCIATED WITH PROJECT ACTIVITIES

14.5.47. The anticipated number of vessels associated with the Proposed Development during the construction and O&M phases are presented within the NRA (Section 6.6) and in Volume 1, Chapter 3 (Project Description). Base ports have not yet been determined therefore it is not possible to provide any detailed overview of the likely pattern of project vessel movements.

CLIMATE CHANGE EFFECTS

14.5.48. For shipping and navigation, adverse weather includes wind, wave and tidal conditions as well as reduced visibility due to fog. In adverse weather, a vessel's standard route, speed of navigation and/ or ability to enter port can be compromised. A change in storm surge severity and frequency may affect the likelihood of such a scenario arising. However, the Met Office has found no evidence for significant changes in future storm surges using the UK Climate Projections 2018 (UKCP18) model (Met Office, 2019). Additionally, the UKCP18 data projects that annual wind speed will decrease both in the short to medium term and long term and CMIP5 simulations suggest an overall decrease in mean significant wave height around most of the UK coastline of 10 to 20% over the 21st century.

14.5.49. The ability of a vessel to safely access a port is affected by several factors including navigable water depths. The UKCP18 data projects an increase in the annual time-mean sea level anomaly from 0.03 m (in 2007) to 0.16 m in 2040, and 0.29m in 2060. This change is likely to increase navigable water depth, but there is potential that the usability of port facilities could be adversely affected.

14.5.50. The effect on adverse weather routeing by commercial vessels due to climate change is assessed to be negligible. The projections do not give any clear indication that adverse weather conditions are likely to arise more frequently or with more severity and thus it is not reasonable to expect climate change to further exacerbate effects caused by the Proposed Development.

14.5.51. The effect on local port access by commercial vessels due to climate change is assessed to be broadly acceptable. The projections indicate that navigable water depth for accessing ports will be positively affected, although the availability of port facilities may be adversely affected, including berthing services. This may increase tidal constraints and subsequently the sensitivity of vessel schedules; however, such a scenario is unlikely to be severe within the parameters of the UKCP18 data.

14.5.52. Overall, the rate of change for relevant climate variables is considered very low and as a result there is limited additional effect due to climate change expected on shipping and navigation receptors over the lifetime of the Proposed Development, noting that there is some uncertainty associated with the projections. It is also noted that changes to international conventions regulating the shipping industry will mitigate impacts associated with increased journey time and/ or distance.

14.5.53. Further consideration of climate change is provided in Volume 2, Chapter 18 (Climate).

DATA LIMITATIONS AND ASSUMPTIONS

AUTOMATIC IDENTIFICATION SYSTEM DATA

14.5.54. The carriage of AIS is required on board all vessels of greater than 300 Gross Tonnage (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 1 July 2002, and fishing vessels over 15 m length overall (LOA).

14.5.55. Therefore, for the vessel traffic surveys larger vessels were recorded on AIS, while smaller vessels without AIS installed (including fishing vessels under 15 m LOA and recreational craft) were recorded, where possible, on the Automatic Radar Plotting Aid (ARPA) Radar on board the dedicated survey vessels. A proportion of smaller vessels also carry AIS voluntarily, typically utilising a Class B AIS device.

14.5.56. Throughout the winter survey, approximately 95% of vessel tracks were recorded via AIS with the remaining 5% recorded via Radar. Throughout the summer survey, approximately 92% of vessel tracks were recorded via AIS with the remaining 8% recorded via Radar. During consultation RYA Scotland indicated that current assumptions are that less than 50% of recreational vessels broadcast on AIS (although this is likely to be higher at the distance offshore of the Array Area).

14.5.57. The long-term vessel traffic data – an AIS only dataset – assumes that vessels under a legal obligation to broadcast via AIS will do so. Both the long-term vessel traffic data and the AIS component of the vessel traffic survey data assume that the details broadcast via AIS is accurate (such as vessel type and dimensions) unless there is clear evidence to the contrary.

HISTORICAL INCIDENT DATA

14.5.58. Although all UK commercial vessels are required to report accidents to the MAIB, non-UK vessels do not have to report unless they are in a UK port or within 12 nm (22.2 km) territorial waters (noting that the Shipping and Navigation study area is not located entirely within 12 nm (22.2 km) 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.

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

UNITED KINGDOM HYDROGRAPHIC OFFICE ADMIRALTY CHARTS

14.5.60. 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. For AtoNs, only those charted and considered key to establishing the Shipping and Navigation baseline are show. 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.

14.6. SHIPPING AND NAVIGATION ASSESSMENT METHODOLOGY

14.6.1. Assessment of effects in this Chapter will be based on the FSA methodology noting this is the international standard for marine assessment, and is the approach required by the MCA under MGN 654 specifically Annex 1 (MCA, 2021). This approach differs to the general approach outlined in Volume 1, Chapter 6 (EIA Methodology) of the EIAR.

14.6.2. Shipping and Navigation specific assessment criteria on assessing Shipping and Navigation is provided below. For relevant Guidance, see Section 14.3.

CRITERIA FOR ASSESSMENT

14.6.3. The process for determining the significance of effects is a two-stage process that involves defining the severity of consequence of the LSE and the frequency of occurrence of the receptors. This Section describes the criteria applied in this Chapter to assign values to the severity of consequence and the frequency of occurrence of LSE.

SEVERITY OF CONSEQUENCE

14.6.4. The severity of consequence criteria for Shipping and Navigation, used within the NRA and this Chapter, is provided in Table 14-7.

Table 14-7 Severity of Consequence Criteria for Shipping and Navigation

Severity of Consequence	Description
Negligible	• No perceptible risk to people, property, the environment, or business.
Minor	• Slight injury(s) to people; • Minor damage to property, i.e., superficial damage; • Tier 1 environmental damage with local assistance required; and • Minor reputational risk to business limited to receptors.
Moderate	• Multiple minor or single serious injury to people; • Damage to property not critical to operations; • Tier 2 environmental damage with limited external assistance required; and • Local reputational risk to business.
Serious	• Multiple serious injuries or single fatality to people; • Damage to property resulting in critical risk to operations; • Tier 2 environmental damage with regional assistance required; and • National reputational risk to business.
Major	• Multiple fatalities to people; • Total loss of property; • Tier 3 environmental damage with national assistance required; and • International reputational risk to business.

FREQUENCY OF OCCURRENCE

14.6.5. The frequency of occurrence criteria for Shipping and Navigation receptors, used within the NRA and this Chapter, are provided in Table 14-8.

Table 14-8 Receptor Frequency of Occurrence Criteria for Shipping and Navigation

Frequency of Occurrence	Description
Negligible	Less than one occurrence per 10,000 years
Extremely unlikely	One per 100 to 10,000 years
Remote	One per 10 to 100 years
Reasonably probable	One per one to ten years
Frequent	Yearly

14.6.6. By assigning and combining severity of consequence and frequency of occurrence criteria, overall effect significance upon Shipping and Navigation receptors can be determined (Table 14-9). As shown, all impacts are determined to be broadly acceptable, tolerable with mitigation, or unacceptable based on the input frequency and consequence rankings.

Table 14-9 Matrix Used for the Assessment of Significance of the Effect

MUIR MHÒR OFFSHORE WIND FARM A joint venture between Fred. Olsen Seawind & Vattenfall		Frequency of Occurrence				
		Negligible	**Extremely Unlikely**	**Remote**	**Reasonably Probable**	**Frequent**
Severity of Consequence	**Negligible**	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable with Mitigation
	Minor	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable with Mitigation	Tolerable with Mitigation
	Moderate	Broadly Acceptable	Broadly Acceptable	Tolerable with Mitigation	Tolerable with Mitigation	Unacceptable
	Serious	Broadly Acceptable	Tolerable with Mitigation	Tolerable with Mitigation	Unacceptable	Unacceptable
	Major	Tolerable with Mitigation	Tolerable with Mitigation	Unacceptable	Unacceptable	Unacceptable

14.6.7. For the purposes of the Shipping and Navigation assessment, a level of effect determined as being of unacceptable significance are considered a 'significant' effect for the purposes of the EIA. Effects determined to be tolerable with mitigation or broadly acceptable are not significant and are As Low As Reasonably Practicable (ALARP).

14.6.8. It is noted that the NRA uses FSA terminology as required under MGN 654 (MCA, 2021). In particular, use of the term "hazard" in the NRA is equivalent to "impact" within the EIA, and "risk" in the NRA is equivalent to "significance". Differences in terminology are detailed in Table 14-10.

Table 14-10 Summary of Differences in Terminology Between EIA and NRA

EIA Term	NRA Term	Definition
Action	Cause	An event or activity that may create an impact.
Impact	Hazard	A potential to threaten human life, health, property or the environment.
Embedded commitment	Embedded mitigation measure	A means of controlling a single element of impact which is embedded (standard or good practice measures utilised or in place).
Secondary mitigation	Additional mitigation measures	A means of controlling a single element of an impact which is additional to the risk with the designed in measures (or embedded mitigation) in place (required to reduce impact to not significant or ALARP).
Effect	Risk	The combination of the frequency of occurrence and the severity of consequence of an impact which results in a statement of significance.
Receptor	User	Sufferer of effect.

EMBEDDED COMMITMENTS

14.6.9. As part of the project design process, several designed-in measures have been proposed to reduce the LSE on environmental receptors. As there is a commitment to implementing these measures, they are considered inherently part of the design of the Proposed Development and have therefore been considered in the assessment (i.e., the determination of severity of consequence and frequency of occurrence and therefore significance assumes implementation of these measures). These measures are considered standard industry practice for this type of development. The embedded commitments relevant to Shipping and Navigation are presented in Table 14-11. Volume 3, Appendix 6.1 (Commitments Register) provides additional information on how these commitments are secured.

14.6.10. Adhering to relevant guidance (C-21 and C-26) ensures risk to navigational safety from offshore renewable energy developments is considered in the assessment of potential effects. Commitments ensuring the lighting and marking of the Proposed Development will be in line with the latest relevant available standard industry guidance as well as conforming to legal requirements in regard to Shipping and Navigation (C-24, C-36, and C-42). In regard to navigational safety, the application of appropriate safety zones (C-17), use of guard vessels where deemed appropriate (C-18), a VMNSP (C-10 and C-16), minimum blade clearance (C-33), marking of the Proposed Development on relevant nautical charts (C-25), and the advanced warning of any project works (C-19) will help ensure vessels remain on safe transits when in the area. Any project vessels carrying out work at the Proposed Development will be compliant with international marine regulations (C-22).

14.6.11. Adherence to additional plans, including the Development Specification and Layout Plan (DSLP) (C-03), Environmental Monitoring Plan (EMP) (C-08), and DP (C-09) will also be ensured. Commitments such as the development of a Cable Plan (CaP) (C-02), notification of cable damage (C-23), and cable burial (C-29) will ensure cables are buried, protected and maintained to remain safe in regard to Shipping and Navigation activity at all times. During all phases of the Proposed Development, engagement with fisheries will also be ongoing (C-12 and C-13).

Table 14-11 Embedded Commitment Measures of relevance to Shipping and Navigation

Code	Commitment	Type (Primary, Secondary or Tertiary)	How Commitment Secured
C-02	Development of and adherence to a Cable Plan (CaP). The CaP will confirm planned cable routing, installation methods, cable specifications and any additional protection and any post-installation monitoring.	Tertiary	CaP
C-03	Development of and adherence to a Development Specification and Layout Plan (DSLP). The DSLP will confirm layout and relevant design parameters.	Tertiary	DSLP
C-04	The infrastructure will be designed in such a way to minimise the impacts and will be within the key parameters set out in the EIA Project Description and EIAR.	Primary	DSLP
C-08	Development of and adherence to an Environmental Management Plan (EMP). This will set out embedded commitments and procedures relevant to environmental management, including but not limited to chemical usage, invasive and non-native species, pollution prevention and waste management.	Tertiary	EMP
C-09	Development of and adherence to a DP. The DP will outline measures for the decommissioning of the Proposed Development.	Tertiary	DP
C-10	Development of and adherence to a VMP (forming part of the VMNSP). The VMNSP will confirm the types and numbers of vessels that will be engaged on the Proposed Development and will consider vessel coordination including indicative transit route planning.	Tertiary	VMNSP
C-12	Ongoing liaison with fishing fleets will be maintained during construction, O&M, and decommissioning operations via an appointed Fisheries Liaison Officer (FLO) and Fishing Industry Representative.	Tertiary	Fisheries Management and Mitigation Strategy (FMMS)
C-13	Adherence to best practice guidance with regards to fisheries liaison and procedures in the event of interactions between the Proposed Development and fishing activities (e.g., FLOWW, 2014; 2015).	Tertiary	FMMS
C-16	Development of and adherence to a NSP (forming part of the VMNSP).	Tertiary	VMNSP

Code	Commitment	Type (Primary, Secondary or Tertiary)	How Commitment Secured
	The VMNSP will describe measures put in place by the Proposed Development related to navigational safety, including information on Safety Zones, charting, construction buoyage, temporary lighting and marking, and means of notification of Proposed Development activity to other sea users (e.g., via Notice to Mariners).		
C-17	Applications to be made, where appropriate, for Safety Zones (500 m) for construction and major maintenance works, and for pre commissioning works (50 m).	Secondary	Safety Zone Application (Undertaken Post consent)
C-18	Use of guard vessels where deemed appropriate to ensure adherence with Safety Zones or advisory passing distances, as defined by risk assessment, to mitigate any impact which poses a risk to surface navigation during construction, O&M, and decommissioning phases. Such impacts may include partially installed structures or cables, extinguished navigation lights or other unmarked hazards.	Secondary	VMNSP
C-19	Advance warning and accurate location details of construction, O&M, and decommissioning operations, associated Safety Zones and advisory passing distances will be given via Notices to Mariners and Kingfisher Bulletins.	Tertiary	VMNSP
C-21	Compliance with MCA MGN 654 (MCA, 2021) and its annexes where applicable (including consideration of a SAR checklist, an ERCoP and Under Keel Clearance.	Tertiary	CaP Construction Method Statement (CMS) DSLP
C-22	Compliance of all project vessels with international marine regulations as adopted by the Flag State (the registered state of the vessel), notably the COLREGs (IMO, 1972/77) and the SOLAS (IMO, 1974).	Tertiary	VMNSP
C-23	Notification of damage or decay to cables to the MCA, NLB Kingfisher and UKHO within 24 hours of discovery.	Tertiary	CaP VMNSP
C-24	Aids to navigation (marking and lighting) will be deployed in accordance with the latest relevant available standard industry guidance	Tertiary	VMNSP LMP Aids to Navigation Management Plan

Code	Commitment	Type (Primary, Secondary or Tertiary)	How Commitment Secured
	and as advised by NLB, MCA and Civil Aviation Authority (CAA) and Ministry of Defence (MoD) as appropriate. This will include a buoyed construction area around the Array Area in consultation with NLB and all Aids to navigation will be subject to an Aids to Navigation Management Plan undertaken post consent.		
C-25	Appropriate marking of the Proposed Development on Admiralty and Aeronautical Charts. This will include provision of the positions and heights of structures to the UKHO, CAA, MoD, and Defence Geographic Centre (DGC).	Tertiary	VMNSP LMP
C-26	Compliance with regulatory expectations on moorings for floating wind and marine devices published by MCA and the HSE.	Tertiary	CMS
C-29	Where practicable, cable burial will be the preferred means of cable protection. Cable burial will be informed by the cable burial risk assessment and detailed within the CaP. In areas where the cable burial risk assessment deems burial not feasible, suitable implementation and monitoring of cable protection will be employed.	Primary	CaP
C-33	Minimum blade clearance of 30 m above Mean Sea Level (MSL) - minimum blade clearance of 30 m will be maintained for floating WTG due to tidal movements.	Primary	DSLP CMS
C-36	Development of and adherence to a Lighting and Marking Plan (LMP). The LMP will confirm compliance with legal requirements with regards to shipping, navigation and aviation marking and lighting.	Tertiary	LMP
C-40	Development of and adherence to a Wet Storage Plan (WSP) to provide details on requirements (if applicable) for assembled WTGs and cabling.	Tertiary	WSP
C-42	Lighting and marking failures appropriately reported/rectified as soon as possible and interim hazard warnings put in place as required.	Tertiary	LMP

IMPACTS SCOPED OUT OF THE ASSESSMENT

14.6.12. Table 14-12 describes the impacts that have been scoped out of this Shipping and Navigation assessment, informed by discussions in the Hazard Workshop.

14.6.13. Relevant stakeholder consultation (see Section 14.4), the Offshore Scoping Report (Volume 3, Appendix 5.1 (Offshore Scoping Report)), the Scoping Opinion for the Proposed Development (Volume 3, Appendix 5.2 (Offshore Scoping Opinion)) along with understanding of worst case design scenarios, environmental baseline conditions and the inclusion of the embedded commitments has informed the decision to scope these impacts out for further consideration in the EIA for Shipping and Navigation.

Table 14-12 Impacts Scoped out of the Shipping and Navigation assessment.

Impact Scoped Out	Justification
Construction	
Creation of vessel to structure allision risk	Embedded commitments applicable during the construction phase, most notably the buoyed construction area, will ensure the likelihood of a third-party vessel navigating in proximity to a structure such that an allision risk arises is negligible.
Reduction of under keel clearance as a result of cable protection, dynamic cables, and mooring lines	Embedded commitments applicable during the construction phase, most notably the buoyed construction area, will ensure the likelihood of a third-party vessel navigating in proximity to mooring lines or dynamic cables contained within the Array Area is negligible. For the export cables, the temporal and spatial extent of the impact during construction is negligible.
Anchor interaction with mooring lines or subsea cables	Embedded commitments applicable during the construction phase, most notably the buoyed construction area, will ensure the likelihood of a third-party vessel anchoring in proximity to mooring lines or dynamic cables contained within the Array Area is negligible. For the export cables, the temporal and spatial extent of the impact during construction is negligible.
Reduction of emergency response capability including SAR	Given the increased presence of project vessels on-site during the construction phase, a project vessel will be well placed to serve as the first responder should an emergency situation arise in line with SOLAS obligations (IMO, 1974).
Operation and Maintenance	
Effects on navigation, communication, and position fixing equipment for third-party vessels.	A desktop review has been undertaken in Section 15 of the NRA with consideration of very high frequency (VHF), VHF Direction Finding (VDF), AIS, navigational telex (NAVTEX), Global Positioning System (GPS), electromagnetic field (EMF), marine Radar, Sound Navigation and Ranging (SONAR), and noise. All of these elements are considered Broadly Acceptable and therefore this impact is screened out of the assessment.
Decommissioning	
Creation of vessel to structure allision risk	Embedded commitments applicable during the decommissioning phase, most notably the buoyed decommissioning area, will ensure the likelihood of a third-party vessel navigating in proximity to a structure such that an allision risk arises is negligible.
Reduction of under keel clearance as a result of cable protection, dynamic cables, and mooring lines	Embedded commitments applicable during the decommissioning phase, most notably the buoyed decommissioning area, will ensure the likelihood of a third-party vessel navigating in proximity to mooring lines or dynamic cables contained within the Array Area is negligible. For the export cables, the temporal and spatial extent of the impact during decommissioning is negligible.

Impact Scoped Out	Justification
Anchor interaction with mooring lines or subsea cables	Embedded commitments applicable during the decommissioning phase, most notably the buoyed decommissioning area, will ensure the likelihood of a third-party vessel anchoring in proximity to mooring lines or dynamic cables contained within the Array Area is negligible. For the export cables, the temporal and spatial extent of the decommissioning is negligible.
Reduction of emergency response capability including SAR	Given the increased presence of project vessels on-site during the decommissioning phase, a project vessel will be well placed to serve as the first responder should an emergency situation arise in line with SOLAS obligations (IMO, 1974).

WORST CASE DESIGN SCENARIO

14.6.14. The Developer has adopted a design envelope approach to impact assessment (also known as a 'Rochdale Envelope'). In line with guidance from the Scottish Government (2022), the design envelope approach offers flexibility in the EIA process by enabling impact assessment to be carried out against several potential design options.

14.6.15. The assessment of Shipping and Navigation impacts has been undertaken with respect to the details provided in Volume 1, Chapter 3 (Project Description). A 'worst case' design scenario has been selected for each impact which would lead to the greatest impact for all receptors or receptor groups, when selected from a range of values. Effects of greater significance are not predicted to arise should any other development scenario, based on details within Volume 1, Chapter 3 (Project Description) (e.g., different infrastructure layout), to that assessed here, be taken forward in the final design scheme.

14.6.16. Table 14-13 presents the worst-case design scenario for each impact associated with LSE assessment on Shipping and Navigation, along with justification.

Table 14-13 Worst Case Design Scenarios with respect to the Shipping and Navigation Assessment.

Impact	Embedded Commitment	Worst Case Design Scenario	Justification
Construction			
Vessel displacement and increased vessel to vessel collision risk between third-party vessels	C-08, C-16, C-17, C-18, C-19, C-21, C-24, C-25, C-36, C-41	• Maximum extent of buoyed construction areas; • Use of 500 m construction Safety Zones and 50 m pre-commissioning Safety Zones; • Maximum of three offshore export cables each 49 nm (90 km) in length; • Peak of 49 construction vessels offshore; and • Single phase offshore construction of approximately four years.	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 and subsequent vessel to vessel collision risk.
Vessel to vessel collision risk between a third party vessel and a project vessel	C-08, C-10 C-16, C-17, C-18, C-19, C-22	• Maximum extent of buoyed construction areas; • Use of 500 m construction Safety Zones and 50 m pre-commissioning Safety Zones; • Maximum of three offshore export cables each 49 nm (90 km) in length; • Peak of 49 construction vessels offshore; and • Single phase offshore construction of approximately four years.	Largest possible extent of infrastructure, greatest number of simultaneous vessel activities and greatest duration resulting in the maximum spatial and temporal effect on vessel to vessel collision risk involving a third-party vessel and a project vessel.
Reduced access to local ports/harbours/and marinas	C-08, C-10, C-19, C22	• Maximum extent of buoyed construction areas; • Use of 500 m construction Safety Zones and 50 m pre-commissioning Safety Zones; • Maximum of three offshore export cables each 49 nm (90 km) in length; • Peak of 49 construction vessels offshore; and • Single phase offshore construction of approximately four years.	Largest possible extent, greatest number of vessel activities associated with the Proposed Development and greatest duration resulting in the maximum spatial and temporal effect on access to local ports.
Loss of Station	C-08, C-12, C-13, C-16, C-18, C-19, C-24, C-26, C-33, C-36, C-41	• Maximum extent of buoyed construction areas; • Up to 67 floating WTGs; • Minimum of three mooring lines per substructure; • Taut mooring lines; • Floater surface dimensions of up to 150 x 40 m (length x width); and • Single phase offshore construction of approximately four years.	Maximum number of WTGs with greatest surface dimensions and greatest duration resulting in the maximum spatial and temporal effect on loss of station risk.
Operation and Maintenance			
Vessel displacement and increased vessel to vessel collision risk between third-party vessels	C-08, C-16, C-17, C-18, C-19, C-21, C-24, C-25, C-36, C-41	• Full buildout of Array Area; • Up to 67 floating WTGs; • Floater surface dimensions of up to 150 x 140 m (length x width); • Up to two fixed OEP(s); • OEP topside dimensions of up to 60 x 50 m (length x width); • Up to 135 nm (250 km) of inter-array cables including use of dynamic cable sections; • Buoyancy module section per dynamic cable up to 300 m in length; • Use of 500 m major maintenance Safety Zones; and • Operational life of 35 years.	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 and subsequent vessel to vessel collision risk.
Vessel to vessel collision risk between a third party vessel and a project vessel	C-08, C-10, C-16, C-17, C-18, C-19, C-22	• Full buildout of Array Area; • Up to 67 floating WTGs; • Floater surface dimensions of up to 150 x 140 m (length x width); • Up to two fixed OEP(s); • Use of 500 m major maintenance Safety Zones; • Peak of 11 maintenance vessels offshore with up to 259 round trips to port per year; and • Operational life of 35 years.	Largest possible extent of infrastructure, greatest number of simultaneous vessel activities and greatest duration resulting in the maximum spatial and temporal effect on vessel to vessel collision risk involving a third-party vessel and a project vessel.
Reduced access to local ports/harbours/and marinas	C-08, C-10, C-19, C-22	• Full buildout of the Array Area; • Maximum of three offshore export cables each 49 nm (90 km) in length;	Largest possible extent, greatest number of vessel activities associated with the Proposed Development and greatest duration

Impact	Embedded Commitment	Worst Case Design Scenario	Justification
		• Use of 500 m major maintenance Safety Zones; • Peak of 11 maintenance vessels offshore with up to 259 round trips to port per year; and • Operational life of 35 years.	resulting in the maximum spatial and temporal effect on access to local ports.
Loss of Station	C-08, C-12, C-13, C-16, C-18, C-19, C-24, C-26, C-33, C-36, C-41	• Full buildout of Array Area; • Up to 67 floating WTGs; • Minimum of three mooring lines per substructure; • Taut mooring lines; • Floater surface dimensions of up to 150 x 140 m (length x width); and • Operational life of 35 years.	Maximum number of WTGs with greatest surface dimensions and greatest duration resulting in the maximum spatial and temporal effect on loss of station risk.
Creation of vessel to structure allision risk (including powered, drifting, and internal)	C-03, C-08, C-10, C-12, C-13, C-17, C-19, C-21, C-22, C-24, C-25, C-33, C-36, C-41	• Full buildout of Array Area; • Up to 67 floating WTGs; • Floater surface dimensions of up to 150 x 140 m (length x width); • Up to two fixed OEP(s); • OEP topside dimensions of up to 60 x 50 m (length x width); • Use of 500 m major maintenance Safety Zones; • Minimum spacing of 1,000 m between WTGs; and • Operational life of 35 years.	Largest possible extent of surface infrastructure, greatest number of surface structures and greatest duration resulting in the maximum spatial and temporal effect on vessel to structure allision risk.
Reduction of under keel clearance as a result of cable protection, dynamic cables, and mooring lines	C-02, C-21, C-23, C-25, C-26, C-29	• Full buildout of Array Area; • Up to 67 floating WTGs; • Maximum of nine mooring lines per substructure; • Taut mooring lines; • Up to two fixed OEP(s); • Up to 135 nm (250 km) of inter-array cables including use of dynamic cable sections with no cable crossings; • Maximum of three offshore export cables each 49 nm (90 km) in length with up to 3 cable crossings; • Interconnector cable up to 3 km • Buoyancy module section per dynamic cable up to 300 m in length; • Inter-array cable touchdown at 100 m; • Minimum burial depth of 1 m for non-dynamic sections of inter-array cables and 4.0 m for the export cables; • External protection where needed, with a height of up to 2 m; and • Operational life of 35 years.	Largest possible extent of subsea infrastructure and greatest duration resulting in the maximum spatial and temporal effect on under keel clearance.
Anchor interaction with mooring lines and subsea cables	C-02, C-16, C-18, C-19, C-23, C-25, C-26	• Full buildout of Array Area; • Up to 67 floating WTGs; • Maximum of nine mooring lines per substructure; • Taut mooring lines; • Mooring line radius up to 1,500 m; • Maximum of three offshore export cables each 49 nm (90 km) in length with up to 3 cable crossings; • Up to 135 nm (250 km) of inter-array cables including use of dynamic cable sections with no cable crossings; • Buoyancy module section per dynamic cable up to 300 m in length; • Minimum burial depth of 1 m for non-dynamic sections of inter-array cables and 4.0 m export cables; • External protection where needed, with a height of up to 2 m; and • Operational life of 35 years.	Largest possible extent of subsea infrastructure and greatest duration resulting in the maximum spatial and temporal effect on anchor interaction with subsea cables.

Impact	Embedded Commitment	Worst Case Design Scenario	Justification
Reduction of emergency response capability including SAR access	C-03, C-08, C-10, C-21, C-22, C-24, C-36, C-41	• Full buildout of Array Area; • Up to 67 floating WTGs; • Maximum of nine mooring lines per substructure; • Floater surface dimensions of up to 150 x 140 m (length x width); • Up to two fixed OEP(s); • OEP topside dimensions of up to 60 x 50 m (length x width); • Peak of 11 maintenance vessels offshore with up to 259 round trips to port per year; and • Operational life of 35 years.	Largest possible extent, greatest number of surface structures, greatest number of simultaneous vessel activities and greatest duration resulting in the maximum spatial and temporal effect on emergency response capability.
Decommissioning			
Vessel displacement and increased vessel to vessel collision risk between third-party vessels	C-08, C-09, C-16, C-17, C-18, C-19, C-21, C-24, C-25, C-36, C-41	• Maximum extent of buoyed decommissioning areas; • Use of 500 m decommissioning Safety Zones and 50 m pre-commissioning Safety Zones; • Maximum of three offshore export cables each 49 nm (90 km) in length; • Peak of 49 decommissioning vessels offshore; and • Single phase offshore decommissioning of approximately three years.	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 and subsequent vessel to vessel collision risk.
Vessel to vessel collision risk between a third party vessel and a project vessel	C-08, C-09, C-10 C-16, C-17, C-18, C-19, C-22	• Maximum extent of buoyed decommissioning areas; • Use of 500 m decommissioning Safety Zones and 50 m pre-commissioning Safety Zones; • Maximum of three offshore export cables each 49 nm (90 km) in length; • Peak of 49 decommissioning vessels offshore; and • Single phase offshore decommissioning of approximately three years.	Largest possible extent of infrastructure, greatest number of simultaneous vessel activities and greatest duration resulting in the maximum spatial and temporal effect on vessel to vessel collision risk involving a third-party vessel and a project vessel.
Reduced access to local ports/harbours/and marinas	C-08, C-09, C-10, C-19, C22	• Maximum extent of buoyed decommissioning areas; • Use of 500 m decommissioning Safety Zones and 50 m pre-commissioning Safety Zones; • Maximum of three offshore export cables each 49 nm (90 km) in length; • Peak of 49 decommissioning vessels offshore; and • Single phase offshore decommissioning of approximately three years.	Largest possible extent, greatest number of vessel activities associated with the Proposed Development and greatest duration resulting in the maximum spatial and temporal effect on access to local ports.
Loss of Station	C-08, C-09, C-12, C-13, C-16, C-18, C-19, C-24, C-26, C-33, C-36, C-41	• Maximum extent of buoyed decommissioning areas; • Up to 67 floating WTGs; • Minimum of three mooring lines per substructure; • Taut mooring lines; • Floater surface dimensions of up to 150 x 140 m (length x width); and • Single phase offshore decommissioning of approximately three years.	Maximum number of WTGs with greatest surface dimensions and greatest duration resulting in the maximum spatial and temporal effect on loss of station risk

14.7. ASSESSMENT OF LSE

14.7.1. Assessment of LSE on Shipping and Navigation has been undertaken for all phases of the Proposed Development. A detailed description of each impact, informed by Volume 1, Chapter 3 (Project Description), baseline information and various analytical methods including modelling is provided below.

CONSTRUCTION PHASE

VESSEL DISPLACEMENT

14.7.2. Construction activities associated with the installation of structures and cables may displace existing routes/activity.

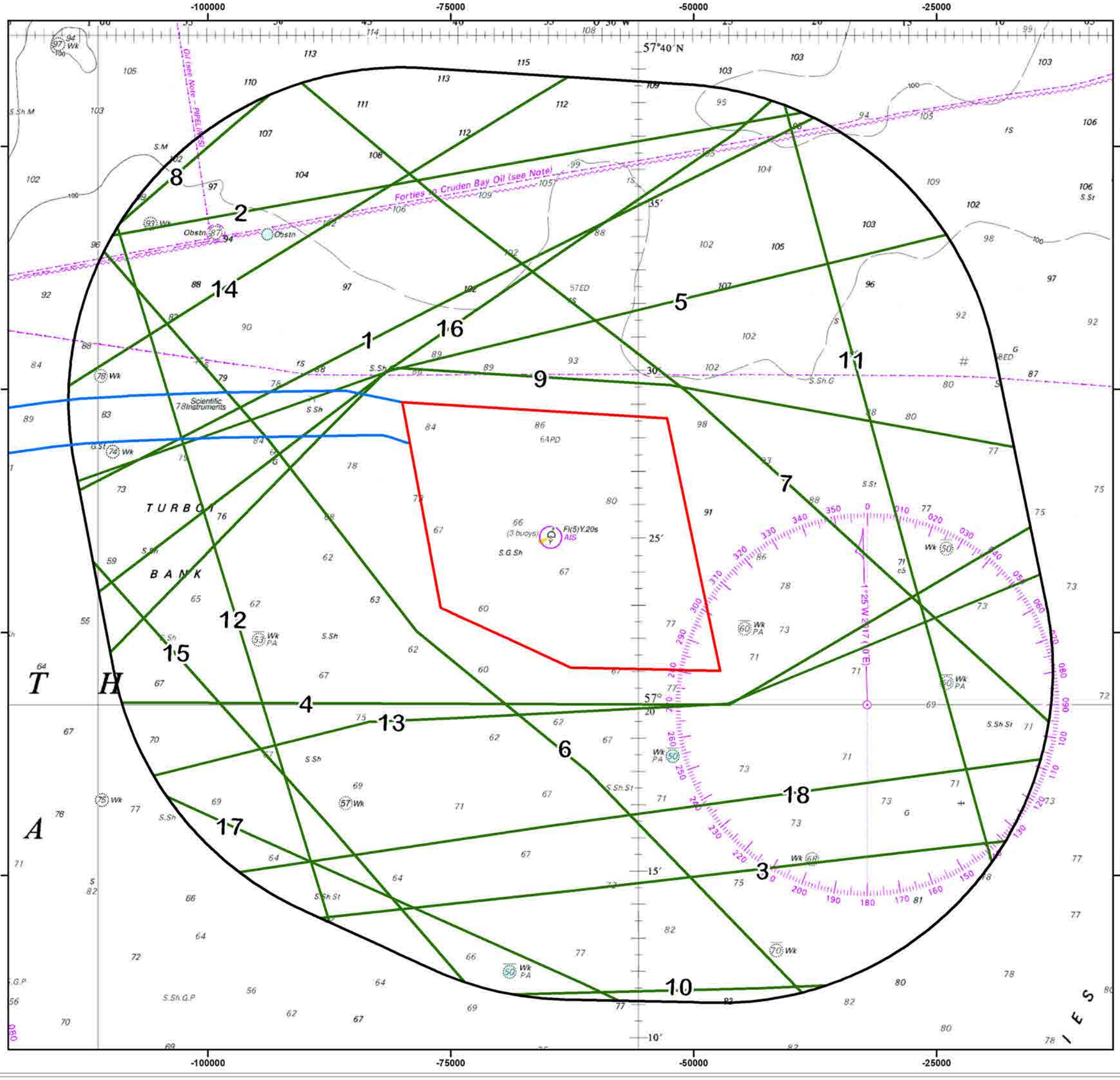
QUALIFICATION OF EFFECT

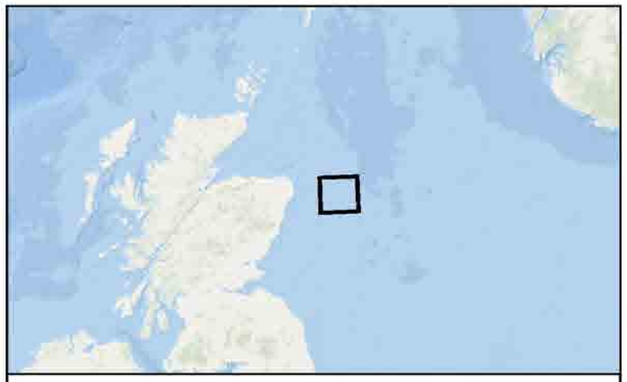
14.7.3. The volume of vessel traffic passing within or in proximity to the Array Area has been established using vessel traffic data collected during dedicated surveys (28 days over winter and summer 2023) and from coastal receivers (12 months, 2022) as well as Anatec's ShipRoutes database. These datasets were interrogated to identify main routes using the principles set out in MGN 654 (MCA, 2021) (Section 14.5).

14.7.4. Although there will be no restrictions on entry into the buoyed construction area, other than through active Safety Zones, based on experience at previously under construction OWFs and consultation, 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.

14.7.5. The full methodology for main route deviations is provided in Section 14.5.1 of the NRA, with deviations established in line with MGN 654 (MCA, 2021). A deviation will be required for seven of the 18 main commercial routes identified. Post wind farm routes are illustrated in Figure 14-6.

14.7.6. The largest deviation is anticipated to be 1.5 nm (2.78 km), associated with Route 4 (east west routeing of oil and gas vessels between Aberdeen and oil and gas fields including Forties, Nelson, and Everest). This increase equates to a 1.5% increase in route length for the portion of the route deviating south around the Array Area. Only one of the other deviated routes features a distance increase equal to or greater than 0.5%; Route 9 at 1.0% with an anticipated deviated of 0.8 nm (1.48 km) (east west routeing of oil and gas vessels between Peterhead and Kittiwake field). Of the other four deviated routes, increases are extremely minimal. For all deviated routes the volumes of traffic are relatively low, with the busiest being Route 4 with an average of five vessels per week. With future case traffic levels these volumes would remain relatively low.





Legend:

- Array Area
- Offshore Export Cable Corridor
- Shipping and Navigation Study Area
- Mean Route Position

Project: Muir Mhòr	Report: Environmental Impact Assessment Report

Post Wind Farm Main Commerical Routes

Figure: 14.6	Drawing No: ANA-EIAR-S&N-006		
Revision:	Date:	Drawn:	Checked:
01	04/07/24	RR	JM

Map scale 1:392,263 @ A3

0 3 6 nm

Co-ordinate system: WGS 1984 World Mercator **EPSG:** 3359

anatec

MUIR MHÒR OFFSHORE WIND FARM

A joint venture between Fred.Olsen Seawind & Vattenfall

Service Layer Credits: Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

14.7.7. Tidewater Marine Ltd was the only operator to respond during the Regular Operator outreach and confirmed that vessel deviation due to vessel displacement caused by the Proposed Development will not impact their vessels greatly as their oil and gas vessels are constantly adjusting passage plans to meet new requirements and are used to adapting to new offshore installations.

14.7.8. Vessel displacement was not raised as a key concern during the Hazard Workshop. It is also recognised that there was only one regular route involving commercial ferries in the area (Route 5) which would be particularly sensitive to any disruption to schedules. This route would be anticipated to deviate 0.6 nm (1.11 km) north-east at an increase of 0.21% total route distance. No concerns were noted relating to the need to deviate as it was understood the deviation would be slight and given the route volume there would be minimal affects.

14.7.9. Given the location of the offshore ECC, it is considered likely that cable installation will lead to displacement with many commercial vessels routeing north south crossing the offshore ECC, however, no concerns were raised over displacement due to cable installation in regard to commercial vessels. Installation activities will be short-term and temporary in nature and cover only a small extent. Therefore, deviations will be manageable, particularly with the promulgation of information allowing mariners to passage plan accordingly.

14.7.10. Based on experience at previously under construction OWFs, it is anticipated that fishing vessels and recreational vessels will also choose not to routinely navigate internally within the buoyed construction area. There is limited transit activity featuring fishing vessels in proximity to the Array Area with vessels already transiting south-west of the Array Area (noting that displacement of active commercial fishing activity is assessed separately in Volume 2, Chapter 13 (Commercial Fisheries)).

14.7.11. For recreational vessels there is even less activity in proximity to the Array Area with vessels only present in very small volumes during the summer periods on a variety of bearings. It was raised by the RYA Scotland that any displacement of recreational vessels should also consider the increase of tiredness due to increased voyages. However, displacement will be limited and there is sufficient sea room around the Array Area to accommodate any affected recreational vessels and any recreational vessels transiting this far offshore would be expected to undertake due diligence of their intended route (i.e., adequate passage planning) as noted by the NLB during the Hazard Workshop.

14.7.12. For installation activities associated with the offshore ECC, fishing vessels in transit to Peterhead Port may be affected if approaching from the north where the cable activities would be occurring. This is of importance as Peterhead Port is the largest fishing port in Europe and it is vital that vessels are able to maintain landing schedules. Vessels departing Peterhead Port were either on transit to fishing grounds or back to home ports such as Fraserburgh as noted by the SWFPA during the Hazard Workshop. There was seasonal static fishing recorded in the offshore ECC which was raised during the Hazard Workshop by the SWFPA noting any displacement would also result in the displacement of gear and this will be assessed separately in Volume 2, Chapter 13 (Commercial Fisheries) but may cause further displacement to other vessel types when gear has to be moved to an alternative location.

14.7.13. For recreational vessels, there are frequent crossings of the offshore ECC in the summer, and therefore some potential for displacement around installation activities. However, there is sufficient sea room available for this (east and west) and so disruption will be limited as agreed by the RYA Scotland at the Hazard Workshop who confirmed cable installation will not pose any problems for recreational vessels as COLREGs will apply and recreational vessels will work around ongoing works associated with the Proposed Development.

CONSEQUENCES

14.7.14. The main consequence of vessel displacement associated with the Array Area and offshore ECC will be increased journey times and or distance but does not impact on schedules or compliance with COLREGs. The extent of these consequences is expected to be limited, noting that the promulgation of information relating to the Proposed Development and marking on relevant nautical charts will allow suitable passage planning and the presence of the buoyed construction area and guard vessels will assist with guiding vessels around the Array Area. No notable effects on navigational safety are anticipated.

14.7.15. As a worst-case, there could be increased journey times and/or distances which impacts on schedules or an inability to comply with COLREGs could occur.

SEVERITY OF CONSEQUENCE

14.7.16. The severity of consequence in relation to displacement of vessel traffic for the Array Area is considered minor.

14.7.17. The severity of consequence in relation to displacement of vessel traffic for the offshore ECC is considered negligible.

FREQUENCY OF OCCURRENCE

14.7.18. The frequency of occurrence in relation to displacement of vessel traffic for the Array Area is considered frequent.

14.7.19. The frequency of occurrence in relation to displacement of vessel traffic for the offshore ECC is considered reasonably probable.

SIGNIFICANCE OF EFFECT

14.7.20. For the Array Area, the severity of consequence is deemed to be minor, and the frequency of occurrence is frequent. The effect will therefore be tolerable with mitigation, which is not significant in EIA terms.

14.7.21. For the offshore ECC, the severity of consequence is deemed to be negligible, and the frequency of occurrence is reasonably probable. The effect will therefore be broadly acceptable, which is not significant in EIA terms.

Table 14-14 Significance of Vessel Displacement

Receptor/Location	Severity of Consequence	Frequency of Occurrence	Significance
All receptors – Array Area	Minor	Frequent	Tolerable with mitigation
All receptors – offshore ECC	Negligible	Reasonably probable	Broadly acceptable

SECONDARY MITIGATION AND RESIDUAL EFFECT

14.7.22. No additional Shipping and Navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 14.6) is not significant in EIA terms.

INCREASED THIRD-PARTY VESSEL COLLISION RISK

14.7.23. Construction activities associated with the installation of structures and cables may increase encounters and collision risk with other third-party vessels.

QUALIFICATION OF EFFECT

14.7.24. It is anticipated that seven of the main 18 commercial routes identified will deviated as a result of the construction of the Proposed Development. This may lead to increased vessel densities in the surrounding areas, which in turn could lead to an increase in vessel to vessel encounters and therefore an increased risk of collision. The risk of collision was not raised as a key topic during consultation including at the Hazard Workshop.

14.7.25. Based on the pre OWF modelling, the baseline encounter levels and collision risk levels within the Shipping and Navigation study area are low, with an estimated vessel to vessel collision frequency of one every 4,310 years. The low level of collision risk is due to the volume of traffic in the area relative to the available sea space.

14.7.26. The collision frequency was estimated at one in 3,359 years, representing a 28% increase on the pre OWF scenario which is a lower change than estimated for various other offshore wind developments. Although this is a moderate increase, the likelihood of a collision incident remains low, and this is also reflected when considering future case traffic levels.

14.7.27. There is a potential for hotspots to occur where traffic routeing east west from ports on the east coast to offshore locations crosses over traffic routeing north-west south-east between northern ports and mainland Europe. This would be a greater risk at each of the four main corner locations of the Array Area, particularly on the western boundary where the greater volume routes intersect. However, these routes are still relatively low in volume and so level of risk is low and there is also ample sea room available around the Array Area.

14.7.28. For the offshore ECC, any displacement of commercial vessels due to installation activities is not anticipated to affect available sea room such that the risk of a collision between third-party vessels is materially increased.

14.7.29. For fishing vessels and recreational vessels, there remains sufficient open sea room around the Array Area and offshore ECC installation activities to ensure that collision risk (including with a commercial vessel) is minimal. Additionally, the promulgation of information relating to construction activities, deployment of the buoyed construction area, and charting of infrastructure will allow vessel Masters (across all vessel types) to passage plan in advance, minimising any displacement and subsequent collision risk. Additionally, information for fishing vessels will be promulgated through ongoing liaison with fishing fleets, and fisheries associations via an appointed FLO and Fishing Industry Representative.

CONSEQUENCES

14.7.30. The main consequence of increased third-party collision risk associated with the Array Area and offshore ECC will be increased encounters. In the event that a third-party to third-party vessel 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 COLREGs, thus ensuring that the situation does not develop into a collision incident. This is supported by experience at previously under construction OWFs where no collision incidents involving two third-party vessels have been reported. Embedded commitments will also minimise the likelihood of encounters including promulgation of information relating to the Proposed Development, marking on relevant nautical charts to allow suitable passage planning and the presence of the buoyed construction area and guard vessels which will assist with guiding vessels around the Array Area.

14.7.31. Historical collision incident data (Section 14.6) 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.

14.7.32. As an unlikely worst-case scenario, a high impact collision event could occur. This could lead to one or more of the vessels foundering resulting in a Potential Loss of Life (PLL) and pollution. In such circumstances, project vessels may attend the incident under SOLAS obligations and in liaison with the MCA the EMP would be implemented.

SEVERITY OF CONSEQUENCE

14.7.33. The severity of consequence in relation to increased third-party vessel collision risk for the Array Area is considered moderate.

14.7.34. The severity of consequence in relation to increased third-party vessel collision risk for the offshore ECC is considered moderate.

FREQUENCY OF OCCURRENCE

14.7.35. The frequency of occurrence in relation to increased third-party vessel collision risk for the Array Area is considered remote.

14.7.36. The frequency of occurrence in relation to increased third-party vessel collision risk for the offshore ECC is considered extremely unlikely.

SIGNIFICANCE OF EFFECT

14.7.37. For the Array Area, the severity of consequence is deemed to be moderate, and the frequency of occurrence is remote. The effect will therefore be tolerable with mitigation, which is not significant in EIA terms.

14.7.38. For the offshore ECC, the severity of consequence is deemed to be moderate, and the frequency of occurrence is extremely unlikely. The effect will therefore of broadly acceptable, which is not significant in EIA terms.

Table 14-15 Significance of Increased Third-Party Vessel Collision Risk

Receptor/Location	Severity of Consequence	Frequency of Occurrence	Significance
All receptors – Array Area	Moderate	Remote	Tolerable with mitigation
All receptors – offshore ECC	Moderate	Extremely unlikely	Broadly acceptable

SECONDARY MITIGATION AND RESIDUAL EFFECT

14.7.39. No additional Shipping and Navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 14.6) is not significant in EIA terms.

THIRD-PARTY WITH PROJECT VESSEL COLLISION RISK

14.7.40. Project vessels associated with construction activities may increase encounters and collision risk for other vessels already operating in the area.

QUALIFICATION OF EFFECT

14.7.41. Up to 49 project vessels may be on site simultaneously during the construction phase making up to 1,543 return trips. This will include Restricted in Ability to Manoeuvre (RAM) vessels. It is assumed that construction vessels will be on-site throughout the duration of the construction phase.

14.7.42. Based on historical incident data, there has been one instance of a third-party vessel colliding with a project vessel in the UK (Section 9.5 of the NRA). During this incident, which occurred in 2011, moderate vessel damage was reported with no harm to persons. Since then, awareness of offshore wind developments and the application of the embedded commitments outlined below has improved or been refined considerably in the interim, with no further collision incidents reported since.

14.7.43. Project vessels will be managed by marine coordination through a VMNSP. This will be particularly important for project vessels transiting to and from the Array Area, noting that the base port(s) for construction are not yet known. It is also noted that project vessels will carry AIS and comply with Flag State regulations including the COLREGs and SOLAS.

14.7.44. Where project vessels are undertaking construction activities associated with surface structures, Safety Zones are anticipated. An application for Safety Zones of 500 m will be sought during the construction phase around structures where construction activity is ongoing (e.g., where a construction vessel is present). These will serve to protect project vessels engaged in construction activities. 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).

14.7.45. Third-party vessels may experience restrictions on visually identifying project vessels entering and exiting the array during reduced visibility; however, this impact will be mitigated by the application of the COLREGs (reduced speeds) in adverse weather conditions and require all vessels operating in reduced visibility to reduce speed to allow more time for reacting to encounters, thus minimising the collision risk.

14.7.46. The promulgation of information will ensure mariner awareness of construction activities is maximised, including charting of infrastructure, ongoing liaison with fisheries via an appointed FLO and Fishing Industry Representative, and advanced warning of Safety Zones and any minimum advisory safe passing distances, with the latter particularly relevant for offshore ECC installation activities since Safety Zones are not permitted. Additionally, a buoyed construction area will be deployed around the Array Area in consultation with NLB. This will further maximise mariner awareness when in proximity to ongoing construction works in the Array Area, both in day and night conditions including in poor visibility.

CONSEQUENCES

14.7.47. The main consequences of third-party with project vessel collision risk associated with the Array Area and offshore ECC are expected to be similar to that outlined for the case of collision risk between two third-party vessels. If an encounter occurs between a third-party vessel and a project vessel, it 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.

14.7.48. As a worst-case, increased encounters and impacts on compliance with COLREGs, resulting in a collision event with the potential of foundering, vessel damage, PLL, and/or pollution could occur. In such circumstances, other project vessels may attend the incident under SOLAS obligations and in liaison with the MCA and the EMP would be implemented.

SEVERITY OF CONSEQUENCE

14.7.49. The severity of consequence in relation to third-party with project vessel collision risk for the Array Area is considered moderate.

14.7.50. The severity of consequence in relation to third-party with project vessel collision risk for the offshore ECC is considered moderate.

FREQUENCY OF OCCURRENCE

14.7.51. The frequency of occurrence in relation to third-party with project vessel collision risk for the Array Area is considered extremely unlikely.

14.7.52. The frequency of occurrence in relation to third-party with project vessel collision risk for the offshore ECC is considered remote.

SIGNIFICANCE OF EFFECT

14.7.53. For the Array Area, the severity of consequence is deemed to be moderate, and the frequency of occurrence is extremely unlikely. The effect will therefore be broadly acceptable, which is not significant in EIA terms.

14.7.54. For the offshore ECC, the severity of consequence is deemed to be moderate, and the frequency of occurrence is remote. The effect will therefore be tolerable with mitigation, which is not significant in EIA terms.

Table 14-16 Significance of Third-Party with Project Vessel Collision Risk

Receptor/Location	Severity of Consequence	Frequency of Occurrence	Significance
All receptors – Array Area	Moderate	Extremely unlikely	Broadly acceptable
All receptors – offshore ECC	Moderate	Remote	Tolerable with mitigation

SECONDARY MITIGATION AND RESIDUAL EFFECT

14.7.55. No additional Shipping and Navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 14.6) is not significant in EIA terms.

REDUCED ACCESS TO LOCAL PORTS, HARBOURS, AND MARINAS

14.7.56. Construction activities associated with the installation of structures and cables may reduce access to local ports and harbours.

QUALIFICATION OF EFFECT

14.7.57. Up to 49 construction vessels may be utilised across the construction phase and will include vessels which are RAM. Project vessels will be managed by marine coordination through a VMNSP.

14.7.58. The closest port or harbour to the Proposed Development is Peterhead Port, located approximately 34 nm (62.9 km) to the west of the Array Area. Given the relative distance to ports in the area and the anticipated deviations for the main commercial routes, it is not anticipated that there will be any substantial effect due to Array Area construction activities on vessel approaches to and from any local ports beyond the deviations already outlined for impacts on vessel displacement, especially since the ports associated with the construction of the Proposed Development are also not yet known.

14.7.59. For offshore ECC construction activities, there is a greater risk given the proximity to the entrance to Peterhead Port, which is located approximately 1 nm (1.85 km) south of the offshore ECC. Where cable installation is ongoing vessel displacement is possible; this is particularly of importance to fishing vessels which as highlighted in the vessel displacement impact, are likely entering Peterhead Port to land and rely on berth availability and landing schedules. Installation activities for the offshore ECC will be short-term and temporary in nature and cover only a small extent at any given time.

14.7.60. RYA Scotland also noted during consultation that Peterhead Marina is a key stopping point for recreational vessels transiting the coast. A key element of the coordination will be in relation to pilotage activities, but it is noted that the pilot boarding station for Peterhead Port is located well clear of the offshore ECC and during the vessel traffic surveys, and long-term vessel traffic data, no pilot vessels intersected the offshore ECC. Additionally, the Peterhead Port Authority raised no concerns in the Hazard Workshop. Nevertheless, information will be promulgated prior to any construction activities to allow mariners to passage plan accordingly.

CONSEQUENCES

14.7.61. The main consequence will be minor disruption to port access and related services via increased journey time and/or distance but with no impact on schedules, berth times, or compliance with COLREGs.

14.7.62. As an unlikely worst-case, increased journey time/distance impacting on schedules, berth times, and/or compliance with COLREGs could occur, relating to navigable water depths, tidal windows, and pilotage services.

SEVERITY OF CONSEQUENCE

14.7.63. The severity of consequence in relation to reduced access to local ports, harbours, and marinas for the Array Area is considered minor.

14.7.64. The severity of consequence in relation to reduced access to local ports, harbours, and marinas for the offshore ECC is considered minor.

FREQUENCY OF OCCURRENCE

14.7.65. The frequency of occurrence in relation to reduced access to local ports, harbours, and marinas for the Array Area is considered remote.

14.7.66. The frequency of occurrence in relation to reduced access to local ports, harbours, and marinas for the offshore ECC is considered frequent.

SIGNIFICANCE OF EFFECT

14.7.67. For the Array Area, the severity of consequence is deemed to be minor, and the frequency of occurrence is remote. The effect will therefore be broadly acceptable, which is not significant in EIA terms.

14.7.68. For the offshore ECC, the severity of consequence is deemed to be minor, and the frequency of occurrence is frequent. The effect will therefore be tolerable with mitigation, which is not significant in EIA terms.

Table 14-17 Significance of Reduced Access to Local Ports, Harbours, and Marinas

Receptor/Location	Severity of Consequence	Frequency of Occurrence	Significance
All receptors – Array Area	Minor	Remote	Broadly acceptable
All receptors – offshore ECC	Minor	Frequent	Tolerable with mitigation

SECONDARY MITIGATION AND RESIDUAL EFFECT

14.7.69. No additional Shipping and Navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 14.6) is not significant in EIA terms.

LOSS OF STATION

14.7.70. In the event that the mooring system holding a floating substructure fails, or there is failure or damage to tow during WTG towage during construction, the floating substructure may suffer loss of station and become a floating hazard to passing vessels.

14.7.71. As this impact is only relevant to the floating WTGs associated within the Array Area; this impact will only assess the Array Area and not the offshore ECC.

QUALIFICATION OF EFFECT

14.7.72. Loss of station was raised as a discussion point during the Hazard Workshop and the UK Chamber of Shipping noting that loss of station is just as crucial to be assessed at the construction phase with the importance of loss of tow being the key concern. Towage of the WTG to site will be subject to a dedicated risk assessment at the time of the towage operations when full specifications relating to the operations is available. This dedicated risk assessment should cover all elements of the towing operation including in port approaches.

14.7.73. For loss of station due to a mooring line failure during the construction phase while located within the Array Area, the Array Area will be monitored by vessels when on-site including any guard vessel(s) ensuring all infrastructure remains *in-situ*. If a mooring line failure was to arise, the project vessels would be able to respond in a timely manner ensuring a loss of station event does not occur and appropriate arrangements are taken which may include towing the floater off-site.

14.7.74. On this basis, a loss of station is considered likely to represent a low frequency event, noting that for a total loss of station, all moorings would be required to fail (each WTG will have a minimum of three).

CONSEQUENCES

14.7.75. The main consequence will be failure of a single mooring line leading to a temporary increase in the maximum excursion of the floating structure but without full loss of station.

14.7.76. As a worst-case, a towage operation could fail resulting in a floater being adrift in a high risk area with collision and/or allision risk arising.

SEVERITY OF CONSEQUENCE

14.7.77. The severity of consequence in relation to loss of station for the Array Area is considered moderate.

FREQUENCY OF OCCURRENCE

14.7.78. The frequency of occurrence in relation to loss of station for the Array Area is considered extremely unlikely.

SIGNIFICANCE OF EFFECT

14.7.79. For the Array Area, the severity of consequence is deemed to be moderate, and the frequency of occurrence is extremely unlikely. The effect will therefore be broadly acceptable, which is not significant in EIA terms.

Table 14-18 Significance of Loss of Station

Receptor/Location	Severity of Consequence	Frequency of Occurrence	Significance
All receptors – Array Area	Moderate	Extremely unlikely	Broadly acceptable

SECONDARY MITIGATION AND RESIDUAL EFFECT

14.7.80. No additional Shipping and Navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 14.6 is not significant in EIA terms.

OPERATION AND MAINTENANCE

VESSEL DISPLACEMENT

14.7.81. The presence of structures may displace existing routes/activity.

QUALIFICATION OF EFFECT

14.7.82. 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 for vessel displacement in line with MGN 654 (MCA, 2021) are again applicable during the O&M phase of the Proposed Development.

14.7.83. Subsequently, the nature of this impact for commercial vessels is expected to be broadly similar to that considered for the equivalent construction phase impact for vessel displacement. The buoyed construction area will no longer serve to assist with guiding vessels around the Array Area, but the operational lighting and marking of the array will serve this purpose.

14.7.84. Vessels using the deviated routes are typically smaller commercial oil and gas vessels whose Masters will be experienced with navigating in close proximity to offshore installations. Therefore, there is potential that depending upon the final array layout, these vessels may occasionally choose to navigate internally through the Array Area noting that there will be no restrictions on entry, other than active O&M Safety Zones. It is noted that under keel interaction risk associated with mooring lines and dynamic cables is assessed in the reduction of under keel clearance as a result of cable protection, dynamic cables, and mooring lines impact for O&M.

14.7.85. For fishing vessels and recreational vessels, internal navigation (in transit) within the Array Area is considered feasible during the O&M phase, noting that the minimum spacing of 1,000 m is sufficient to accommodate transits by smaller vessels. Additionally, 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. The SWFPA noted during the Hazard Workshop that large pelagic fishing vessels (50 to 60 m) may transit within the operational array with small vessel internal transits dependant on weather conditions and time of day; this will be down to skipper preference.

14.7.86. The RYA also noted that it should be expected that some recreational vessel transits occur within the Array Area during operation, and possibly in adverse weather conditions. Vessels may also enter if avoiding larger commercial vessels. Based on baseline characteristics of recreational vessels, noting the RYA confirmed the vessel traffic survey data to be representative, recreational vessel volumes are very low, and any internal transits or deviations made by recreational vessels would be infrequent. Again, as noted during the construction phase, any recreational vessels transiting this far offshore would be expected to undertake due diligence of the intended route as noted by the NLB during the Hazard Workshop.

14.7.87. The frequency of O&M activities associated with the offshore ECC is expected to be limited, and so potential disruption associated with the offshore ECC will again be limited and any deviations will be minimal and easily manageable with notice of any maintenance being promulgated.

CONSEQUENCES

14.7.88. The main consequences of vessel displacement during the O&M phase are also considered to be equivalent to the construction phase, in particular potential for increased journey times and distances. No notable effects on navigational safety are anticipated.

SEVERITY OF CONSEQUENCE

14.7.89. The severity of consequence in relation to displacement of vessel traffic for the Array Area is considered minor.

14.7.90. The severity of consequence in relation to displacement of vessel traffic for the offshore ECC is considered negligible.

FREQUENCY OF OCCURRENCE

14.7.91. The frequency of occurrence in relation to displacement of vessel traffic for the Array Area is considered frequent.

14.7.92. The frequency of occurrence in relation to displacement of vessel traffic for the offshore ECC is considered reasonably probable.

SIGNIFICANCE OF EFFECT

14.7.93. For the Array Area, the severity of consequence is deemed to be minor, and the frequency of occurrence is frequent. The effect will therefore be tolerable with mitigation, which is not significant in EIA terms.

14.7.94. For the offshore ECC, the severity of consequence is deemed to be negligible, and the frequency of occurrence is reasonably probable. The effect will therefore be broadly acceptable, which is not significant in EIA terms.

Table 14-19 Significance of Vessel Displacement

Receptor/Location	Severity of Consequence	Frequency of Occurrence	Significance
All receptors – Array Area	Minor	Frequent	Tolerable with mitigation
All receptors – offshore ECC	Negligible	Reasonably probable	Broadly acceptable

SECONDARY MITIGATION AND RESIDUAL EFFECT

14.7.95. No additional Shipping and Navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 14.6 is not significant in EIA terms.

INCREASED THIRD-PARTY VESSEL COLLISION RISK

14.7.96. The presence of structures may increase encounters and collision risk with other third-party vessels.

QUALIFICATION OF EFFECT

14.7.97. 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 for vessel displacement in line with MGN 654 (MCA, 2021) are again applicable.

14.7.98. Subsequently, the nature of this impact (increased third-party vessel to vessel collision) for commercial vessels is expected to be broadly similar to that considered for the equivalent construction phase impact including embedded commitments. Although the buoyed construction area will no longer serve to assist with guiding vessels around the Array Area, the operational lighting and marking of the array will serve this purpose.

14.7.99. An additional factor during the O&M phase is the potential for the view of other vessels to be blocked or hindered due to the presence of structures, particularly for small craft which may choose to navigate internally within the Array Area. However, the minimum spacing between WTGs (1,000 m) is sufficient to ensure that any notable effects – which would likely arise only along a row of WTGs – occur only where the vessels involved are far apart, i.e., at opposite ends of the row of WTGs. As the distance between the vessels closes, any blocking effect would quickly reduce. In adverse weather conditions obtaining a visual of a crossing vessel may be more challenging, but it is anticipated that in such circumstances the COLREGs would be applied in terms of using reduced speeds in limited visibility.

14.7.100. Based on the post OWF modelling, the baseline encounter levels and collision risk levels within the Shipping and Navigation study area are low, with an estimated vessel to vessel collision frequency of one every 3,359 years. The low level of collision risk is due to the volume of traffic in the area relative to the available sea space. With post wind farm vessel traffic volumes increased by 20% in the area, collision risk only rises to a frequency of one every 2,379 years, which is still considered low.

14.7.101. As noted in the vessel displacement impact for the O&M phase, smaller commercial oil and gas vessels may transit within the operational array and may reduce the hotspots identified during the construction phase on the corners of the Array Area.

14.7.102. This is the same for smaller craft, fishing vessels and recreational vessels, where internal transits within the operational array may be expected as noted throughout the vessel displacement impact. There remains sufficient open sea room around the Array Area and offshore ECC during O&M activities to ensure that collision risk (including with a commercial vessel) is minimal.

14.7.103. Additionally, the promulgation of information relating to O&M activities and charting of infrastructure will allow vessel Masters (across all vessel types) to passage plan in advance, minimising any displacement and subsequent collision risk. Additionally, information for fishing vessels will be promulgated through ongoing liaison with fishing fleets, and fisheries associations via an appointed FLO and Fishing Industry Representative.

14.7.104. Any displacement due to O&M activities within the offshore ECC is not anticipated to affect available sea room such that the risk of a collision between third-party vessels is materially increased.

CONSEQUENCES

14.7.105. Again, the main consequence of increased third-party collision risk associated with the Array Area and offshore ECC is expected to be broadly similar to the equivalent construction phase impact, i.e., increased encounters.

SEVERITY OF CONSEQUENCE

14.7.106. The severity of consequence in relation to increased third-party vessel collision risk for the Array Area is considered moderate.

14.7.107. The severity of consequence in relation to increased third-party vessel collision risk for the offshore ECC is considered moderate.

FREQUENCY OF OCCURRENCE

14.7.108. The frequency of occurrence in relation to increased third-party vessel collision risk for the Array Area is considered remote.

14.7.109. The frequency of occurrence in relation to increased third-party vessel collision risk for the offshore ECC is considered negligible.

SIGNIFICANCE OF EFFECT

14.7.110. For the Array Area, the severity of consequence is deemed to be moderate, and the frequency of occurrence is remote. The effect will therefore be tolerable with mitigation, which is not significant in EIA terms.

14.7.111. For the offshore ECC, the severity of consequence is deemed to be moderate, and the frequency of occurrence is negligible. The effect will therefore of broadly acceptable, which is not significant in EIA terms.

Table 14-20 Significance of Increased Third-Party Vessel Collision Risk

Receptor/Location	Severity of Consequence	Frequency of Occurrence	Significance
All receptors – Array Area	Moderate	Remote	Tolerable with mitigation
All receptors – Offshore ECC	Moderate	Negligible	Broadly acceptable

SECONDARY MITIGATION AND RESIDUAL EFFECT

14.7.112. No additional Shipping and Navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 14.6) is not significant in EIA terms.

THIRD-PARTY WITH PROJECT VESSEL COLLISION RISK

14.7.113. Project vessels associated with O&M activities may increase encounters and collision risk for other vessels already operating in the area.

QUALIFICATION OF EFFECT

14.7.114. Up to 259 return trips per year by a peak of 11 O&M vessels may be made throughout the O&M phase, including RAM vessels. It is assumed that O&M vessels will be on-site throughout the O&M phase. It is noted that the movement of project vessels during the O&M represents a large decrease in movements in comparison to the construction phase.

14.7.115. As with the equivalent construction phase impact, encounter and collision risk involving a project vessel will be well mitigated, including through marine coordination, carriage of AIS, compliance with Flag State regulations by project vessels, and promulgation of information to fishing fleets via an appointed FLO. An application for Safety Zones of 500 m radius will be sought during the O&M phase for any ongoing major maintenance within the Array Area.

14.7.116. As stated during the equivalent construction based impact, based on historical incident data, there has been one instance of a third-party vessel colliding with a project vessel in the UK (Section 9.5 of the NRA), with no further collision incidents reported since.

14.7.117. Again, third-party vessels may experience restrictions on visually identifying project vessels entering and exiting the array during reduced visibility; however, this impact will be mitigated by the application of the COLREGs (reduced speeds) in adverse weather conditions and require all vessels operating in reduced visibility to reduce speed to allow more time for reacting to encounters, thus minimising the collision risk.

CONSEQUENCES

14.7.118. The main consequences between a third-party vessel and a project vessel are expected to be broadly similar to the equivalent construction phase impact for third-party to project vessel collision risk.

SEVERITY OF CONSEQUENCE

14.7.119. The severity of consequence in relation to third-party with project vessel collision risk for the Array Area is considered moderate.

14.7.120. The severity of consequence in relation to third-party with project vessel collision risk for the offshore ECC is considered moderate.

FREQUENCY OF OCCURRENCE

14.7.121. The frequency of occurrence in relation to third-party with project vessel collision risk for the Array Area is considered extremely unlikely.

14.7.122. The frequency of occurrence in relation to third-party with project vessel collision risk for the offshore ECC is considered extremely unlikely.

SIGNIFICANCE OF EFFECT

14.7.123. For the Array Area, the severity of consequence is deemed to be moderate, and the frequency of occurrence is extremely unlikely. The effect will therefore be broadly acceptable, which is not significant in EIA terms.

14.7.124. For the offshore ECC, the severity of consequence is deemed to be moderate, and the frequency of occurrence is extremely unlikely. The effect will therefore be broadly acceptable, which is not significant in EIA terms.

Table 14-21 Significance of Third-Party with Project Vessel Collision Risk

Receptor/Location	Severity of Consequence	Frequency of Occurrence	Significance
All receptors – Array Area	Moderate	Extremely unlikely	Broadly acceptable
All receptors – offshore ECC	Moderate	Extremely unlikely	Broadly acceptable

SECONDARY MITIGATION AND RESIDUAL EFFECT

14.7.125. No additional Shipping and Navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 14.6) is not significant in EIA terms.

REDUCED ACCESS TO LOCAL PORTS, HARBOURS, AND MARINAS

14.7.126. O&M activities associated with the installation of structures and cables may reduce access to local ports and harbours.

QUALIFICATION OF EFFECT

14.7.127. Up to 259 return trips per year by a peak of 11 O&M vessels may be made throughout the O&M phase, including RAM vessels. It is assumed that O&M vessels will be on-site throughout the O&M phase. It is noted that the movement of project vessels during the O&M represents a large decrease in movements in comparison to the construction phase. As per the construction phase, project vessels will be managed by marine coordination through a VMNSP.

14.7.128. Given the extent of the Array Area will be similar to during the construction phase, this element of the impact is considered broadly similar.

14.7.129. For the offshore ECC, as noted in the construction phase impact, there is a greater risk given the proximity to Peterhead Port and importance of access for fishing vessels. However, the frequency of O&M activities is expected to be limited, and so potential disruption will be further limited with information promulgated in advance to allow mariners to passage plan accordingly if required.

CONSEQUENCES

14.7.130. The main consequences will be broadly similar to the equivalent construction phase impact for reduced access to local ports, harbours, and marinas.

SEVERITY OF CONSEQUENCE

14.7.131. The severity of consequence in relation to reduced access to local ports, harbours, and marinas for the Array Area is considered minor.

14.7.132. The severity of consequence in relation to reduced access to local ports, harbours, and marinas for the offshore ECC is considered minor.

FREQUENCY OF OCCURRENCE

14.7.133. The frequency of occurrence in relation to reduced access to local ports, harbours, and marinas for the Array Area during the construction phase is considered extremely unlikely.

14.7.134. The frequency of occurrence in relation to reduced access to local ports, harbours, and marinas for the offshore ECC during the construction phase is considered reasonably probable.

SIGNIFICANCE OF EFFECT

14.7.135. For the Array Area, the severity of consequence is deemed to be minor, and the frequency of occurrence is extremely unlikely. The effect will therefore be broadly acceptable, which is not significant in EIA terms.

14.7.136. For the offshore ECC, the severity of consequence is deemed to be minor, and the frequency of occurrence is reasonably probable. The effect will therefore be tolerable with mitigation, which is not significant in EIA terms.

Table 14-22 Significance of Reduced Access to Local Ports, Harbours, and Marinas

Receptor/Location	Severity of Consequence	Frequency of Occurrence	Significance
All receptors – Array Area	Minor	Extremely unlikely	Broadly acceptable
All receptors – offshore ECC	Minor	Reasonably probable	Tolerable with mitigation

SECONDARY MITIGATION AND RESIDUAL EFFECT

14.7.137. No additional Shipping and Navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 14.6) is not significant in EIA terms.

LOSS OF STATION

14.7.138. In the event that the mooring system holding a floating substructure fails, or there is failure or damage to tow during WTG towage for maintenance, the floating substructure may suffer loss of station and become a floating hazard to passing vessels.

14.7.139. As per the construction phase impact, this impact is only relevant to the floating WTGs associated within the Array Area; therefore, this impact will only be assessed for the Array Area and not the offshore ECC.

QUALIFICATION OF EFFECT

14.7.140. During the O&M phase, towage of WTGs to and from site for maintenance will be subject to a dedicated risk assessment at the time of the towage operation when full specifications relating to the operations is available. It is anticipated that a maximum of five return trips per year will be carried out for WTG towage to port. This dedicated risk assessment will cover all elements of the towage operation including in port approaches and internally within the array (noting the latter was specifically raised during consultation by the UK Chamber of Shipping).

14.7.141. The MCA require under their Regulatory Expectations on Moorings for Floating Wind and Marine Devices (MCA & HSE, 2017) 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 should there be any modifications to a system or if new information becomes available with regard to its reliability, additional TPV would be required.

14.7.142. The Regulatory Expectations guidance also requires the provision of continuous monitoring either by GPS or other suitable means. Each WTG should also have an alarm system in place, whereby an alert will be provided to the Marine Coordination Centre in the event that any floating substructure leaves a pre-defined ringfenced alarm zone. This means in the unlikely event that a floating substructure suffers total loss of station and drifts outside of its alarm zone, the Developer would be made aware and would be able to track its position and make the necessary emergency arrangements, which will depend upon the design of the substructure and any predefined emergency response protocols. These protocols will also include recovery of a deliberately sunken floating foundation should this be deemed a necessary option in the event of a floating substructure going off station.

14.7.143. On the basis of compliance with the Regulatory Expectations, a loss of station is considered likely to represent a low frequency event, noting that for a total loss of station, all moorings would be required to fail (each WTG will have a minimum of three).

CONSEQUENCES

14.7.144. The main consequences will be broadly similar to the equivalent construction phase impact for loss of station, noting that towage operations will occur less frequently. There is also potential for the lighting and marking of the array to be compromised should a loss of station lead to the loss of a key AtoN as highlighted by NLB during consultation. The implementation of the AtoN Management Plan will ensure that this issue is addressed appropriately, which may include deployment of a guard vessel.

SEVERITY OF CONSEQUENCE

14.7.145. The severity of consequence in relation to loss of station for the Array Area is considered moderate.

FREQUENCY OF OCCURRENCE

14.7.146. The frequency of occurrence in relation to loss of station for the Array Area during the construction phase is considered remote.

SIGNIFICANCE OF EFFECT

14.7.147. For the Array Area, the severity of consequence is deemed to be moderate, and the frequency of occurrence is remote. The effect will therefore be tolerable with mitigation, which is not significant in EIA terms.

Table 14-23 Significance of Loss of Station

Receptor/Location	Severity of Consequence	Frequency of Occurrence	Significance
All receptors – Array Area	Moderate	Remote	Tolerable with mitigation

SECONDARY MITIGATION AND RESIDUAL EFFECT

14.7.148. No additional Shipping and Navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 14.6) is not significant in EIA terms

CREATION OF VESSEL TO STRUCTURE ALLISION RISK

14.7.149. The presence of structures within the Array Area will lead to the creation of powered, drifting, and internal allision risk for vessels.

14.7.150. This impact is only relevant to the floating WTGs associated within the Array Area; this impact will only assess the Array Area and not the offshore ECC.

QUALIFICATION OF EFFECT

14.7.151. The spatial extent of the impact is small given that a vessel must be in close proximity to a surface structure for an allision incident to occur. Each allision element is considered in turn with the frequency of occurrence, severity of consequence, and resulting significance of effect across the various elements summarised at the end of the assessment. The forms of allision considered include:

- Powered allision risk;
- Drifting allision risk; and
- Internal allision risk.

Powered Allision Risk

14.7.152. Based on the quantitative assessment undertaken for the indicative array layout, the base case annual powered vessel to structure allision frequency was estimated to be 2.29×10^{-4}, corresponding to a return period of approximately one in 4,376 years. This is a low return period compared to that estimated for other UK OWF developments and is reflective of the distance offshore and the relatively low volume of vessel traffic intersecting or passing in close proximity to the Array Area. The low return period is also reflected when considering future case traffic levels.

14.7.153. Based on historical incident data, there have been two reported instances of a third-party vessel alliding with an operational OWF structure in the UK (in the Irish Sea and Southern North Sea). Both of these incidents involved a fishing vessel, with an RNLI lifeboat attending on both occasions and a helicopter deployed in one case.

14.7.154. 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 which minimises risk given the promulgation of information relating to the Proposed Development, 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. Furthermore, the final layout will be agreed post consent in consultation with MCA and NLB to ensure it is safe from a surface navigation perspective.

14.7.155. Should a powered allision occur, the consequences will depend on multiple factors including the energy of the contact, structural integrity of the vessel involved, and sea state at the time of the contact. Fishing vessels and recreational vessels are considered most vulnerable to the impact given the potential for a non-steel construction. With consideration of lessons learned the most likely consequences are minor damage with the vessel able to resume passage and undertake a full inspection at the next port of call. As an unlikely worst-case, the vessel could founder resulting in a PLL and pollution. If pollution were to occur, then the EMP would be implemented.

Drifting Allision Risk

14.7.156. Based on the quantitative assessment undertaken for the indicative array layout, the base case annual drifting vessel to structure allision frequency was estimated to be 2.98×10^{-5}, corresponding to a return period of approximately one in 33,517 years. This is a low return period compared to that estimated for other UK OWF developments and again reflects the relatively low volume of vessel traffic intersecting or passing in close proximity to the Array Area. The low return period is also reflected when considering future case traffic levels.

14.7.157. Based on historical incident data, there have been no instances of a third-party vessel alliding with an operational OWF structure whilst NUC. The MAIB incident data reviewed in proximity to the Proposed Development indicates that machinery failure is not a common incident type and so there is not consider a great potential for a vessel to be adrift in the area.

14.7.158. A vessel adrift may only develop into an allision situation if in proximity to a surface 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.

14.7.159. 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. For powered vessels, the ideal and likely solution would be 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 an emergency anchoring event, following a check of the relevant nautical charts to ensure the deployment of the anchor will

not lead to other risks (such as anchor snagging on a subsea cable or mooring line), or the use of thrusters (depending on availability and power supply).

14.7.160. Noting the considerable water depth within and in proximity to the Array Area, deployment of the anchor may not be possible, particularly for small craft. In such circumstances, any project vessels on-site may be able to render assistance in liaison with the MCA and in line with SOLAS obligations (IMO, 1974), particularly in the summer months when O&M activities are likely to be more frequent. This response would be managed via the coastguard and marine coordination and depends on the type and capability of vessels on site. This would be particularly relevant for sailing vessels relying on metocean conditions for propulsion, noting if the vessel becomes adrift in proximity to a structure there may be limited time to render assistance.

14.7.161. Should a drifting allision occur, the consequences will be similar to those noted for the case of a powered allision including the unlikely worst-case of foundering, PLL, and pollution. However, a drifting vessel is likely to be moving at a reduced speed compared to a powered vessel, thus reducing the energy of the impact, including in the case of a recreational vessel under sail.

Internal Allision Risk

14.7.162. 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. Fishing and recreational vessels may be more likely to transit through although are less likely to do so at a floating site such as the Proposed Development compared to fixed sites due to the presence of mooring infrastructure associated with floating WTGs. Nevertheless, during consultation RYA Scotland did note that some recreational vessels may navigate internally, particularly to avoid larger commercial vessels.

14.7.163. The base case annual fishing vessel to structure allision frequency for the indicative array layout is estimated to be 2.93×10^{-2}, corresponding to a return period of approximately one in 34 years. This return period is reflective of fishing vessel traffic within the Array Area, and the conservative assumptions made within the modelling process. In particular, it has been assumed that the baseline fishing activity in terms of proximity to WTGs will not change. This is a very conservative assumption, particularly for a floating site, noting internal transits by larger pelagic fishing vessels may occur based on consultation feedback from the SWFPA.

14.7.164. The estimated return period also does not take account of the nature of any allision incident. 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 incidents).

14.7.165. The minimum spacing between structures of 1,000 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 much greater than that associated with many other operational OWFs in the UK. Moreover, the final layout – agreed with MCA and NLB post consent – will be compliant with the requirements of MGN 654 (MCA, 2021).

14.7.166. 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 by the Proposed Development will ensure that such vessels have good awareness of the presence of surface structures. Operational marine lighting and marking will be in place as required by and agreed with NLB and MCA. Given the size of the Array Area, it is unlikely that a mariner would become disoriented when navigating internally; nevertheless, marking will include unique identification marking of each structure in an easily understandable pattern.

14.7.167. Should a recreational vessel under sail enter the proximity of a WTG, there is also LSE 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, 2008) but that 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 receptors to date when operating in proximity to existing offshore wind developments.

14.7.168. For recreational vessels with a mast there is an additional allision risk when navigating internally within the array associated with the WTG blades. However, the minimum blade tip clearance of 30 m above MSL is greater than the minimum clearance the RYA recommend (22 m above MHWS) for minimising allision risk (RYA, 2019 (b)) and which is also noted in MGN 654 (MCA, 2021).

CONSEQUENCES

14.7.169. Consequences for each scenario are included under the relevant Sections. However, the main consequences associated with the creation of vessel to structure allision risk would be that a vessel passes at an unsafe distance resulting in a need to make a late adjustment to course/speed.

14.7.170. As a worst-case, an allision event occurs involving vessel damage, PLL and/or pollution.

SEVERITY OF CONSEQUENCE

14.7.171. The severity of consequence in relation to the creation of vessel to structure allision risk for the Array Area is considered moderate.

FREQUENCY OF OCCURRENCE

14.7.172. The frequency of occurrence in relation to the creation of vessel to structure allision risk for the Array Area is considered remote.

SIGNIFICANCE OF EFFECT

14.7.173. For the Array Area, the severity of consequence is deemed to be moderate, and the frequency of occurrence is remote. The effect will therefore be tolerable with mitigation, which is not significant in EIA terms.

Table 14-24 Significance of Creation of Vessel to Structure Allision Risk

Receptor/Location	Severity of Consequence	Frequency of Occurrence	Significance
All receptors – Array Area	Moderate	Remote	Tolerable with mitigation

SECONDARY MITIGATION AND RESIDUAL EFFECT

14.7.174. No additional Shipping and Navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 14.6) is not significant in EIA terms.

REDUCTION OF UNDER KEEL CLEARANCE AS A RESULT OF CABLE PROTECTION, DYNAMIC CABLES, AND MOORING LINES

14.7.175. The presence of mooring lines, buoyant inter-array cables, or protection over subsea cables may reduce charted water depths leading to increased risk of under keel interaction for passing vessels.

QUALIFICATION OF EFFECT

14.7.176. The spatial extent of the impact is small given that a vessel must be in close proximity to a mooring line, inter-array cable or subsea cable with cable protection for a reduction to occur. Each element is considered in turn with the frequency of occurrence, severity of consequence, and resulting significance of effect across the various elements summarised at the end of the assessment.

14.7.177. Vessels navigating in proximity to the floating WTGs may be at risk of interaction with the mooring lines or inter-array cables associated with floating WTGs. The level of risk will depend on the clearance available above the subsea elements of the substructures.

14.7.178. There will be a maximum of nine mooring lines per floating WTG used to secure the substructures to the seabed. The highest risk areas in terms of potential under keel clearance interaction will be the areas in the immediate vicinity of the floating substructures where the mooring lines and inter-array cables are closest to the surface. Should barges be selected, the mooring lines will connect above the waterline at a height of up to 25 m.

14.7.179. As previously noted, it is likely that commercial vessels will not enter the Array Area. Moreover, experience indicates that commercial vessels frequently pass 1 nm (1.85 km) or more off established developments. On this basis, taking into consideration the baseline and anticipated post wind farm vessel routeing, it is considered highly unlikely that a commercial vessel would pass within the Array Area let alone in sufficiently close proximity to the WTGs for an under keel interaction to arise.

14.7.180. An analysis of under keel interaction for vessel draughts local to the area has been undertaken in Section 16.6 of the NRA. This analysis found – compared against maximum draughts – that the horizontal distance over which an under keel interaction could occur associated with the mooring lines was 539 m for fishing vessels and 715 m for commercial vessels. For the inter-array cables, the horizontal distance over which an under keel interaction could occur was 79 m for fishing vessels and 102 m for commercial vessels.

14.7.181. It is noted that across all commercial vessels only smaller oil and gas vessels are considered possible candidates for internal navigation, and so the distance for commercial vessels is highly conservative.

14.7.182. For the mooring lines, these distances represent a substantial radius from the floater within which an under keel interaction could occur (and which is out with the maximum rotor diameter of the WTG), the mooring line would be located above the water line for the majority of this distance and therefore the vessel should be able to visually identify the risk. Additionally, the mooring lines will be marked on appropriately scaled UKHO Admiralty Charts and, when navigating internally within the array, vessels would be expected to exercise an increased level of caution and awareness.

14.7.183. For the inter-array cables, these distances are less substantial, and in particular are well within the maximum rotor diameter of the WTG. Therefore, a vessel may be deterred from navigating in proximity to the structure, reducing the potential for an under keel interaction.

14.7.184. It will be necessary to confirm available under keel clearance from the mooring lines post installation, in particular if taut mooring lines are used. The confirmed available clearance should be discussed with the MCA and NLB post installation to determine if any secondary mitigation is required.

14.7.185. There is limited experience of deployment of floating offshore wind projects in UK waters; however, to date there have been no reported under keel interactions between passing vessels and the components associated with such projects.

14.7.186. Details of the infrastructure will be promulgated to maximise awareness of the Proposed Development and any potential under keel interaction risk, including via the FLO. As noted, the locations of the floating substructures will be clearly shown on appropriate nautical charts, and the Developer will also provide the locations of the foundation anchors and mooring lines to the UKHO for charting purposes.

14.7.187. Reduction in under keel clearance is only of relevance to subsea cables associated with the Proposed Development where the cable is not buried, and external cable protection is required.

14.7.188. The minimum burial depth for inter-array cables will be 1.0 m and for the export cables 4.0 m. Actual burial depths will be determined via the cable burial risk assessment process undertaken post consent once geotechnical survey data is available. Where cables are buried no under keel interaction risk is anticipated.

14.7.189. Where cable burial is not possible, alternative cable protection methods may be deployed which will be determined within the cable burial risk assessment. The requirements of MGN 654 in relation to cable protection will apply, namely cable protection will not change the charted water depth by more than 5% unless appropriate mitigation is 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 (b)).

14.7.190. Given existing water depths within the Array Area (between 62 and 97 m), it is not anticipated that the presence of cable protection associated with inter-array cables will reduce charted water depths by more than 5%. For the export cable, the water depth is shallow in the nearshore area, and therefore the likelihood of a reduction in charted water depth by more than 5% is much greater, should cable protection be required. However, spatially this is minimal and water depths quickly increase and reach the 50 m depth contour approximately 3 nm (5.56 km) offshore. Also, from the vessel traffic data limited activity occurs in the nearshore area of the offshore ECC with vessels mainly comprising fishing and recreational which typically have smaller vessel draughts. No large commercial vessel were recorded inshore of the 50 m depth contour in the offshore ECC. Nevertheless, as noted above, in such circumstances the MCA will be consulted on appropriate mitigation (if required) to ensure the under keel interaction risk is ALARP.

CONSEQUENCES

14.7.191. The most likely consequence in regard to reduction of under keel clearance as a result of cable protection, dynamic cables, and mooring lines is a vessel transits over an area of reduced clearance but does not make contact.

14.7.192. Should an underwater allision occur, minor damage incurred is the most likely consequence, and foundering or grounding of the vessel resulting in injury to person and pollution (including spillage of potential hazardous cargo) the unlikely worst-case consequences, with the environmental risks of the latter minimised by the implementation of the EMP.

SEVERITY OF CONSEQUENCE

14.7.193. The severity of consequence in relation to reduction of under keel clearance as a result of cable protection, dynamic cables, and mooring lines for the Proposed Development is considered minor.

FREQUENCY OF OCCURRENCE

14.7.194. The frequency of occurrence in relation to reduction of under keel clearance as a result of cable protection, dynamic cables, and mooring lines for the Proposed Development is considered reasonably probable.

SIGNIFICANCE OF EFFECT

14.7.195. For the Proposed Development, the severity of consequence is deemed to be minor, and the frequency of occurrence is reasonably probable. The effect will therefore be tolerable with mitigation, which is not significant in EIA terms.

Table 14-25 Significance of Reduction of Under Keel Clearance as a Result of Cable Protection, Dynamic Cables, and Mooring Lines

Receptor/Location	Severity of Consequence	Frequency of Occurrence	Significance
All receptors – Proposed Development	Minor	Reasonably probable	Tolerable with mitigation

SECONDARY MITIGATION AND RESIDUAL EFFECT

14.7.196. No additional Shipping and Navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 14.6) is not significant in EIA terms.

ANCHOR INTERACTION WITH MOORING LINES OR SUBSEA CABLES

14.7.197. The presence of mooring lines and subsea cables may increase the risk of anchor interaction.

QUALIFICATION OF EFFECT

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

14.7.199. 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 subsea operations;
- Unplanned anchoring – generally resulting from an emergency situation where the vessel has experienced steering failure; and
- Anchor dragging – caused by anchor failure.

14.7.200. 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 and mooring lines (where scale of chart is appropriate) will inform the decision of a vessel to anchor, as per Regulation 34 of SOLAS (IMO, 1974).

14.7.201. No anchored vessels were observed within the Shipping and Navigation study area for the Array Area during the survey periods or long-term vessel traffic data. Risk of interaction with an inter-array cable or mooring line on a planned anchoring or dragged anchoring basis is therefore anticipated to be extremely low. In terms of emergency anchoring, any areas of high

traffic volume are likely to represent the areas of highest risk, particularly where there are hazards nearby (e.g., structures, rocks, shallows). However; given the open sea room in proximity to the Array Area and water depths the likelihood of this scenario arising is very low.

14.7.202. Again, no anchored vessels were observed within the offshore ECC study area during the data periods. The burial of the export cables and use of external cable protection as informed by the cable burial risk assessment with a minimum burial depth of 4.0 m, will minimise the likelihood of an interaction occurring. The cable burial risk assessment will also account for traffic volume and sizes.

14.7.203. Additionally, as per Regulation 34 of SOLAS (IMO, 1974), it is anticipated that mariners will take account of the presence of the export cables via nautical charts prior to dropping the anchor. With this good practice and mitigation, it is considered unlikely that an anchor interaction will occur.

CONSEQUENCES

14.7.204. The most likely consequence resulting from an anchor interaction with mooring lines or subsea cables, based on historical anchor interaction incidents, would be a vessel anchors on or drags anchor over a subsea cable or mooring line but no interaction occurs.

14.7.205. As a worst-case, a vessel anchors on or drags anchor over a subsea cable or mooring line with interaction occurring resulting in a snagging event or potential damage to the cable, protection, mooring line, and/or anchor. Potential for loss of stability for a small vessel could also occur. For an interaction with an inter-array cable or mooring line in the water column, a further consequence could be the breaking of the cable, which may have implications for the stability of the floating substructure, depending upon the particular design. This scenario is highly unlikely given that this section of the cable will be in close proximity to the WTG, with vessels expected to be aware of the presence of subsea infrastructure.

SEVERITY OF CONSEQUENCE

14.7.206. The severity of consequence in relation to anchor interaction with mooring lines and subsea cables for the Proposed Development is considered negligible.

FREQUENCY OF OCCURRENCE

14.7.207. The frequency of occurrence in relation to anchor interaction with mooring lines and subsea cables for the Proposed Development is considered minor.

SIGNIFICANCE OF EFFECT

14.7.208. For the Proposed Development, the severity of consequence is deemed to be negligible, and the frequency of occurrence is minor. The effect will therefore be broadly acceptable, which is not significant in EIA terms.

Table 14-26 Significance of Anchor Interaction with Mooring Lines and Subsea Cables

Receptor/Location	Severity of Consequence	Frequency of Occurrence	Significance
All receptors – Proposed Development	Negligible	Minor	Broadly acceptable

SECONDARY MITIGATION AND RESIDUAL EFFECT

14.7.209. No additional Shipping and Navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 14.6) is not significant in EIA terms.

REDUCTION OF EMERGENCY RESPONSE CAPABILITY INCLUDING SAR

14.7.210. Presence of structures, increased vessel activity, and personnel numbers may reduce emergency response capability by increasing the number of incidents, increase consequences or reducing access for the responders.

QUALIFICATION OF EFFECT

14.7.211. Given the distances that may be covered by air-based SAR support (the SAR helicopter base at Inverness is located approximately 108 nm (200 km) from the Array Area), the spatial extent of this impact is considered large. The Array Area covers approximately 58 square nautical mile (nm^2) (198 square kilometre [km^2]) which represents a moderate to large area to search in comparison with other offshore UK developments.

14.7.212. Up to 259 return trips per year by O&M vessels may be made throughout the O&M phase (Section 6.6.2 of the NRA). It is estimated that project vessel movements will be more frequent during the summer months. The presence of such vessels will increase the likelihood of an incident and subsequently increase the likelihood of multiple incidents occurring simultaneously in the region as a whole, diminishing emergency response capability.

14.7.213. However, with project vessels to be managed through marine coordination and in 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. For a pollution incident, the EMP will also be implemented. Given the distance offshore, it is likely that in the event of an emergency response incident a project vessel would be the first responder.

14.7.214. From recent SAR helicopter taskings data, the frequency of SAR operations in proximity to the Proposed Development is low, with no SAR helicopter incidents occurring within the Array Area. The frequency of SAR operations in proximity to the Array Area is not anticipated to change markedly from the current level given the measures noted above which will be in place. However, in the event that a SAR operation is required internally within the Array Area, its small-scale and the minimum spacing of 1,000 m between WTGs should ensure that access risks are minimal.

14.7.215. An ERCoP will be submitted to the MCA post consent in line with the requirements of MGN 654 (MCA, 2021), and a SAR Checklist will be completed and agreed with the MCA. Furthermore, the final array layout will be agreed with the MCA and NLB post consent and be MGN 654 compliant.

CONSEQUENCES

14.7.216. The most likely consequence to occur from a reduction of emergency response capability including SAR would be a delay to any emergency response request.

14.7.217. As a worst-case, the consequences of such a situation could include a failure of emergency response to an incident, resulting in PLL and pollution.

SEVERITY OF CONSEQUENCE

14.7.218. The severity of consequence in relation to reduction of emergency response capability including SAR for the Proposed Development is considered serious.

FREQUENCY OF OCCURRENCE

14.7.219. The frequency of occurrence in relation to reduction of emergency response capability including SAR for the Proposed Development is considered extremely unlikely.

SIGNIFICANCE OF EFFECT

14.7.220. For the Proposed Development, the severity of consequence is deemed to be serious, and the frequency of occurrence is extremely unlikely. The effect will therefore be tolerable with mitigation, which is not significant in EIA terms.

Table 14-27 Significance of Reduction of Emergency Response Capability Including SAR

Receptor/Location	Severity of Consequence	Frequency of Occurrence	Significance
All receptors – Proposed Development	Serious	Extremely unlikely	Tolerable with mitigation

SECONDARY MITIGATION AND RESIDUAL EFFECT

14.7.221. No additional Shipping and Navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 14.6) is not significant in EIA terms.

DECOMMISSIONING

VESSEL DISPLACEMENT

14.7.222. Decommissioning activities associated with removal of structures and cables may displace existing routes/activity.

QUALIFICATION OF EFFECT

14.7.223. Since the methods used to remove structures and subsea cables are expected to be similar to those used to install them, the risk pathway for this impact is expected to be similar in nature to the equivalent construction phase impact for vessel displacement. This includes the use of a buoyed decommissioning area.

CONSEQUENCES

14.7.224. Given the broadly similar nature of decommissioning activities when compared to construction activities, the main consequences of vessel displacement during the decommissioning phase for the Array Area and the offshore ECC are considered to be equivalent to that highlighted for the construction phase impact for vessel displacement in particular potential for increased journey times and distances. No significant effects on navigational safety are anticipated.

SEVERITY OF CONSEQUENCE

14.7.225. The severity of consequence in relation to displacement of vessel traffic for the Array Area is considered minor.

14.7.226. The severity of consequence in relation to displacement of vessel traffic for the offshore ECC is considered negligible.

FREQUENCY OF OCCURRENCE

14.7.227. The frequency of occurrence in relation to displacement of vessel traffic for the Array Area is considered frequent.

14.7.228. The frequency of occurrence in relation to displacement of vessel traffic for the offshore ECC is considered reasonably probable.

SIGNIFICANCE OF EFFECT

14.7.229. For the Array Area, the severity of consequence is deemed to be minor, and the frequency of occurrence is frequent. The effect will therefore be tolerable with mitigation, which is not significant in EIA terms.

14.7.230. For the offshore ECC, the severity of consequence is deemed to be negligible, and the frequency of occurrence is reasonably probable. The effect will therefore be broadly acceptable, which is not significant in EIA terms.

Table 14-28 Significance of Vessel Displacement

Receptor/Location	Severity of Consequence	Frequency of Occurrence	Significance
All receptors – Array Area	Minor	Frequent	Tolerable with mitigation
All receptors – offshore ECC	Negligible	Reasonably probable	Broadly acceptable

SECONDARY MITIGATION AND RESIDUAL EFFECT

14.7.231. No additional Shipping and Navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 14.6) is not significant in EIA terms.

INCREASED THIRD-PARTY VESSEL COLLISION RISK

14.7.232. Decommissioning activities associated with the removal of structures and cables may increase encounters and collision risk with other third-party vessels.

QUALIFICATION OF EFFECT

14.7.233. Since the methods used to remove structures and subsea cables are expected to be similar to those used to install them, the risk pathway for this impact is expected to be similar in nature to the equivalent construction phase impact for increased third-party vessel to vessel collision risk. This includes the use of a buoyed decommissioning area.

CONSEQUENCES

14.7.234. Given the broadly similar nature of decommissioning activities when compared to construction activities, the main consequences of collision risk during the decommissioning phase for the Array Area and the offshore ECC are considered to be equivalent to that highlighted for the construction phase impact for increased third-party vessel to vessel collision risk, in particular the unlikely worst-case of foundering resulting in PLL and pollution.

SEVERITY OF CONSEQUENCE

14.7.235. The severity of consequence in relation to increased third-party vessel collision risk for the Array Area is considered moderate.

14.7.236. The severity of consequence in relation to increased third-party vessel collision risk for the offshore ECC is considered moderate.

FREQUENCY OF OCCURRENCE

14.7.237. The frequency of occurrence in relation to increased third-party vessel collision risk for the Array Area is considered remote.

14.7.238. The frequency of occurrence in relation to increased third-party vessel collision risk for the offshore ECC is considered extremely unlikely.

SIGNIFICANCE OF EFFECT

14.7.239. For the Array Area, the severity of consequence is deemed to be moderate, and the frequency of occurrence is remote. The effect will therefore be tolerable with mitigation, which is not significant in EIA terms.

14.7.240. For the offshore ECC, the severity of consequence is deemed to be moderate, and the frequency of occurrence is extremely unlikely. The effect will therefore of broadly acceptable, which is not significant in EIA terms.

Table 14-29 Significance of Increased Third-Party Vessel Collision Risk

Receptor/Location	Severity of Consequence	Frequency of Occurrence	Significance
All receptors – Array Area	Moderate	Remote	Tolerable with mitigation
All receptors – offshore ECC	Moderate	Extremely unlikely	Broadly acceptable

SECONDARY MITIGATION AND RESIDUAL EFFECT

14.7.241. No additional Shipping and Navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 14.6) is not significant in EIA terms.

THIRD-PARTY WITH PROJECT VESSEL COLLISION RISK

14.7.242. Project vessels associated with decommissioning activities may increase encounters and collision risk for other vessels already operating in the area.

QUALIFICATION OF EFFECT

14.7.243. Since the methods used to remove structures and subsea cables are expected to be similar to those used to install them, including the vessels involved, the risk pathway for this impact is expected to be similar in nature to the equivalent construction phase impact for third-party to project vessel collision risk, including the number of return trips by project vessels and the use of a buoyed decommissioning area.

CONSEQUENCES

14.7.244. Given the broadly similar nature of decommissioning activities when compared to construction activities, the main consequences in the event of an encounter or collision are considered to be equivalent to that highlighted for the construction phase impact for third-party to project vessel collision risk, including a worst-case of foundering, PLL, and pollution.

SEVERITY OF CONSEQUENCE

14.7.245. The severity of consequence in relation to third-party with project vessel collision risk for the Array Area is considered moderate.

14.7.246. The severity of consequence in relation to third-party with project vessel collision risk for the offshore ECC is considered moderate.

FREQUENCY OF OCCURRENCE

14.7.247. The frequency of occurrence in relation to third-party with project vessel collision risk for the Array Area is considered extremely unlikely.

14.7.248. The frequency of occurrence in relation to third-party with project vessel collision risk for the offshore ECC is considered remote.

SIGNIFICANCE OF EFFECT

14.7.249. For the Array Area, the severity of consequence is deemed to be moderate, and the frequency of occurrence is extremely unlikely. The effect will therefore be broadly acceptable, which is not significant in EIA terms.

14.7.250. For the offshore ECC, the severity of consequence is deemed to be moderate, and the frequency of occurrence is remote. The effect will therefore be tolerable with mitigation, which is not significant in EIA terms.

Table 14-30 Significance of Third-Party with Project Vessel Collision Risk

Receptor/Location	Severity of Consequence	Frequency of Occurrence	Significance
All receptors – Array Area	Moderate	Extremely unlikely	Broadly acceptable
All receptors – offshore ECC	Moderate	Remote	Tolerable with mitigation

SECONDARY MITIGATION AND RESIDUAL EFFECT

14.7.251. No additional Shipping and Navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 14.6) is not significant in EIA terms.

REDUCED ACCESS TO LOCAL PORTS, HARBOURS, AND MARINAS

14.7.252. Decommissioning activities associated with the removal of structures and cables may reduce access to local ports and harbours.

QUALIFICATION OF EFFECT

14.7.253. Since the methods used to remove structures and subsea cables are expected to be similar to those used to install them, the risk pathway for this impact is expected to be similar in nature to the equivalent construction phase impact for reduced access to local ports and harbours, including the number of return trips by decommissioning vessels.

CONSEQUENCES

14.7.254. Given the broadly similar nature of decommissioning activities when compared to construction activities, the main consequences during the decommissioning phase are considered to be equivalent to that highlighted for the construction phase impact for reduced access to local ports and harbours, in particular minor disruption to port access.

SEVERITY OF CONSEQUENCE

14.7.255. The severity of consequence in relation to reduced access to local ports, harbours, and marinas for the Array Area is considered minor.

14.7.256. The severity of consequence in relation to reduced access to local ports, harbours, and marinas for the offshore ECC is considered minor.

FREQUENCY OF OCCURRENCE

14.7.257. The frequency of occurrence in relation to reduced access to local ports, harbours, and marinas for the Array Area is considered remote.

14.7.258. The frequency of occurrence in relation to reduced access to local ports, harbours, and marinas for the offshore ECC is considered frequent.

SIGNIFICANCE OF EFFECT

14.7.259. For the Array Area, the severity of consequence is deemed to be minor, and the frequency of occurrence is remote. The effect will therefore be broadly acceptable, which is not significant in EIA terms.

14.7.260. For the offshore ECC, the severity of consequence is deemed to be minor, and the frequency of occurrence is frequent. The effect will therefore be tolerable with mitigation, which is not significant in EIA terms.

Table 14-31 Significance of Reduced Access to Local Ports, Harbours, and Marinas

Receptor/Location	Severity of Consequence	Frequency of Occurrence	Significance
All receptors – Array Area	Minor	Remote	Broadly acceptable
All receptors – offshore ECC	Minor	Frequent	Tolerable with mitigation

SECONDARY MITIGATION AND RESIDUAL EFFECT

14.7.261. No additional Shipping and Navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 14.6) is not significant in EIA terms.

LOSS OF STATION

14.7.262. In the event that the mooring system holding a floating substructure fails, or there is failure or damage to tow during WTG towage during decommissioning, the floating substructure may suffer loss of station and become a floating hazard to passing vessels.

14.7.263. As this impact is only relevant to the floating WTGs associated within the Array Area; this impact will only assess the Array Area and not the offshore ECC.

QUALIFICATION OF EFFECT

14.7.264. Since the methods used to remove structures are expected to be similar to those used to install them, the risk pathway for this impact is expected to be similar in nature to the equivalent construction phase impact for loss of station.

CONSEQUENCES

14.7.265. Given the broadly similar nature of decommissioning activities when compared to construction activities, the main consequences during the decommissioning phase are considered to be equivalent to that highlighted for the construction phase impact for loss of station.

SEVERITY OF CONSEQUENCE

14.7.266. The severity of consequence in relation to loss of station for the Array Area is considered moderate.

FREQUENCY OF OCCURRENCE

14.7.267. The frequency of occurrence in relation to loss of station for the Array Area is considered extremely unlikely.

SIGNIFICANCE OF EFFECT

14.7.268. For the Array Area, the severity of consequence is deemed to be moderate, and the frequency of occurrence is extremely unlikely. The effect will therefore be broadly acceptable, which is not significant in EIA terms.

Table 14-32 Significance of Loss of Station

Receptor/Location	Severity of Consequence	Frequency of Occurrence	Significance
All receptors – Array Area	Moderate	Extremely unlikely	Broadly acceptable

SECONDARY MITIGATION AND RESIDUAL EFFECT

14.7.269. No additional Shipping and Navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 14.6) is not significant in EIA terms.

PROPOSED MONITORING

14.7.270. No shipping and navigation monitoring is proposed to test the predictions made within the assessment of LSE on shipping and navigation receptors as no LSE were predicted during construction, O&M and decommissioning phases of the Proposed Development.

14.8. WHOLE PROJECT ASSESSMENT

14.8.1. The Proposed Development's infrastructure and activities are the focus of this EIAR. However, where the potential exists for onshore elements of the Project (the onshore infrastructure landward of MLWS) to impact the offshore receptors, these have been identified and assessed below in the Whole Project Assessment (WPA).

14.8.2. A separate onshore EIAR is being prepared which will provide a description of the onshore elements of the Project landward of MLWS, and an assessment of the associated LSE.

14.8.3. There are no impacts arising from the onshore aspects of the Project to Shipping and Navigation receptors. It is noted that Project vessel movements are an offshore matter which will be managed from the marine coordination centre using the procedures presented within the VMNSP.

14.9. CUMULATIVE EFFECTS ASSESSMENT

CEA METHODOLOGY

14.9.1. Effects of the Proposed Development alone are generally spatially restricted to being near the Array Area and offshore ECC. However, certain impacts have the potential to be observed over a wider area. These cumulative effects are the effects of the Proposed Development, combined with the effects from other projects, on the same receptor or group of receptors.

14.9.2. Details of how the cumulative LSE will be assessed for the Proposed Development through a CEA for Shipping and Navigation has been detailed within Section 13 of the NRA. A CEA screening process has identified the relevant other plans, projects, and activities which are to be included in the assessment. Those OWF projects relevant to the CEA for Shipping and Navigation are highlighted in Figure 14-7, colour coded by tier. Information on each tiered project is given in Table 14-33.

14.9.3. For each of these relevant plans/projects, the most up-to-date publicly available project parameters will be used to inform the CEA. Where information is not publicly available, the Developer will seek to consult and collaborate to obtain project parameters for assessment.

14.9.4. These other plans or projects may present different levels of the cumulative LSE when combined with the Proposed Development, informed by other plan/project's readiness and likelihood for actual operation. A tiered approach to the CEA is therefore applied here, allowing weighted assessment of cumulative effects. Details of the tiers applied for Shipping and Navigation are given below noting that the approach taken aligns with industry standard for NRAs rather than the approach across the EIAR as a whole.

- **Tier 1** – Whole project (both onshore and offshore elements) combined with consented or under determination projects with high/ medium data confidence and which may impact a main commercial route passing within 1 nm (1.85 km) of the Array Area and/or interacts with traffic which may be directly displaced by the Array Area. Distances typically considered from the Array Area:
  - OWFs up to 25 nm (46.3 km);
  - Oil and gas infrastructure up to 5 nm (9.26 km); and
  - Subsea cables up to 2 nm (3.70 km).
- **Tier 2** – Tier 1 plus consented or under determination projects with high/medium data confidence and which may impact a main commercial route passing within 1 nm (1.85 km) of the Array Area and/or interacts with traffic which may be directly displaced by the Array Area. Distances typically considered from the Array Area:

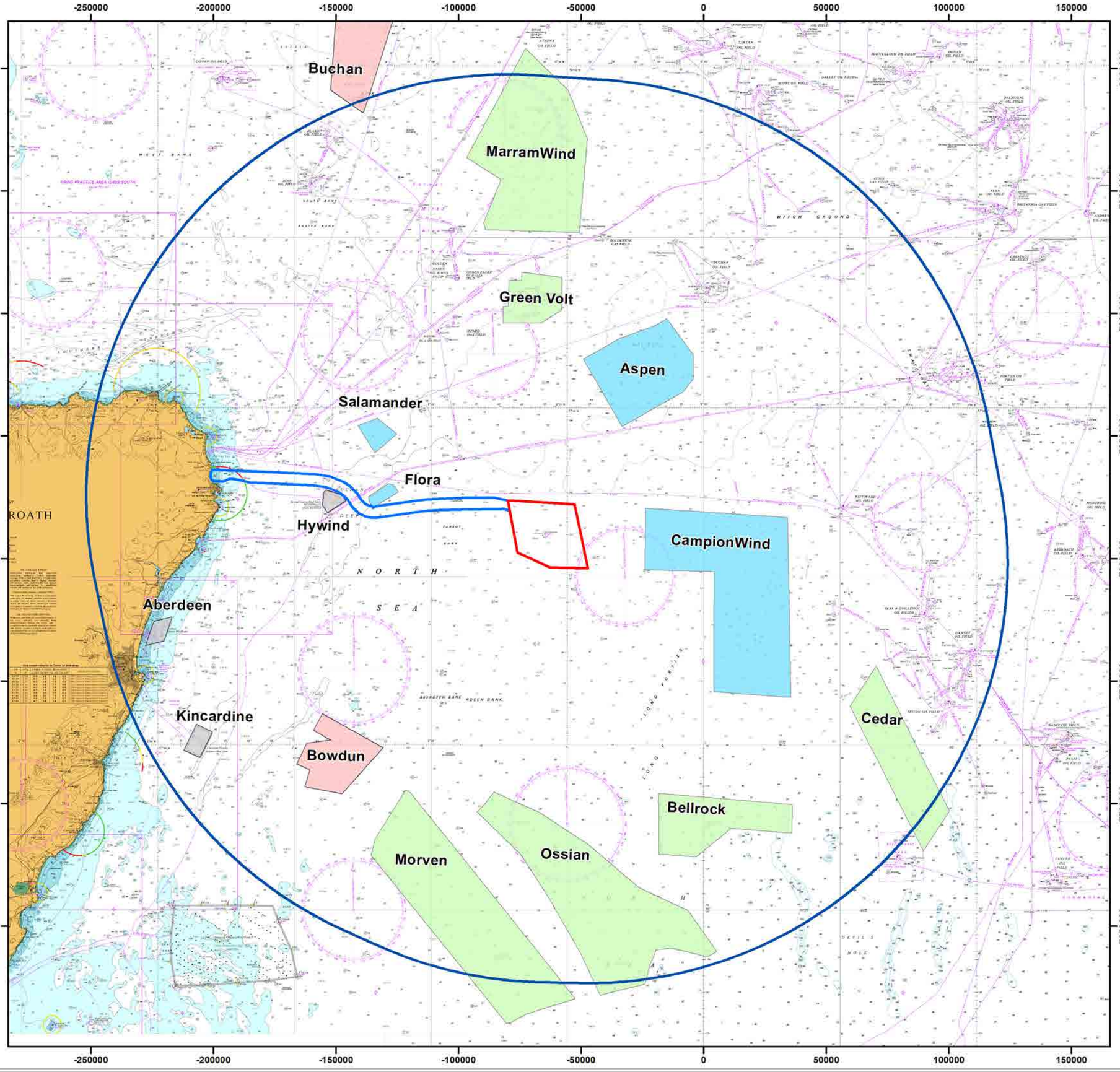
  - OWFs between 25 to 50 nm (46.3 to 92.6 km);
  - Oil and gas infrastructure between 5 and 10 nm (9.26 to 18.5 km); and
  - Subsea cables up to 2 nm (3.70 km).

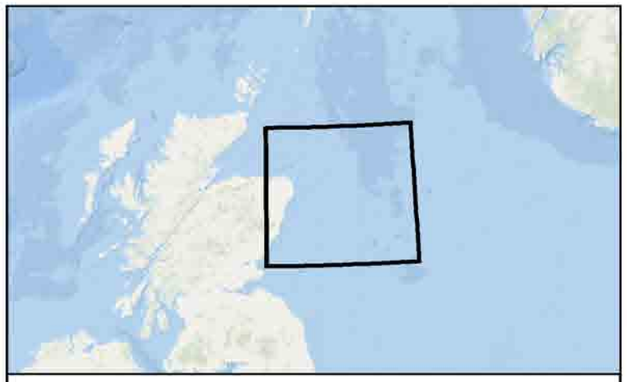
- **Tier 3** – Tier 2 plus scoped or submitted projects with low data confidence and which do not impact a main commercial route passing within 1 nm (1.85 km) of the Array Area and does not interact with traffic which may be directly displaced by the Array Area. Distances typically considered from the Array Area:

  - OWFs up to 50 nm (92.6 km);
  - Oil and gas infrastructure up to 10 nm (18.5 km); and
  - Subsea cables up to 2 nm (3.70 km).

14.9.5. An aggregate of these the criterion is used to determine the tier of each project and consultation feedback may influence the tiering should specific cumulative scenarios need to be addressed.

14.9.6. This CEA for Shipping and Navigation will consider the worst-case design scenario for each of the projects, plans and activities in line with the same methodology outlined in for the Proposed Development in isolation, including the assessment undertaken within the NRA (Section 14.5.1) to identify the anticipated worst-case shift in mean position of the main commercial routes within a 50 nm (9.26 km) buffer following the development of the Proposed Development and Tier 1 and Tier 2 cumulative projects (Tier 3 projects are assessed qualitatively only). These deviations are based on Anatec's assessment of the worst case design and follow the same methodology outlined for deviations due to the Proposed Development in isolation.





Legend:

- Array Area
- Offshore Export Cable Corridor
- 50 nm Buffer

Cumualtive OWF Projects

- Tier 1
- Tier 2
- Tier 3
- Baseline

Project:	Report:
Muir Mhòr	Environmental Impact Assessment Report

Other OWF Projects Relevant to the Shipping and Navigation CEA

Figure: 14.7	Drawing No: ANA-EIAR-S&N-007		
Revision:	Date:	Drawn:	Checked:
01	04/07/24	RR	JM

Map scale 1:1,550,000 @A3

0 15 30 nm

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Co-ordinate system: WGS 1984 World Mercator **EPSG:** 3395

anatec

MUIR MHÒR OFFSHORE WIND FARM

A joint venture between Fred.Olsen Seawind & Vattenfall

Service Layer Credits: Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

Table 14-33 Other Plans/Projects included in the Shipping and Navigation CEA.

Plan/Project	Summary	Status	Distance from Array Area (nm)	Distance from ECC (nm)	Construction dates (if relevant)	Operational by (if relevant)	Summary of interaction with Proposed Development
Tier 1							
CampionWind	OWF development	Pre-planning	12.56	29.91	Unknown	Unknown	Development is located up to 25 nm (46.3 km) from the Array Area and will impact main commercial routes passing within 1 nm (1.85 km) of the Array Area and/or interacts with vessel traffic which may be directly displaced by the Array Area.
Aspen	OWF development	Pre-planning	20.05	29.88	2026 to 2027	2028	
Flora	OWF development	Pre-planning	24.12	0.0	Unknown	Unknown	
Salamander	OWF development	Consent application submitted	28.37	9.10	2028 to 2030	2031	
Tier 2							
Green Volt	OWF development	Consented	36.26	35.64	2025 to 2027	2028	Development is located within 25 to 50 nm (46.3 to 92.6 km) of the Array Area and will impact main commercial routes passing within 1 nm (1.85 km) of the Array Area and/or interacts with vessel traffic which may be directly displaced by the Array Area.
Ossian	OWF development	Consent application submitted	51.38	62.42	2031 to 2038	2038	
Bellrock	OWF development	Scoped	52.35	70.78	2028 to 2031	2032	
Morven	OWF development	Scoped	58.16	60.80	2027 to 2029	2030	
MarramWind	OWF development	Scoped	58.90	58.35	Unknown	Unknown	
Cedar	OWF development	Pre-planning	65.58	86.78	Unknown	Unknown	
Tier 3							
Bowdun	OWF development	Pre-planning	52.50	44.60	2029 to 2032	2033	Development is located up to 50 nm (92.6 km) from the Array Area and does not impact a main commercial route passing within 1 nm (1.85 km) of the Array Area and does not interact with vessel traffic which may be directly displaced by the Array Area.
Buchan	OWF development	Scoped	89.95	79.21	2028 to 2030	2031	
NorthConnect	Subsea cable development	Pre-planning	43.96	0.00	Unknown	Unknown	Development crosses the offshore ECC.
Buchan Oil Field	Subsea cable development	Pre-planning	14.56	0.00	Unknown	Unknown	

WORST CASE DESIGN SCENARIO CEA

14.9.7. The Shipping and Navigation CEA has been undertaken with respect to the details provided in Volume 1, Chapter 3 (Project Description). A 'worst case' design scenario has been selected for each cumulative impact which would lead to the greatest impact for all receptors or receptor groups, when selected from a range of values. Effects of greater significance are not predicted to arise should any other development scenario, based on details within Volume 1, Chapter 3 (Project Description) (e.g., different infrastructure layout), to that assessed here, be taken forward in the final design scheme.

14.9.8. Table 14-34 presents the worst-case design scenario for each cumulative impact associated with the Shipping and Navigation CEA**,** along with justification.

Table 14-34 Worst Case Design Scenarios with respect to the Shipping and Navigation CEA

Cumulative Impact	Tier	Worst Case Design Scenario
All Phases		
Vessel displacement and increased vessel to vessel collision risk between third-party vessels	1	The same worst case design parameters as detailed for the Proposed Development in isolation impact are relevant for the Shipping and Navigation CEA in addition to the full build out of CampionWind, Aspen, Flora, and Salamander OWFs.
	2	The same worst case design parameters as detailed for the Proposed Development in isolation impact are relevant for the Shipping and Navigation CEA in addition to the full build out of Tier 1 developments as well as Green Volt, Ossian, Bellrock, Morven, MarramWind, and Cedar OWFs.
	3	The same worst case design parameters as detailed for the Proposed Development in isolation impact are relevant for the Shipping and Navigation CEA in addition to the full build out of Tier 1 and tier 2 developments as well as Bowdun and Buchan OWFs as well as the NorthConnect and Buchan Oil Field cable developments.
Vessel to vessel collision risk between a third party vessel and a project vessel	1	The same worst case design parameters as detailed for the Proposed Development in isolation impact are relevant for the Shipping and Navigation CEA in addition to the full build out of CampionWind, Aspen, Flora, and Salamander OWFs.
	2	The same worst case design parameters as detailed for the Proposed Development in isolation impact are relevant for the Shipping and Navigation CEA in addition to the full build out of Tier 1 developments as well as Green Volt, Ossian, Bellrock, Morven, MarramWind, and Cedar OWFs.
	3	The same worst case design parameters as detailed for the Proposed Development in isolation impact are relevant for the Shipping and Navigation CEA in addition to the full build out of Tier 1 and Tier 2 developments as well as Bowdun and Buchan OWFs as well as the NorthConnect and Buchan Oil Field cable developments.
Reduced access to local ports/harbours/and marinas.	1	The same worst case design parameters as detailed for the Proposed Development in isolation impact are relevant for the Shipping and Navigation CEA in addition to the full build out of CampionWind, Aspen, Flora, and Salamander OWFs.
	2	The same worst case design parameters as detailed for the Proposed Development in isolation impact are relevant for

Cumulative Impact	Tier	Worst Case Design Scenario
		the Shipping and Navigation CEA in addition to the full build out of Tier 1 developments as well as Green Volt, Ossian, Bellrock, Morven, MarramWind, and Cedar OWFs.
	3	The same worst case design parameters as detailed for the Proposed Development in isolation impact are relevant for the Shipping and Navigation CEA in addition to the full build out of Tier 1 and Tier 2 developments as well as Bowdun and Buchan OWFs as well as the NorthConnect and Buchan Oil Field cable developments.
Operation and Maintenance		
Creation of vessel to structure allision risk	1	The same worst case design parameters as detailed for the Proposed Development in isolation impact are relevant for the Shipping and Navigation CEA in addition to the full build out of CampionWind, Aspen, Flora, and Salamander OWFs.
	2	The same worst case design parameters as detailed for the Proposed Development in isolation impact are relevant for the Shipping and Navigation CEA in addition to the full build out of Tier 1 developments as well as Green Volt, Ossian, Bellrock, Morven, MarramWind, and Cedar OWFs.
	3	The same worst case design parameters as detailed for the Proposed Development in isolation impact are relevant for the Shipping and Navigation CEA in addition to the full build out of Tier 1 and Tier 2 developments as well as Bowdun and Buchan OWFs as well as the NorthConnect and Buchan Oil Field cable developments.
Reduction in under keel clearance as a results of cable protection, dynamic, cables, or mooring lines	1	The same worst case design parameters as detailed for the Proposed Development in isolation impact are relevant for the Shipping and Navigation CEA in addition to the full build out of CampionWind, Aspen, Flora, and Salamander OWFs.
	2	The same worst case design parameters as detailed for the Proposed Development in isolation impact are relevant for the Shipping and Navigation CEA in addition to the full build out of Tier 1 developments as well as Green Volt, Ossian, Bellrock, Morven, MarramWind, and Cedar OWFs.
	3	The same worst case design parameters as detailed for the Proposed Development in isolation impact are relevant for the Shipping and Navigation CEA in addition to the full build out of Tier 1 and Tier 2 developments as well as Bowdun and Buchan OWFs as well as the NorthConnect and Buchan Oil Field cable developments.
Reduction in emergency response capabilities including SAR	1	The same worst case design parameters as detailed for the Proposed Development in isolation impact are relevant for the Shipping and Navigation CEA in addition to the full build out of CampionWind, Aspen, Flora, and Salamander OWFs.
	2	The same worst case design parameters as detailed for the Proposed Development in isolation impact are relevant for the Shipping and Navigation CEA in addition to the full build out of Tier 1 developments as well as Green Volt, Ossian, Bellrock, Morven, MarramWind, and Cedar OWFs.
	3	The same worst case design parameters as detailed for the Proposed Development in isolation impact are relevant for the Shipping and Navigation CEA in addition to the full build

Cumulative Impact	Tier	Worst Case Design Scenario
		out of Tier 1 and Tier 2 developments as well as Bowdun and Buchan OWFs as well as the NorthConnect and Buchan Oil Field cable developments.

ALL PHASES CEA

VESSEL DISPLACEMENT

14.9.9. Construction and decommissioning activities associated with the installation and/or removal of structures and cables and the presence of structures during O&M may displace existing routes/activity on a cumulative level.

TIER 1

14.9.10. Based on the cumulative assessment of vessel routeing, a deviation will be required for all 18 main commercial routes identified in a cumulative scenario. One route, Route 5, would not be further affected by cumulative developments and the route remains the same as in the in-isolation scenario. It is anticipated that eight of the routes affected by cumulative developments will deviate around CampionWind, five around Aspen, and one route around each of Flora and Salamander.

14.9.11. A total of 12 main commercial routes will be required to deviate as a result of CampionWind and Aspen, located to the east and north-east of the Proposed Development, respectively. Routes deviate north of the Proposed Development and through the gap between CampionWind and Aspen before returning to their intended route position. This is the case for all 10 routes on an east-west bearing (all oil and gas routes) with the two other routes on a north-south bearing either passing east of both projects (Route 11) or west of the Array Area and south of CampionWind (Route 7). The presence of CampionWind alone would require a further deviation, due to the Proposed Development, to an additional three routes from what was identified in the in isolation scenario.

14.9.12. Although an increase in route length would be required for these deviations, the deviations illustrated in Section 14.7 are a conservative worst-case, with vessels on these routes likely to take a more direct approach between port locations on the east coast of Scotland and the offshore oil and gas fields in particular, given that there is sea room available to do so. This is especially the case for the area between Aberdeen and the Array Area which is clear of cumulative developments.

14.9.13. Tidewater Marine Ltd stated during consultation that there is no cumulative effect to Tidewater vessels from the presence of cumulative developments. Commercial routes north-south will also likely take a more direct approach noting these routes are between mainland Europe and North America and the Northern Isles and any deviation in this area would be small in proportion to the entire route. It is also noted that traffic volumes on these routes are considered relatively low.

14.9.14. The MCA noted during consultation that vessels may use the gap between the Proposed Development and CampionWind, but the MCA had no concerns over the 6.8 nm (12.6 km) gap and again echoes that vessels will take a more direct approach to routeing in the area than what has been assumed worst-case.

14.9.15. Other Tier 1 developments, Flora, and Salamander, have a lower level of cumulative impact than CampionWind and Aspen. Both developments only deviate one route each, with both routes only deviating marginally to pass at a mean distance of 1 nm (1.85 km) off each

development. It is noted that Route 8, deviated by Flora, is only affected by Flora and no other cumulative development or the Proposed Development. Route 1 which is deviated by Salamander is also deviated due to the presence of CampionWind. Vessels routeing in the vicinity of these developments will already be familiar with offshore wind developments considering Hywind is situated inshore of both developments and so limited impact is expected to occur.

14.9.16. The SWFPA noted during consultation that commercial fishing vessels and fishing grounds may be affected cumulatively with vessels being deviated and filtered into gaps between developments especially with vessel numbers increasing over time. The majority of fishing vessels on transits were to the south-east of the Proposed Development and so would not be on passage in proximity to Tier 1 developments unless heading north-west to Fraserburgh in which case vessels would need to deviate around Salamander. Just like commercial vessels, fishing vessels and recreational vessels, especially closer to shore, there will be familiarity transiting around offshore developments and so minor deviations are not considered to impact smaller craft materially.

TIER 2

14.9.17. Of the 18 routes requiring a deviation in the cumulative scenario, six are impacted by Tier 2 developments, with three routes not also affected by any Tier 1 developments.

14.9.18. The three routes which are impacted by Tier 2 developments only are all low use commercial routes routeing north-south to the west of the Array Area. These routes are not deviated as a result of the in-isolation scenario or by the Proposed Development as a result of other cumulative developments. These routes are deviated to pass at a mean distance of 1 nm (1.85 km) off the Tier 2 developments to the south of the Proposed Development and given the nature of these route, deviations are not considered large.

14.9.19. Of the three routes which are impacted by Tier 2 developments as well as Tier 1, the same measures that have been addressed for Tier 1 developments also apply, noting another of these routes is not affected by the Proposed Development in isolation or at a cumulative level (Route 11).

14.9.20. The same impacts for smaller craft as detailed for Tier 1 developments is also considered for Tier 2 developments, although Tier 2 developments are further offshore and not in proximity to the Proposed Development and so any impact would be due to the Tier 2 developments only.

TIER 3

14.9.21. For this impact there is no direct link between the Proposed Development and Tier 3 OWF and subsea cable developments due to the distance from the Proposed Development and the lack of interaction with any main commercial routes associated with the Proposed Development or lack of data available. Therefore, no additional assessment of risk has been undertaken.

SEVERITY OF CONSEQUENCE

14.9.22. The severity of consequence in relation to cumulative displacement of vessel traffic for the Array Area is considered moderate.

14.9.23. The severity of consequence in relation to cumulative displacement of vessel traffic for the offshore ECC is considered minor.

FREQUENCY OF OCCURRENCE

14.9.24. The frequency of occurrence in relation to cumulative displacement of vessel traffic for the Array Area is considered frequent.

14.9.25. The frequency of occurrence in relation to cumulative displacement of vessel traffic for the offshore ECC is considered reasonably probable.

SIGNIFICANCE OF CUMULATIVE EFFECT

14.9.26. For the Array Area, the severity of consequence is deemed to be moderate, and the frequency of occurrence is frequent. The cumulative effect will therefore be tolerable with mitigation, which is not significant in EIA terms.

14.9.27. For the offshore ECC, the severity of consequence is deemed to be minor, and the frequency of occurrence is reasonably probable. The cumulative effect will therefore be tolerable with mitigation, which is not significant in EIA terms.

Table 14-35 Significance of Vessel Displacement

Receptor/Location	Severity of Consequence	Frequency of Occurrence	Significance
All receptors – Array Area	Moderate	Frequent	Tolerable with mitigation
All receptors – offshore ECC	Minor	Reasonably probable	Tolerable with mitigation

SECONDARY MITIGATION AND RESIDUAL CUMULATIVE EFFECTS

14.9.28. No additional Shipping and Navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 14.6) is not significant in EIA terms.

INCREASED THIRD-PARTY VESSEL COLLISION RISK

14.9.29. Construction/decommissioning activities associated with the installation and/or removal of structures and cables and the presence of structures during O&M may increase encounters and collision risk with other third-party vessels on a cumulative level.

TIER 1/2

14.9.30. The same cumulative vessel routeing considered for the vessel displacement impact is again applicable for Tier 1 and Tier 2 developments. Tier 1 and Tier 2 developments are considered together given that the reduction in navigable sea room resulting from the presence of developments will be greater with Tier 1 and Tier 2 developments present.

14.9.31. Vessels using the gap between the Array Area and CampionWind may be subject to a greater collision risk. However, given the frequency with which vessels are anticipated to use this gap the likelihood of an encounter is very low. Should an encounter occur, the width of the gap (6.8 nm [12.6 km]) is sufficient to allow collision avoidance in compliance with COLREGs. This aligns with feedback from the MCA who were not concerned given the width of the gap.

14.9.32. The deviation of multiple routes north of the Array Area and through the gap of CampionWind and Aspen could increase collision risk given that the ability to approach this gap is constrained by the presence of the Array Area. However, given the volumes and sizes of traffic associated with these routes, the increase is anticipated to be limited and there is sea

room available to ensure vessels are able to pass each other safely in compliance with the COLREGs should an encounter arise.

14.9.33. For small craft, the option to pass between the Array Area and other Tier 1 and Tier 2 developments is feasible, noting that small craft traffic volumes in the area are low. This may allow small craft to avoid commercial routeing and thus minimise collision risk, noting that the consequences should a small craft collide with a larger vessel would likely be exacerbated.

TIER 3

14.9.34. For this impact there is no direct link between the Proposed Development and Tier 3 OWF and subsea cable developments due to the distance from the Proposed Development and the lack of interaction with any main commercial routes associated with the Proposed Development or lack of data available. Therefore, no additional assessment of risk has been undertaken.

SEVERITY OF CONSEQUENCE

14.9.35. The severity of consequence in relation to cumulative increased third-party vessel collision risk for the Array Area is considered moderate.

14.9.36. The severity of consequence in relation to cumulative increased third-party vessel collision risk for the offshore ECC is considered moderate.

FREQUENCY OF OCCURRENCE

14.9.37. The frequency of occurrence in relation to cumulative increased third-party vessel collision risk for the Array Area is considered remote.

14.9.38. The frequency of occurrence in relation to cumulative increased third-party vessel collision risk for the offshore ECC is considered extremely unlikely.

SIGNIFICANCE OF CUMULATIVE EFFECT

14.9.39. For the Array Area, the severity of consequence is deemed to be moderate, and the frequency of occurrence is remote. The cumulative effect will therefore be tolerable with mitigation, which is not significant in EIA terms.

14.9.40. For the offshore ECC, the severity of consequence is deemed to be moderate, and the frequency of occurrence is extremely unlikely. The cumulative effect will therefore be broadly acceptable, which is not significant in EIA terms.

Table 14-36 Significance of Increased Third-Party Vessel Collision

Receptor/Location	Severity of Consequence	Frequency of Occurrence	Significance
All receptors – Array Area	Moderate	Remote	Tolerable with mitigation
All receptors – offshore ECC	Moderate	Extremely unlikely	Broadly acceptable

SECONDARY MITIGATION AND RESIDUAL CUMULATIVE EFFECTS

14.9.41. No additional Shipping and Navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 14.6) is not significant in EIA terms.

THIRD-PARTY WITH PROJECT VESSEL COLLISION RISK

14.9.42. Project vessels associated with construction, O&M, and decommissioning activities may increase encounters and collision risk for other vessels already operating in the area on a cumulative level.

TIER 1/2/3

14.9.43. All tiers of development are considered together given that the presence of project vessels will be greater with all tiers of development present.

14.9.44. There is the potential that the same base port(s) or similarly located ports could be used by cumulative developments for construction, O&M, and/or decommissioning vessels. On this basis, there may be an overall cumulative increase in project vessel presence within the general area, and as such the potential for increased encounters and collision risk with third party traffic. However, details of base ports are not currently available (across all cumulative tiers) and so a detailed risk assessment is not possible.

14.9.45. However, all developers are expected to establish appropriate marine coordination and vessel management systems with project vessels complying with Flag State regulations including the COLREGs and SOLAS.

SEVERITY OF CONSEQUENCE

14.9.46. The severity of consequence in relation to cumulative third-party with project vessel collision risk for the Array Area is considered minor.

14.9.47. The severity of consequence in relation to cumulative third-party with project vessel collision risk for the offshore ECC is considered minor.

FREQUENCY OF OCCURRENCE

14.9.48. The frequency of occurrence in relation to cumulative increased third-party vessel collision risk for the Array Area is considered reasonably probable.

14.9.49. The frequency of occurrence in relation to cumulative increased third-party vessel collision risk for the offshore ECC is considered reasonably probable.

SIGNIFICANCE OF CUMULATIVE EFFECT

14.9.50. For the Array Area, the severity of consequence is deemed to be minor, and the frequency of occurrence is reasonably probable. The cumulative effect will therefore be broadly acceptable, which is not significant in EIA terms.

14.9.51. For the offshore ECC, the severity of consequence is deemed to be minor, and the frequency of occurrence is reasonably probable. The cumulative effect will therefore be broadly acceptable, which is not significant in EIA terms.

Table 14-37 Significance of Third-Party with Project Vessel Collision Risk

Receptor/Location	Severity of Consequence	Frequency of Occurrence	Significance
All receptors – Array Area	Minor	Reasonably probable	Broadly acceptable
All receptors – offshore ECC	Minor	Reasonably probable	Broadly acceptable

SECONDARY MITIGATION AND RESIDUAL CUMULATIVE EFFECTS

14.9.52. No additional Shipping and Navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 14.6) is not significant in EIA terms.

REDUCED ACCESS TO LOCAL PORTS, HARBOURS, AND MARINAS

14.9.53. Construction, O&M, and decommissioning activities, and the presence of the Proposed Development alongside other cumulative developments may reduce access to local ports and harbours.

TIER 1/2

14.9.54. Tier 1 and Tier 2 developments are considered together given that the reduction in navigable sea room resulting from the presence of developments and potential for overlapping programmes will be greater with Tier 1 and Tier 2 developments present.

14.9.55. Given the relative distance to ports in the area and the anticipated cumulative deviations for the main commercial routes, it is not anticipated that there will be any substantial effect due to activities associated with Tier 1 and Tier 2 cumulative developments beyond the deviations already outlined for impacts relating to vessel displacement. This assumes that the duration and nature of such activities are analogous to that considered for the Proposed Development, especially for the areas on approach to the offshore ECC landfall.

14.9.56. There is also no current known programmes of construction or cable installation activities associated with Tier 1 or Tier 2 developments that will overlap temporally with the Proposed Development. However, in the event this did occur, it is anticipated that the developments would coordinate activities in liaison with local ports so as to ensure that access constraints are minimised. As is the case for the assessment of the Proposed Development in isolation, promulgation of information to allow mariners to passage plan accordingly is key.

TIER 3

14.9.57. Again, it is not anticipated that there will be any substantial effect due to activities associated with Tier 3 cumulative developments beyond the deviations already outlined for impacts relating to vessel displacement.

SEVERITY OF CONSEQUENCE

14.9.58. The severity of consequence in relation to cumulative reduced access to local ports, harbours, and marinas for the Array Area is considered minor.

14.9.59. The severity of consequence in relation to cumulative reduced access to local ports, harbours, and marinas for the offshore ECC is considered minor.

FREQUENCY OF OCCURRENCE

14.9.60. The frequency of occurrence in relation to cumulative reduced access to local ports, harbours, and marinas for the Array Area is considered reasonably probable.

14.9.61. The frequency of occurrence in relation to cumulative reduced access to local ports, harbours, and marinas for the offshore ECC is considered frequent.

SIGNIFICANCE OF CUMULATIVE EFFECT

14.9.62. For the Array Area, the severity of consequence is deemed to be minor, and the frequency of occurrence is reasonably probable. The cumulative effect will therefore be broadly acceptable, which is not significant in EIA terms.

14.9.63. For the offshore ECC, the severity of consequence is deemed to be minor, and the frequency of occurrence is frequent. The cumulative effect will therefore be tolerable with mitigation, which is not significant in EIA terms.

Table 14-38 Significance of Reduced Access to Local Ports, Harbours, and Marinas

Receptor/Location	Severity of Consequence	Frequency of Occurrence	Significance
All receptors – Array Area	Minor	Reasonably probable	Broadly acceptable
All receptors – offshore ECC	Minor	Frequent	Tolerable with mitigation

SECONDARY MITIGATION AND RESIDUAL CUMULATIVE EFFECTS

14.9.64. No additional Shipping and Navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 14.6) is not significant in EIA terms.

OPERATION AND MAINTENANCE CEA

CREATION OF VESSEL TO STRUCTURE ALLISION RISK

14.9.65. The presence of structures within the Array Area and other cumulative developments will lead to the creation of powered, drifting, and internal allision risk for vessels.

TIER 1

14.9.66. Given the localised nature of vessel to structure allision risk, cumulative risk is limited. However, given that small craft may choose to navigate between the Array Area and nearby Tier 1 developments, especially CampionWind, there is some cumulative LSE. This sea room is considered adequate to allow safe navigation by small craft, noting the 6.8 nm (12.6 km) gap between the Array Area and CampionWind was deemed suitable by the MCA during consultation for commercial routeing vessels to utilise. The NLB will give due consideration to cumulative lighting and marking requirements across both the Proposed Development and other developments (most notably CampionWind).

TIER 2/3

14.9.67. The distance between the Array Area and Tier 2 and Tier 3 developments is sufficient that no potential cumulative allision risk is considered and therefore Tier 2 and Tier 3 developments are considered together for this hazard. All developments will be required to implement marine lighting and marking in agreement with NLB and in compliance with IALA G1162 (IALA, 2021), meaning the localised risk is managed.

SEVERITY OF CONSEQUENCE

14.9.68. The severity of consequence in relation to cumulative creation of vessel to structure allision risk for the Array Area is considered moderate.

FREQUENCY OF OCCURRENCE

14.9.69. The frequency of occurrence in relation to cumulative creation of vessel to structure allision risk for the Array Area is considered remote.

SIGNIFICANCE OF CUMULATIVE EFFECT

14.9.70. For the Array Area, the severity of consequence is deemed to be moderate, and the frequency of occurrence is remote. The cumulative effect will therefore be tolerable with mitigation, which is not significant in EIA terms.

Table 14-39 Significance of Creation of Vessel to Structure Allision Risk

Receptor/Location	Severity of Consequence	Frequency of Occurrence	Significance
All receptors – Array Area	Moderate	Remote	Tolerable with mitigation

SECONDARY MITIGATION AND RESIDUAL CUMULATIVE EFFECTS

14.9.71. No additional Shipping and Navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 14.6) is not significant in EIA terms.

REDUCTION IN UNDER KEEL CLEARANCE AS A RESULT OF CABLE PROTECTION, DYNAMIC CABLES, OR MOORING LINES

14.9.72. Presence of mooring lines, buoyant inter-array cables, or protection over subsea cables of other cumulative developments may reduce charted water depths leading to increased risk of under keel interaction for passing vessels.

TIER 1/2

14.9.73. Given the localised nature of under keel clearance risk, cumulative risk is limited. However, given the potential for the export cable route corridors for the Proposed Development and Tier 1 and Tier 2 developments to be in relatively close proximity, there is some potential cumulative under keel clearance risk associated with the presence of cable protection. Tier 1 and Tier 2 developments are considered together given the similar nature of these developments and the export cable related mitigation.

14.9.74. Portions of the offshore ECC which may be shared with the Tier 1 or Tier 2 export cable routes are expected to be outside of the nearshore area such that the likelihood of a reduction in charted water depth greater than 5% is low. Nevertheless, as per the assessment of the Proposed Development in isolation, in such circumstances the MCA will be consulted on appropriate mitigation (if required) to ensure the under keel interaction risk is ALARP.

TIER 3

14.9.75. RYA Scotland noted during consultation that subsea cables may have a cumulative impact. Where Tier 3 subsea cable developments may cross the offshore ECC a further reduction in under keel clearance may occur at the site of cable crossing. The spatial extent of the impact is small given that a vessel must be in close proximity to the cable crossing for any risk to occur. Any reduction in under keel clearance created by cable crossings will be determined within the cable burial risk assessment which will be undertaken by both developments. At

the time of instalment of a cable crossing, a cable crossing agreement will also likely occur between developments.

SEVERITY OF CONSEQUENCE

14.9.76. The severity of consequence in relation to cumulative reduction of under keel clearance as a result of cable protection, dynamic cables, and mooring lines for the Proposed Development is considered minor.

FREQUENCY OF OCCURRENCE

14.9.77. The frequency of occurrence in relation to cumulative reduction of under keel clearance as a result of cable protection, dynamic cables, and mooring lines for the Proposed Development is considered frequent.

SIGNIFICANCE OF CUMULATIVE EFFECT

14.9.78. For the Array Area, the severity of consequence is deemed to be minor, and the frequency of occurrence is frequent. The cumulative effect will therefore be tolerable with mitigation, which is not significant in EIA terms.

Table 14-40 Significance of Creation of Vessel to Structure Allision Risk

Receptor/Location	Severity of Consequence	Frequency of Occurrence	Significance
All receptors – Proposed Development	Minor	Frequent	Tolerable with mitigation

SECONDARY MITIGATION AND RESIDUAL CUMULATIVE EFFECTS

14.9.79. No additional Shipping and Navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 14.6) is not significant in EIA terms.

REDUCTION IN EMERGENCY RESPONSE CAPABILITIES INCLUDING SAR

14.9.80. The presence and activities associated with additional cumulative development may further increase the likelihood of incidents requiring an emergency response and could subsequently increase the likelihood of multiple incidents occurring simultaneously, adding additional stress on emergency responders.

14.9.81. As for the Proposed Development in isolation, it is assumed that cumulative developments will have embedded commitments in place to reduce the likelihood of emergency response capability being compromised. This includes marine coordination for project vessels and compliance with Flag State regulations. SOLAS obligations will also be applicable to all cumulative developments and may have a positive effect, e.g., a project vessel for any other nearby offshore wind developments may be able to assist with an incident associated with the Proposed Development, or vice-versa. Nevertheless, the presence of structures and associated activities across multiple developments will increase the likelihood of an incident occurring that requires an emergency response.

14.9.82. Given that the Array Area is not immediately adjacent to any cumulative development, there is not considered to be any cumulative risk associated with SAR access, noting that a 1 nm (1.85 km) separation is required by MGN 654.

SEVERITY OF CONSEQUENCE

14.9.83. The severity of consequence in relation to cumulative reduction of emergency response capability including SAR for the Proposed Development is considered serious.

FREQUENCY OF OCCURRENCE

14.9.84. The frequency of occurrence in relation to cumulative reduction of emergency response capability including SAR for the Proposed Development is considered remote.

SIGNIFICANCE OF CUMULATIVE EFFECT

14.9.85. For the Array Area, the severity of consequence is deemed to be serious, and the frequency of occurrence is remote. The cumulative effect will therefore be tolerable with mitigation, which is not significant in EIA terms.

Table 14-41 Significance of Reduction of Emergency Response Capability Including SAR

Receptor/Location	Severity of Consequence	Frequency of Occurrence	Significance
All receptors – Proposed Development	Serious	Remote	Tolerable with mitigation

SECONDARY MITIGATION AND RESIDUAL CUMULATIVE EFFECTS

14.9.86. No additional Shipping and Navigation mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the commitments outlined in Section 14.6) is not significant in EIA terms.

PROPOSED MONITORING FOR CUMULATIVE EFFECTS

14.9.87. No shipping and navigation monitoring is proposed to test the predictions made within the assessment of cumulative effects on shipping and navigation receptors as no LSE were predicted during construction, O&M and decommissioning phases of the Proposed Development.

14.10. TRANSBOUNDARY EFFECTS

14.10.1. A transboundary effect assessment assesses the Shipping and Navigation effects from the Proposed Development upon the interests of European Economic Areas (EEA).

14.10.2. Transboundary impacts in terms of vessel routeing (including to international ports are considered to have been assessed in Section 14.7 (for the Proposed Development in isolation) and Section 14.8 (on a cumulative basis). Individual transits may have the potential to be associated with vessels that are internationally owned or located; however, any such transits have been captured within the baseline assessment of vessel traffic as per Section 14.5 noting that AIS carriage requirements are set by the IMO and apply across EEAs.

14.10.3. As such, no transboundary impacts other than those already assessed in Sections 14.7 and 14.8 are anticipated.

14.11. INTER-RELATED EFFECTS

14.11.1. Inter-related effects may occur due to multiple impacts on a receptor or a group of receptors from the Proposed Development. This includes the following:

- **Project Lifecycle Effects** - Interactions between impacts across different phases of the Proposed Development i.e., interaction of impacts across construction, operation and maintenance and decommissioning; and
- **Inter-related Receptor Effects** - Interactions between impacts on a receptor or group of receptors within an offshore Project stage (Inter-related Receptor Effects).

14.11.2. Several LSE have been considered for inter-related effects with respect to Shipping and Navigation, including:

- Vessel Displacement;
- Increased third-party vessel collision risk;
- Third with Project vessel collision risk;
- Reduced access to local ports, harbours, and marinas; and
- Creation of vessel to structure allision risk.

14.11.3. No Project Lifecycle Effects with respect to Shipping and Navigation are predicted during construction, O&M, and decommissioning. None of the LSE considered will be worsened through interactions across different phases of the Proposed Development.

14.11.4. Inter-related Receptor Effects from Shipping and Navigation are presented in Table 14-42.

Table 14-42 Inter-related Receptor Effects from Shipping and Navigation

Inter-related Receptor	Inter-Related Effect
Commercial Fisheries	During construction and decommissioning phases, navigational access to defined areas will likely be restricted, displacing commercial fishing vessels from fishing grounds.

14.12. ASSESSMENT SUMMARY

14.12.1. A summary of the findings of the effects and cumulative effects assessments undertaken in Section 14.7 and Section 14.8 is given in Table 14-43 and Table 14-44, respectively. This includes residual effect significance after any required secondary mitigation and proposed monitoring.

14.12.2. An effect significance of tolerable with mitigation or broadly acceptable is not significant in EIA terms. Likewise, no significant residual effect translates to not significant in EIA terms.

Table 14-43 Summary of Assessment of Effects on Shipping and Navigation

Effect	Receptor	Severity of Consequence	Frequency of Occurrence	Effect Significance	Secondary Mitigation	Residual Effect	Proposed Monitoring
Construction							
Vessel displacement	Array Area	Minor	Frequent	Tolerable with Mitigation	None	No significant residual effect	None
	Offshore ECC	Negligible	Reasonably Probable	Broadly Acceptable	None	No significant residual effect	None
Increased third-party vessel collision risk	Array Area	Moderate	Remote	Tolerable with Mitigation	None	No significant residual effect	None
	Offshore ECC	Moderate	Extremely Unlikely	Broadly Acceptable	None	No significant residual effect	None
Third-party with project vessel collision risk	Array Area	Moderate	Extremely Unlikely	Broadly Acceptable	None	No significant residual effect	None
	Offshore ECC	Moderate	Remote	Tolerable with Mitigation	None	No significant residual effect	None
Reduced access to local port, harbours, and marinas	Array Area	Minor	Remote	Broadly Acceptable	None	No significant residual effect	None
	Offshore ECC	Minor	Frequent	Tolerable with Mitigation	None	No significant residual effect	None
Loss of station	Array Area	Moderate	Extremely Unlikely	Broadly Acceptable	None	No significant residual effect	None
Operation and Maintenance							
Vessel displacement	Array Area	Minor	Frequent	Tolerable with Mitigation	None	No significant residual effect	None
	Offshore ECC	Negligible	Reasonably Probable	Broadly Acceptable	None	No significant residual effect	None
Increased third-party vessel collision risk	Array Area	Moderate	Remote	Tolerable with Mitigation	None	No significant residual effect	None
	Offshore ECC	Moderate	Negligible	Broadly Acceptable	None	No significant residual effect	None
Third-party with project vessel collision risk	Array Area	Moderate	Extremely Unlikely	Broadly Acceptable	None	No significant residual effect	None
	Offshore ECC	Moderate	Extremely Unlikely	Broadly Acceptable	None	No significant residual effect	None
Reduced access to local port, harbours, and marinas	Array Area	Minor	Extremely Unlikely	Broadly Acceptable	None	No significant residual effect	None
	Offshore ECC	Minor	Reasonably Probable	Tolerable with Mitigation	None	No significant residual effect	None
Loss of station	Array Area	Moderate	Remote	Tolerable with Mitigation	None	No significant residual effect	None
Creation of vessel to structure allision risk	Array Area	Moderate	Remote	Tolerable with Mitigation	None	No significant residual effect	None
Reduction of under keel clearance as a result of cable protection, dynamic cables, and mooring lines	Proposed Development	Minor	Reasonably Probable	Tolerable with Mitigation	None	No significant residual effect	None
Anchor interaction with mooring lines or subsea cables	Proposed Development	Negligible	Minor	Broadly Acceptable	None	No significant residual effect	None
Reduction of emergency response capability including SAR	Proposed Development	Serious	Extremely Unlikely	Tolerable with Mitigation	None	No significant residual effect	None
Decommissioning							
Vessel displacement	Array Area	Minor	Frequent	Tolerable with Mitigation	None	No significant residual effect	None
	Offshore ECC	Negligible	Reasonably Probable	Broadly Acceptable	None	No significant residual effect	None
Increased third-party vessel collision risk	Array Area	Moderate	Remote	Tolerable with Mitigation	None	No significant residual effect	None
	Offshore ECC	Moderate	Extremely Unlikely	Broadly Acceptable	None	No significant residual effect	None
Third-party with project vessel collision risk	Array Area	Moderate	Extremely Unlikely	Broadly Acceptable	None	No significant residual effect	None
	Offshore ECC	Moderate	Remote	Tolerable with Mitigation	None	No significant residual effect	None
Reduced access to local port, harbours, and marinas	Array Area	Minor	Remote	Broadly Acceptable	None	No significant residual effect	None
	Offshore ECC	Minor	Frequent	Tolerable with Mitigation	None	No significant residual effect	None
Loss of station	Array Area	Moderate	Extremely Unlikely	Broadly Acceptable	None	No significant residual effect	None

Table 14-44 Summary of Assessment of Cumulative Effects on Shipping and Navigation

Effect	CEA Tier	Receptor	Magnitude of Cumulative Impact	Receptor Sensitivity	Cumulative Effect Significance	Secondary Mitigation	Residual Cumulative Effect	Proposed Monitoring
All Phases								
Vessel displacement	All tiers	Array Area	Moderate	Frequent	Tolerable with mitigation	None	No significant residual effect	None
	All tiers	Offshore ECC	Minor	Reasonably probable	Tolerable with mitigation	None	No significant residual effect	None
Increased third-party vessel collision risk	All tiers	Array Area	Moderate	Remote	Tolerable with mitigation	None	No significant residual effect	None
	All tiers	Offshore ECC	Moderate	Extremely unlikely	Broadly acceptable	None	No significant residual effect	None
Third-party with project vessel collision risk	All tiers	Array Area	Minor	Reasonably probable	Broadly acceptable	None	No significant residual effect	None
	All tiers	Offshore ECC	Minor	Reasonably probable	Broadly acceptable	None	No significant residual effect	None
Reduced access to local port, harbours, and marinas	All tiers	Array Area	Minor	Reasonably probable	Broadly acceptable	None	No significant residual effect	None
	All tiers	Offshore ECC	Minor	Frequent	Tolerable with mitigation	None	No significant residual effect	None
Operation and Maintenance								
Creation of vessel to structure allision risk	All tiers	Array Area	Moderate	Remote	Tolerable with mitigation	None	No significant residual effect	None
Reduction of under keel clearance as a result of cable protection, dynamic cables, and mooring lines	All tiers	Proposed Development	Minor	Frequent	Tolerable with mitigation	None	No significant residual effect	None
Reduction in emergency response capabilities including SAR	All tiers	Proposed Development	Serious	Remote	Tolerable with mitigation	None	No significant residual effect	None

14.13. REFERENCES

Anatec (2024) Ship Routes Database.

Andy Carnduff and Forth Yacht Club Association (2023) East Coast of Scotland Sailing Directions.

The Department of Energy and Climate Change (2011) Standard Marking Schedule for Offshore Installations.

His Majesty's Government (2011) UK Marine Policy Statement.

Health and Safety Executive and Maritime & Coastguard Agency (2017) Regulatory Expectations on Moorings for Floating Wind and Marine Devices.

International Association of Marine Aids to Navigation and Lighthouse Authorities (2021a) IALA Recommendation O-139 on The Marking of Man-Made Offshore Structures, Edition 3.0.

International Association of Marine Aids to Navigation and Lighthouse Authorities (2021b) IALA Guideline G1162 The Marking of Offshore Man-Made Structures, Edition 1.0.

International Maritime Organization (1972/77) Convention on International Regulations for Preventing Collisions at Sea (COLREGs).

International Maritime Organization (1974) International Convention for the Safety of Life at Sea (SOLAS).

International Maritime Organization (2018) Revised Guidelines for Formal Safety Assessment (FSA) for Use in the Rule-Making Process. MSC-MEPCC.2/Circ.12/Rev.2.

Maritime & Coastguard Agency (2008) Marine Guidance Note 371 (Merchant and Fishing) Offshore Renewable Energy Installations (OREIs): Guidance on UK Navigational Practice, Safety and Emergency Response Issues.

Maritime & Coastguard Agency (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.

Maritime & Coastguard Agency (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.

Met Office (2019) UKCP18 Science Overview Report. https://www.metoffice.gov.uk/pub/data/weather/uk/ukcp18/science-reports/UKCP18-Overview-report.pdf [Accessed: May 2024].

Met Office (2024) 'Case Studies of Past Weather Events, https://www.metoffice.gov.uk/weather/learn-about/past-uk-weather-events [Accessed: 05 2024].

Royal Yachting Association (2019) UK Coastal Atlas of Recreational Boating 2.1.

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

Scottish Government (2015) Scotland's National Marine Plan

Scottish Government (2020) Sectoral Marine Plan for Offshore Wind Energy.

Scottish Government (2022) Guidance for applicants on using the design envelope for application under Section 36 of the Electricity Act 1989.

United Kingdom Hydrographic Office (2021) Admiralty Sailing Directions North Sea (West) Pilot NP54. 12th Edition.

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