GREEN VOLT

Chapter 14
Shipping and Navigation

Offshore EIA Report: Volume 1

Revision history

Revision	Date	Description	Prepared	Checked	Approved
1	07/08/2022	First draft	Anatec	PP (Royal HaskoningDHV)	VC (Flotation Energy)
2	13/10/2022	Second draft	Anatec	PP (Royal HaskoningDHV)	VC (Flotation Energy)
3	09/01/2023	Final for submission	Anatec	PP (Royal HaskoningDHV)	VC (Flotation Energy)

Table of Contents

Table of Tables

Table of Figures

Appendices

Acronyms

Acronym	Description
AIS	Automatic Identification System
ALARP	As Low As Reasonably Practicable
BEIS	The Department for Business, Energy and Industrial Strategy
CCS	Carbon Capture and Storage
CIA	Cumulative Impact Assessment
COLREGS	Convention on the International Regulations for Preventing Collisions at Sea
CoS	Chamber of Shipping
DECC	Department of Energy and Climate Change
DSLP	Development Specification and Layout Plan
EIA	Environmental Impact Assessment
ERCoP	Emergency Response Cooperation Plan
FLO	Fishing Liaison Officer
FSA	Formal Safety Assessment
HDD	Horizontal Directional Drill
HSE	Health and Safety Executive
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IMO	International Maritime Organization
JNCC	Joint Nature Conservation Committee
km	Kilometre

Acronym	Description
LOA	Length Overall
m	Metre
MAIB	Maritime Accident Investigation Branch
MCA	Maritime and Coastguard Agency
MGN	Marine Guidance Note
NLB	Northern Lighthouse Board
nm	Nautical mile
NRA	Navigational Risk Assessment
OREI	Offshore Renewable Energy Installation
OSP	Offshore Substation Platform
OWF	Offshore Wind Farm
PLL	Potential Loss of Life
Radar	Radio Detection and Ranging
RAM	Restricted in Ability to Manoeuvre
RNLI	Royal National Lifeboat Institution
RYA	Royal Yachting Association
SAR	Search and Rescue
SOLAS	International Convention for the Safety of Life at Sea
TPV	Third Party Verification
UK	United Kingdom

Acronym	Description
UKHO	United Kingdom Hydrographic Office
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
VHF	Very High Frequency
VMS	Vessel Monitoring System
WTG	Wind Turbine Generator

Glossary

Term	Description
Applicant	Green Volt Offshore Windfarm Ltd.
Buzzard	Buzzard Platform Complex.
Buzzard Export Cable Corridor	The area in which the export cables will be laid, from the perimeter of the Windfarm Site to Buzzard Platform Complex.
Green Volt Offshore Windfarm	Offshore windfarm including associated onshore and offshore infrastructure development (Combined On and Offshore Green Volt Projects).
Horizontal Directional Drilling	Mechanism for installation of export cable at landfall.
Inter-array cables	Cables which link the wind turbines to each other and the offshore substation platform.
Landfall Export Cable Corridor	The area in which the export cables will be laid, from the perimeter of the Windfarm Site to landfall.
Mean High Water Springs	At its highest and 'Neaps' or 'Neap tides' when the tidal range is at its lowest. The height of Mean High Water Springs (MHWS) is the average throughout the year, of two successive high waters, during a 24-hour period in each month when the range of the tide is at its greatest (Spring tides).
Moorings	Mechanism by which wind turbine generators are fixed to the seabed.
NorthConnect Parallel Export Cable Corridor Option	Landfall Export Cable Corridor between NorthConnect Parallel Landfall and point of separation from St Fergus South Export Cable Corridor Option.
NorthConnect Parallel Landfall	Southern landfall option where the offshore export cables come ashore.
Offshore Development Area	Encompasses i) Windfarm Site, including offshore substation platform ii) Offshore Export Cable Corridor to Landfall, iii) Export Cable Corridor to Buzzard Platform Complex.
Offshore export cables	The cables which would bring electricity from the offshore substation platform to the Landfall or to the Buzzard Platform Complex.
Offshore infrastructure	All of the offshore infrastructure, including wind turbine generators, offshore substation platform and all inter-array and export cables.
Offshore substation platform	A fixed structure located within the Windfarm Site, containing electrical equipment to aggregate the power from the wind turbine generators and convert it into a more suitable form for export to shore.
Onshore Export Cable Corridor	The proposed onshore area in which the export cables will be laid, from landfall to the onshore substation.
Project	Green Volt Offshore Windfarm project as a whole, including associated onshore and offshore infrastructure development.

Safety zones	An area around a structure or vessel which must be avoided.
St Fergus South Export Cable Corridor Option	Landfall Export Cable Corridor between St Fergus South Landfall and point of separation from NorthConnect Parallel Export Cable Corridor Option.
St Fergus South Landfall	Northern landfall option where the offshore export cables come ashore.
Windfarm Site	The area within which the wind turbine generators, offshore substation platform and inter-array cables will be present.

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CHAPTER 14: SHIPPING AND NAVIGATION

14.1 Introduction

1. This chapter presents the assessment of impacts that may arise as a result of the offshore infrastructure associated with the Project (in this instance the Project refers to the offshore elements of the Green Volt Offshore Windfarm only, up to Mean High Water Springs (MHWS)) on shipping and navigation users during the construction, operation and maintenance (O&M), and decommissioning phases.

2. The assessment presented is informed by the Navigational Risk Assessment (NRA) which has been drafted to support the application as required by the Maritime and Coastguard Agency (MCA) under their Marine Guidance Note (MGN) 654 (MCA, 2021) and its annexes. In line with the guidance this includes the undertaking of a Formal Safety Assessment (FSA) as discussed in **Section 14.4**.

3. This chapter and the NRA assess impacts to shipping and navigation users associated with navigational safety. This includes navigational safety impacts to fishing vessels in transit, noting that impacts associated with fishing gear are assessed separately in **Chapter 13: Commercial Fisheries**.

14.2 Legislation, Guidance and Policy

14.2.1 Legislation

4. Relevant provisions from legislation of relevance to shipping and navigation are detailed in **Table 14.1**, which includes reference to where each point is considered and / or addressed within the **Offshore Environmental Impact Assessment (EIA) Report**.

Table 14.1 Summary of Legislation Relevant to Shipping and Navigation

Summary of Relevant Legislation	Where Considered / Assessed
United Nations Convention on the Law of the Sea (UNCLOS) (United Nations (UN), 1982)	
"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 routeing measures in proximity to the Project as detailed in the NRA. Baseline routeing has been identified as per **Section 14.6.2**.
Convention on the International Regulations for Preventing Collisions at Sea (COLREGS) (International Maritime Organization (IMO), 1972/77)	
Rule 8 Part (a) "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."	COLREGS provisions have been considered where relevant throughout the NRA and this chapter. In particular, collision avoidance provisions have been considered in the relevant impact assessment sections (see **Section 14.7**).
Rule 19 Part (b) "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."	
International Convention for the Safety of Life at Sea (SOLAS) (IMO, 1974)	
Regulation 33 "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."	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 in the relevant impact assessment sections (see **Section 14.7**).
Regulation 34 "Prior to proceeding to sea, the master shall ensure that the intended voyage has been planned using the appropriate nautical charts and nautical publications for the area concerned."	

14.2.2 Guidance

5. The primary guidance used for the shipping and navigation assessment is MGN 654 (Merchant and Fishing) Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response (MCA, 2021) and its annexes. This guidance sets out issues that need to be taken into consideration when assessing the potential impacts on navigational safety and emergency response caused by OREIs including Offshore Wind Farms (OWFs). Compliance with MGN 654 has been demonstrated via the completion of an MGN 654 checklist which is presented in the NRA.

6. As per MGN 654 requirements and in line with industry standards for marine risk assessment, impact assessment has been undertaken using the International Maritime Organization (IMO) FSA approach (IMO, 2018). Further details are provided in **Section 14.4**.

7. Other relevant guidance documents used during the assessment include:

- MGN 372 (Merchant and Fishing) OREI: Guidance to Mariners Operating in the Vicinity of UK OREIs (MCA, 2008);
- International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Guidance G1162 on the Marking of Offshore Man-Made Structures (IALA, 2021);
- IALA Recommendations R139 on the Marking of Offshore Man-Made Structures (IALA, 2021);
- The Royal Yachting Association's (RYA) Position on Offshore Renewable Energy Developments: Paper 1 (of 4) – Wind Energy (RYA, 2019); and
- Regulatory Expectations on Moorings for Floating Wind and Marine Devices (MCA and Health and Safety Executive (HSE), 2017).
- National Policy Statement for renewable Energy Infrastructure (EN-3) (Department of Energy and Climate Change (DECC), 2011).
- Natural England and Joint Nature Conservation Committee (JNCC) advice on key sensitivities of habitats and Marine Protected Areas in English Waters to offshore wind farm cabling within Proposed Round 4 leasing areas (Natural England and JNCC, 2019).
- Cable Burial Risk Assessment (CBRA) Guidance and Application Guide (Carbon Trust, 2015).

14.2.3 Policy

8. The provisions of policy deemed of relevance to shipping and navigation are detailed in **Table 14.2**, which includes reference to where each point is considered and / or addressed within the **Offshore EIA Report**.

Table 14.2: Summary of Policy Relevant to Shipping and Navigation

Summary of Relevant Policy Framework	Where Addressed
UK Marine Policy Statement (His Majesty's Government, 2011)	
Paragraph 3.4.7 "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.**

Summary of Relevant Policy Framework	Where Addressed
Scotland's National Marine Plan (Scottish Government, 2015)	
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:	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 mitigations are detailed in **Section 14.7.1**, with additional mitigation identified as needed under the FSA in **Sections 14.7 and 14.8**.
The extent to which the locational decision interferes with existing or planned routes used by shipping, access to ports and harbour sand 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 port sand harbours."	
Transport 3 "Ferry routes and maritime transport to island and remote mainland areas provide essential connections and should be safeguarded from inappropriate marine development.	
Developments will not be consented where they will unacceptably interfere with lifeline ferry services."	
Transport 6 "Developers should ensure displacement of shipping is avoided where possible to mitigate against potential increased journey lengths (and associated fuel costs, emissions and impact on journey frequency)."	

14.3 Consultation

9. Relevant outputs of the Scoping Opinion and key points raised at consultee meetings are summarised in **Table 14.3**. This includes where each comment has been addressed in the EIA Report. It is noted that additional consultation aspects including the Hazard Workshop, the regular operator outreach and the recreational vessel outreach are summarised in the NRA.

Table 14.3: Consultation

Consultee	Date / Document	Comment	Response / where addressed in the EIA Report
Chamber of Shipping (CoS)	31/01/2022 - Letter	The CoS welcomes the consultation and at this stage, does not have any particular items that need additional consideration other than those captured within the Scoping Report.	Items within **Offshore Scoping Report** have all been considered within the NRA (**Appendix 14.1**) and **Offshore EIA Report**. Impact assessment has been undertaken as per **Section 14.7**.
		The CoS looks forward to more detailed analysis on shipping and navigation in due course.	A dedicated consultation meeting was held with the CoS in July 2022. Summary of relevant minutes provided in relevant row below.
MCA	21/12/2021 - Letter	The EIA Report should supply detail on the possible impact on navigational impact on navigational issues for both commercial and recreational craft, specifically: Collision Risk	The **Offshore EIA Report** including the NRA (**Appendix 14.1**)has considered each item listed noting this has been

Consultee	Date / Document	Comment	Response / where addressed in the EIA Report
		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 The likely squeeze of small craft into the routes of larger commercial vessels.	evidenced via the inclusion of a completed MGN 654 checklist in the NRA.
		An NRA will need to be submitted in accordance with MGN 654 (and MGN 372) and the MCA's Methodology for Assessing the Marine Navigation Safety & Emergency Response Risks of OREIs. This NRA should be accompanied by a detailed MGN 654 Checklist which can be downloaded from the MCA website at https://www.gov.uk/guidance/offshore-renewable-energy-installations-impact-on-shipping	An NRA (**Appendix 14.1**) has been produced in support of this chapter and this includes a completed MGN 654 checklist.
		I note, in Table 7.6, that a vessel traffic survey will be undertaken to the standard of MGN 654 i.e. at least 28 days which is to include seasonal data (two x 14-day surveys) collected 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.	The associated data has been collected and has been considered in the NRA (**Appendix 14.1**). A summary is provided in **Section 14.6.2**. The approach to vessel traffic survey data was agreed with the MCA via a consultation meeting and is MGN 654 compliant.
		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.	As standard the layout will be agreed with the MCA as part of the Development Specification and Layout Plan (DSLP) process post consent (see **Section 14.7.1**).
		If a 'worst case' layout is used within the NRA, the applicant should ensure it is a realistic layout design that complies with MGN 654 guidance. Any additional navigation safety and/or SAR requirements, as per MGN 654 Annex 5, will be agreed at the approval stage.	The layout assessed within the NRA (**Appendix 14.1**) has been defined such that it represents a realistic worst case scenario from a shipping and navigation perspective.
		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.	The post consent Cable Burial Risk Assessment will be informed via vessel traffic assessment including anchoring studies if appropriate (see **Section 14.7.1).**
		If cable protection measures are required e.g. rock bags or concrete mattresses, the MCA would be willing to accept a 5% reduction in surrounding depths referenced to chart datum. This will be particularly relevant where depths are decreasing towards shore and potential impacts on navigable water increase, such as at the Horizontal Directional Drill (HDD) location.	The project will comply with MGN 654 including the requirement to consult with the MCA if charted water depths would be reduced by more than 5% (see **Section 14.7.1**).
		Consideration of electromagnetic deviation on ships' compasses should be included within the assessment. The MCA would be willing to accept a three-degree deviation for 95% of the cable route. For the remaining 5% of the cable route no more than five degrees will be attained. The MCA may request a deviation survey post the cable being laid.	Effects associated with electromagnetic deviation to compasses have been assessed within the NRA

Consultee	Date / Document	Comment	Response / where addressed in the EIA Report
		Under section 7.2.3.4, regulatory mooring expectations is identified as a potential mitigation and I can confirm this guidance should be followed and that a Third-Party Verification of the mooring arrangements will be required.	All relevant regulatory requirements will be applied including third party mooring verification (see **Section 14.7.1**).
		Particular consideration will need to be given to the implications of the site size and location on SAR resources and Emergency Response Co-operation Plans (ERCoP). Attention should be paid to the level of Radar surveillance, AIS and shore-based Very High Frequency (VHF) radio coverage and give due consideration for appropriate mitigation such as Radar, AIS receivers and in-field, Marine Band VHF radio communications aerial(s) (VHF voice with Digital Selective Calling) that can cover the entire wind farm sites and their surrounding areas. A SAR checklist will also need to be completed in consultation with MCA.	The project will agree an ERCoP and SAR checklist with the MCA as required under MGN 654 (see **Section 14.7.1**)
		MGN 654 Annex 4 requires that hydrographic surveys should fulfil the requirements of the International Hydrographic Organisation Order 1a standard, with the final data supplied as a digital full density data set, and survey report to the MCA Hydrography Manager. Failure to report the survey or conduct it to Order 1a might invalidate the NRA if it was deemed not fit for purpose.	All MGN 654 requirements around hydrographic surveys will be complied with, and this has been evidenced via completion of the MGN 654 checklist included in the NRA.
	02/02/2022	We are looking at providing guidance for post consent stage. Further guidance will be provided in due course.	Noted and there will be ongoing consultation with MCA.
Northern Lighthouse Board (NLB)	03/12/2021 - Letter	NLB note the inclusion within Section 7 of a proposal to engage with both NLB and MCA regarding Lighting and Marking across both the construction and Operational phases of the wind farm.	Lighting and marking will be agreed with NLB and MCA post consent (see **Section 14.7.1**).
RYA	21/12/2021 – Letter	Recreational boating should be scoped into the Shipping and Navigation section of the EIA as the site is on the route from southwest Norway to Scotland.	The EIA Report including the NRA includes assessment of impacts to recreational users (see **Section 14.7**)
		I note that a hazard workshop will be held and RYA Scotland will wish to contribute to it.	The NRA process included a Hazard Workshop as standard and RYA Scotland were in attendance. Full details are provided in the NRA.
		This will be the first large grid-connected floating wind farm to be built and, as it is also located near oil and gas production infrastructure, there may turn out to be issues that were not relevant for existing and planned floating wind farms. On the other hand, the oil and gas industry has many years of experience of ensuring safe navigation near production platforms and the mitigation measures employed will be very relevant to the current proposal.	The NRA process has identified relevant necessary mitigations and this has included consideration of lessons learnt from other offshore developments.
		Although the current version of the UK Coastal Atlas of Recreational Boating published by the RYA has poor coverage of the sea at the proposed site, tracks can be seen heading towards the site. We estimate that a quarter of recreational vessels crossing the northern North Sea transmit an AIS signal and consider that their routes are typical of those of the other vessels.	The NRA has considered the RYA Coastal Atlas as a data source (see **Section 14.5.2**). RYA Scotland consultation input has fed into the baseline assessment.
		Note that recreational boats can be difficult to spot on Radar, which may lead to an underestimate of numbers. This may be exacerbated by variations in numbers of vessels and routes from year to year depending inter alia on wind direction and strength. However, what matters is that some vessels will pass through the area, some of which will do so in conditions of poor visibility.	The NRA has considered multiple data sources and consultation input to ensure comprehensive understanding of non-AIS traffic in the area (see **Section 14.5.2**). It is noted that the vessel traffic survey approach has been

Consultee	Date / Document	Comment	Response / where addressed in the EIA Report
			agreed with the MCA and NLB and is MGN 654 compliant.
		There may be information on the ports of departure from Norway from the marinas at Whitehills and Peterhead. I also suggest that contact is made with the Norwegian Sailing Federation (https://www.norgesseilforbund.org/ in case they are able to contribute their knowledge of the routes between Norway and Scotland.	The stated ports / marinas / organisations were contacted to determine whether any relevant data and / or feedback could be provided. No response was received. Full details are provided in the NRA.
		In terms of the proposed landfall sites, Peterhead is one of the termini of the planned SEGL 2 HVDC link from Peterhead to Drax in Yorkshire which may lead to a cumulative impact.	The EIA Report will consider cumulative cable impacts. Relevant shipping and navigation impacts are assessed in **Sections 14.7 and 14.8**.
MCA	Meeting, 7th June 2021	MCA confirmed content with vessel traffic survey approach.	Approach is as per agreed (**Section 14.5.2**, full details in NRA).
MCA	Meeting, 2nd February 2022	MCA confirmed content with NRA methodology.	Approach is as per agreed and in line with MGN 654 (see **Section 14.4**).
NLB	Meeting, 8th February 2022	NLB confirmed content with NRA methodology.	Approach is as per agreed and in line with MGN 654 (see **Section 14.4**).
CoS	Meeting, 28th July 2022	CoS confirmed content with NRA methodology.	Approach is as per agreed and in line with MGN 654 (see **Section 14.4**).
		CoS stated loss of station should be considered within the NRA.	Loss of station has been assessed in Section 14.7.5.9.
RYA	PAC consultation 18/7/2022	At this stage RYA Scotland does not envisage that the export cable works will have an adverse impact on recreational boating. I note that an action from the Green Volt Hazard Workshop of 30 May was that 'RYAS to be consulted once a landfall has been confirmed".	RYA will continue to be consulted with as the project develops
MS-LOT	MS-LOT Scoping Opinion 19/04/2022	The Scottish Ministers are broadly content with regards to the proposed Study Areas and baseline data sources identified in the Scoping Report. However, the Scottish Ministers draw attention to the representation from RYA and its point regarding potential underestimate of recreational boat numbers. The Scottish Ministers are content that the Developer has agreed the data collection method for the Navigational Risk Assessment in advance with the MCA.	The NRA has considered multiple data sources (including collection of non AIS vessel traffic data via Radar and the RYA Coastal Atlas) and consultation input to ensure comprehensive understanding of non-AIS traffic in the area as per **Section 14.5.2**. This includes recreational representative input received in the Hazard Workshop.
		In Table 7.4 of the Scoping Report the Developer summarises the potential impacts to shipping and navigation identified during the different phases of the Proposed Development which it proposes to scope in to the EIA Report. The Scottish Ministers agree with the impacts detailed and scoped in, however advise that recreational boating must also scoped in to the EIA Report for further assessment as the site is on the route from South West Norway to Scotland. Additionally, the Scottish Ministers advise that the representations from the MCA, RYA and NorthConnect must be fully addressed within the EIA Report. In relation to the embedded mitigation measures, the Scottish Ministers highlight the MCA and NLB representations which must be fully addressed by the Developer.	Impacts to recreational vessels have been assessed in **Section 14.7**. MCA, NLB and RYA representations have been fully considered as summarised in this table, including in terms of mitigations (see **Section 14.7.1**). Electromagnetic Interference within the context of shipping and navigation has been

Consultee	Date / Document	Comment	Response / where addressed in the EIA Report
			considered in the NRA. Other elements of the NorthConnect representation are addressed in **Chapter 9: Benthic Ecology**, **Chapter 10: Fish and Shellfish Ecology**, **Chapter 11: Marine Mammal Ecology** and **Chapter 17: Infrastructure and Other Users**
		With regards to cabling routes and cable burial, the Scottish Ministers draw the Developers attention to the MCA representation. The MCA advises that a Burial Protection Index study should be completed and subject to the traffic volumes, an anchor penetration study may be necessary. The Scottish Ministers advise that this should be fully addressed in the EIA Report and highlight the MCA advice regarding a 5% reduction in surrounding depths referenced to Chart Datum for cable protection measures.	The post consent Cable Burial Risk Assessment will be informed via vessel traffic assessment including anchoring studies if appropriate (see **Section 14.7.1**). The project will comply with MGN 654 including the requirement to consult with the MCA if charted water depths would be reduced by more than 5% (see **Section 14.7.1**).
		Additionally with regards to cabling, the Scottish Ministers emphasise the representation from the SFF which states that impacts on safe navigation for fishing vessels around the export and inter-array cables should be scoped in to the EIA Report. The Scottish Ministers agree and advise that this point must be fully addressed by the Developer.	Navigational safety impacts to fishing vessels in transit are considered in **Section 14.7**. Additional assessment is available in **Chapter 13: Commercial Fisheries**.
		In addition, the Scottish Ministers highlight the MCA representation regarding Search and Rescue ("SAR"), Emergency Response Co-operation Plans, radar surveillance, Automatic Identification System and shore-based VHF radio coverage. The Scottish Ministers advise that the MCA representation must be fully addressed within the EIA Report and that a SAR checklist must be completed by the Developer in consultation with the MCA.	The project will agree an ERCoP and SAR checklist with the MCA as required under MGN 654 (see **Section 14.7.1**)
		For completeness, the Developer should note that the MCA confirmed that compliance with regulatory expectations on moorings for floating wind and marine devices as stated in Section 7.2.3.4 of the Scoping Report is required and a Third-Party Verification of the mooring arrangements will be required.	All relevant regulatory requirements will be applied including third party mooring verification (see **Section 14.7.1**).

14.4 Assessment Methodology

14.4.1 Impact Assessment Methodology

14.4.1.1 Overview

10. As per **Section 14.1**, the assessment of shipping and navigation impacts has been based on the FSA methodology noting this is the international standard for marine risk assessment, and is the approach required by the MCA under MGN 654 specifically Annex 1 (MCA, 2021).

11. The following sections describe the FSA methodology.

14.4.1.2 Impact Assessment Criteria

12. The criteria for determining the significance of each impact are based on the severity of consequence and frequency of occurrence, as determined by the NRA. The definitions for severity of consequence and frequency of occurrence in the NRA and this chapter are outlined in **Table 14.4** and **Table 14.5** respectively.

Table 14.4: Definition of Terms Relating to the Severity of Consequence

Severity of Consequence	Definition
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 users.
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.

Table 14.5: Definition of Terms Relating to the Frequency of Occurrence

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

13. The significance of the effect upon shipping and navigation is then determined via a risk matrix as presented in **Table 14.6**. As shown, all impacts are determined to be broadly acceptable, tolerable, or unacceptable based on the input frequency and consequence rankings.

Table 14.6: Matrix Used for the Assessment of the Significance of the Effect

		Frequency of Occurrence				
Severity of Consequence		**Negligible**	**Extremely Unlikely**	**Remote**	**Reasonably Probable**	**Frequent**
	Negligible	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable
	Minor	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable
	Moderate	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable	Unacceptable
	Serious	Broadly Acceptable	Tolerable	Tolerable	Unacceptable	Unacceptable
	Major	Tolerable	Tolerable	Unacceptable	Unacceptable	Unacceptable

14. For the purposes of the shipping and navigation assessment, impacts determined as being of Unacceptable significant are considered a 'significant' effect in terms of the EIA Regulations. Impacts determined to be tolerable are not significant assuming the risks have been reduced to As Low As Reasonably Practicable (ALARP).

15. 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”.

14.4.2 Cumulative Impact Assessment

16. The NRA includes a cumulative screening process to determine which developments are screened into the cumulative assessment based on a number of criteria notably data confidence and proximity to the Windfarm Site.

17. Each impact identified by the NRA is then screened for the potential for cumulative impact. The outputs of this process are summarised in **Section 14.8**.

18. Each screened in impact is then assessed using the FSA (IMO, 2018) as set out in **Section 14.4.1**.

14.4.3 Transboundary Impact Assessment

19. Transboundary impacts in terms of vessel routeing (including to international ports) are considered to have been assessed within **Sections 14.7** (for the Project 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 14.6.2** (noting further detail and assessment is provided in the NRA).

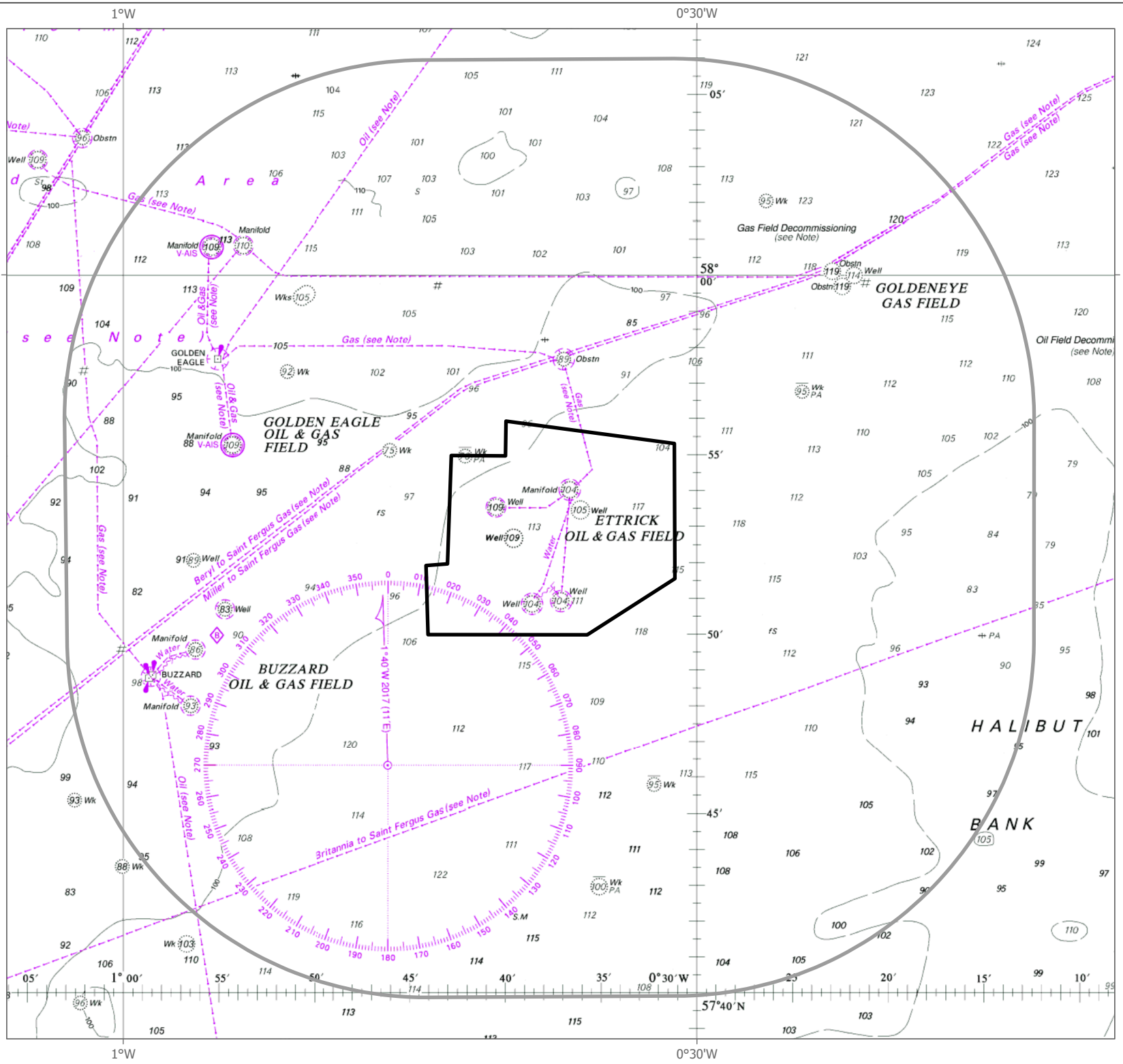
20. As such, no transboundary impacts other than those already assessed in **Sections 14.7 and 14.8** are anticipated.

14.5 Scope

14.5.1 Study Area

21. A 10 nautical mile (nm) buffer has been applied around the Windfarm Site (hereafter referred to as the ‘Study Area’) as shown in **Figure 14.1**. The 10 nm 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.

22. It is noted that the NRA also includes detailed assessment of vessel traffic within a 2 nm buffer of the Offshore Export Cable Corridor (hereafter referred to as the ‘cable Study Area’). Full details of this assessment are provided in the NRA.



LEGEND

- Windfarm Site
- Study Area

0 20

Kilometres

PROJECT: GREEN VOLT

TITLE: Figure 14.1 Shipping and Navigation Study Area

VER	DATE	COMMENTS	DRAWN	CHECKED
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ARCGIS REF: Shipping and Navigation Study Area
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14.5.2 Data Sources

23. The main data sources used to characterise the shipping and navigation baseline relative to the Offshore Development Area are outlined in **Table 14.7**.

Table 14.7: Data Sources

Data	Year	Coverage	Confidence	Notes
Vessel Traffic Survey data	2021/2022	Study Area between 5th to 18th August 2021 and 5th to 18th January 2022.	High	A total of 28 days AIS, Radar and visual observation data used to characterise vessel traffic movements within and in proximity to the Windfarm Site in line with MGN 654 (MCA, 2021) requirements.
Vessel Traffic Survey data – Offshore Export Cable Corridor	2021/2022	Cable Study Area between 5th to 18th August 2021 and 5th to 18th January 2022.	Medium	A total of 28 days AIS data used to characterise vessel traffic movements within and in proximity to the Offshore Export Cable Corridor. Does not include non AIS vessels.
Long Term fishing vessel AIS data	2018-2020	Fishing AIS data for the Study Area recorded from offshore receivers.	Medium	Assessment of historical fishing activity in proximity to the Windfarm Site. Does not include non AIS vessels.
Anatec's ShipRoutes database.	2020	Routeing pattern data covering the Study Area.	High	Secondary source used for validation of commercial vessel traffic movements.
RYA Coastal Atlas	2018	Intensity grid showing recreational vessel density, and defines recreational boating areas to illustrate where non AIS activity may occur. Covers coastal areas and provides an indication of offshore activity.	Medium	Assessment of recreational activity.
Vessel Monitoring System (VMS) data	2021	Fishing vessels within Study Area and cable Study Area during 2021.	Medium	Comprehensive for fishing vessels above 12 metres (m) in length.
Maritime Accident Investigation Branch (MAIB) marine accidents database.	2000-2019	Study Area	Medium	Review of maritime incidents within and in proximity to the Windfarm Site to characterise baseline incident rates.
Royal National Lifeboat Institution (RNLI) incident data.				
Department for Transport UK civilian SAR helicopter taskings.	2015-2021			
United Kingdom Hydrographic Office (UKHO) Admiralty Charts	2022	Study Area and Cable Study Area	High	Characterising navigational features in proximity to the Offshore Development Area
Admiralty Sailing Directions NP52 (2018) and Admiralty Sailing Directions NP54 (2021)	2018 and 2021	Study Area and Cable Study Area	High	

14.5.3 Assumptions and Limitations

14.5.3.1 Automatic Identification System Data

24. 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 500GT not engaged on international voyages, passenger vessels irrespective of size built on or after 1 July 2002, and fishing vessels over 15m length overall (LOA). It should therefore be considered that certain vessel types (in particular fishing vessels of less than 15m in length and recreational vessels) may be underrepresented in the AIS only datasets. However, additional data sources including the RYA Coastal Atlas and VMS data have also been considered.

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

14.5.3.2 COVID-19

26. It is widely accepted that the COVID-19 pandemic has had a substantial effect on shipping movements globally, noting this aligns with consultation input. It should therefore be considered that the vessel traffic survey data may have been affected to some degree particularly during 2021. In line with best practices, the Applicant has agreed the approach to data collection with relevant stakeholders, including the MCA and NLB noting this includes consideration of multiple data sources.

14.5.3.3 Historical Incident Data

27. Although all United Kingdom (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 territorial waters (noting that the Study Area is not located entirely within 12 nm 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.

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

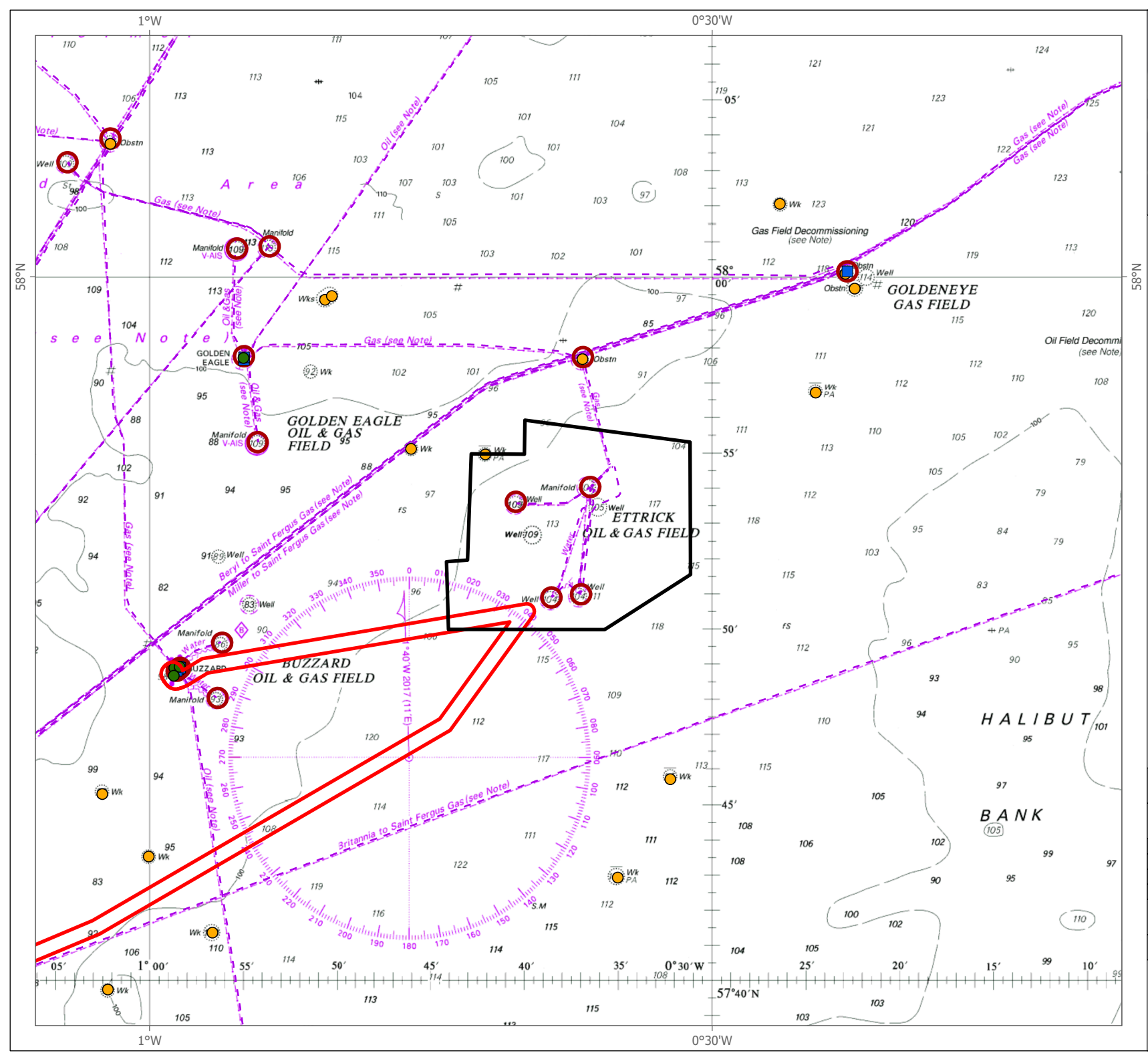
14.5.3.4 United Kingdom Hydrographic Office Admiralty Charts

29. The UKHO admiralty charts are updated periodically and therefore the information shown may not reflect the real time features within the region with total accuracy. However, during consultation input has been sought from relevant stakeholders regarding the navigational features baseline and the Admiralty Sailing Directions has also been considered.

14.6 Existing Environment

14.6.1 Navigational Features

30. A plot of navigational features in proximity to the Windfarm Site is presented in **Figure 14.2** based on the Admiralty Charts and Sailing Directions (UKHO, 2018/2021). More detail on navigational features is provided in the NRA.



LEGEND

- Windfarm Site
- Study Area
- Export Cable Corridor

Navigational Features

- Aid to Navigation
- Platform
- Wreck or Obstruction
- Decommissioning Area
- Safety Zone
- Pipeline

0 20

Kilometres

PROJECT: GREEN VOLT

TITLE: Figure 14.2 General Overview of Navigational Features in Proximity to the Windfarm Site

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ARCGIS REF: Navigational Features
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31. The most prominent navigational features in the Study Area are associated with oil and gas. The Ettrick and Blackbird oil and gas field is situated within the Windfarm Site, noting that production has ceased and decommissioning is currently being finalised. Fields in the Study Area currently in production include Buzzard Platform Complex, which is approximately 7.5 nm to the southwest of the Windfarm Site, and Golden Eagle approximately 6 nm to the northwest. Oil and gas fields that have ceased production and are in proximity to the Windfarm Site include Atlantic, Goldeneye, and Cromarty.

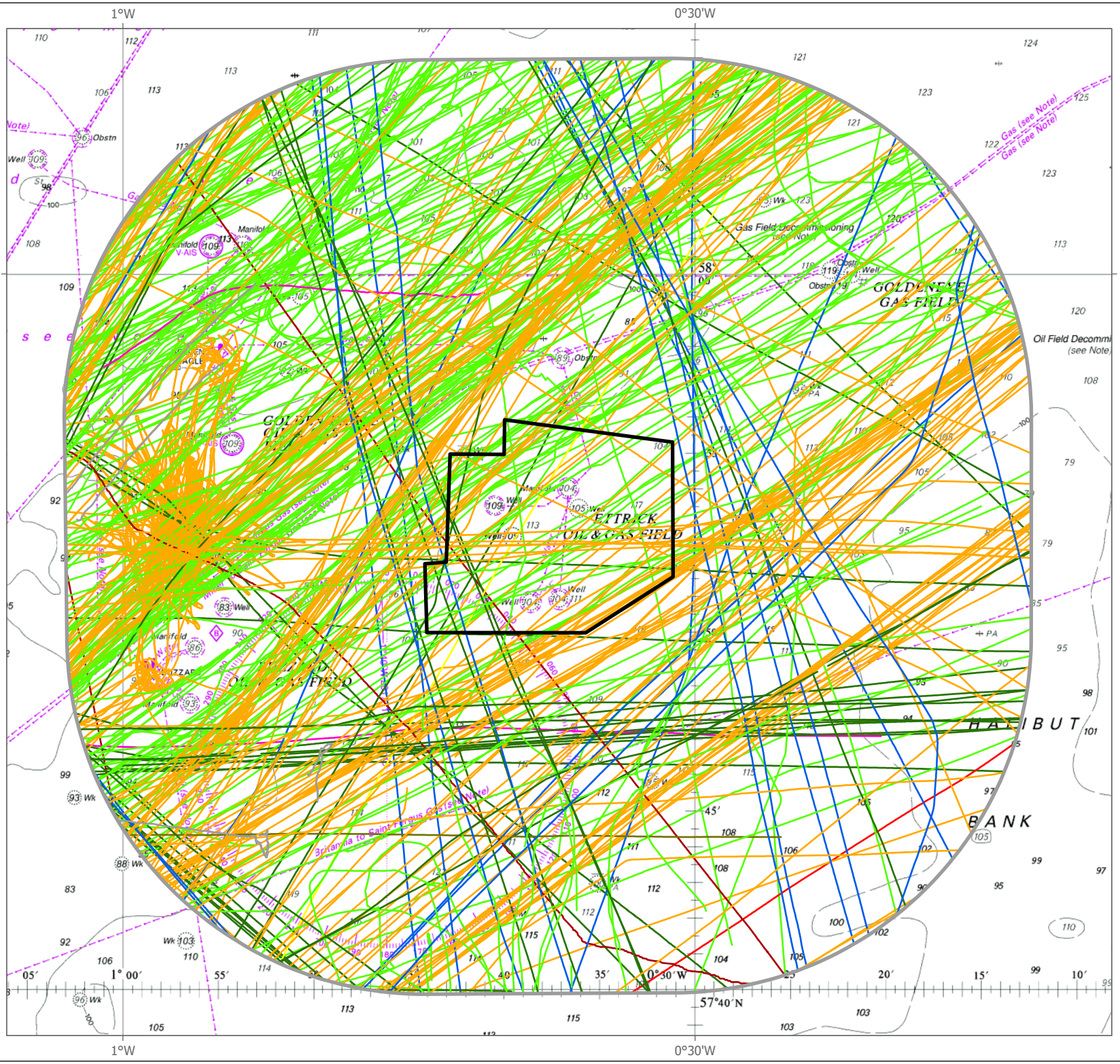
32. The nearest operational OWF is Hywind Scotland Pilot Park, located 28 nm to the southwest of the Windfarm Site. Hywind Scotland Pilot Park was fully commissioned in 2017 and consists of five Wind Turbine Generators (WTG) on floating substructures.

33. There are 11 wrecks or obstructions located within the Study Area, noting none of these are located within the Windfarm Site itself. The shallowest wreck or obstruction is at a depth of approximately 90m below chart datum. No wrecks or obstructions are located within the Offshore Export Cable Corridor.

34. The key port in the area is Peterhead, located 29 nm to the southwest of the Windfarm Site and between the two landfall options of the Offshore Export Cable Corridor. It is noted that approximately 1.4 kilometres (km) of the Offshore Export Cable Corridor option lies within the Peterhead Port Authority limits. Other key ports / harbours include Aberdeen and Fraserburgh.

14.6.2 Vessel Traffic Movements

35. A plot of vessel traffic survey data recorded within the Study Area, colour-coded by vessel type, is presented in **Figure 14.3**. Detailed analysis and the methodology behind the data collection and preparation are provided in the NRA.



LEGEND

- Windfarm Site
- Study Area

Vessel Type

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

0 20

Kilometres

PROJECT: GREEN VOLT

TITLE: Figure 14.3 All Vessel Traffic Survey Data (Vessel Type)

VER	DATE	COMMENTS	DRAWN	CHECKED
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ARCGIS REF: Vessels by Type
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36. For the summer survey period (August 2021), an average of 22 unique vessels per day were recorded within the Study Area, with an average of three to four unique vessels per day recorded within the Windfarm Site itself. The main vessel types within the Study Area were fishing (56%), oil and gas (32%), and cargo (8%).

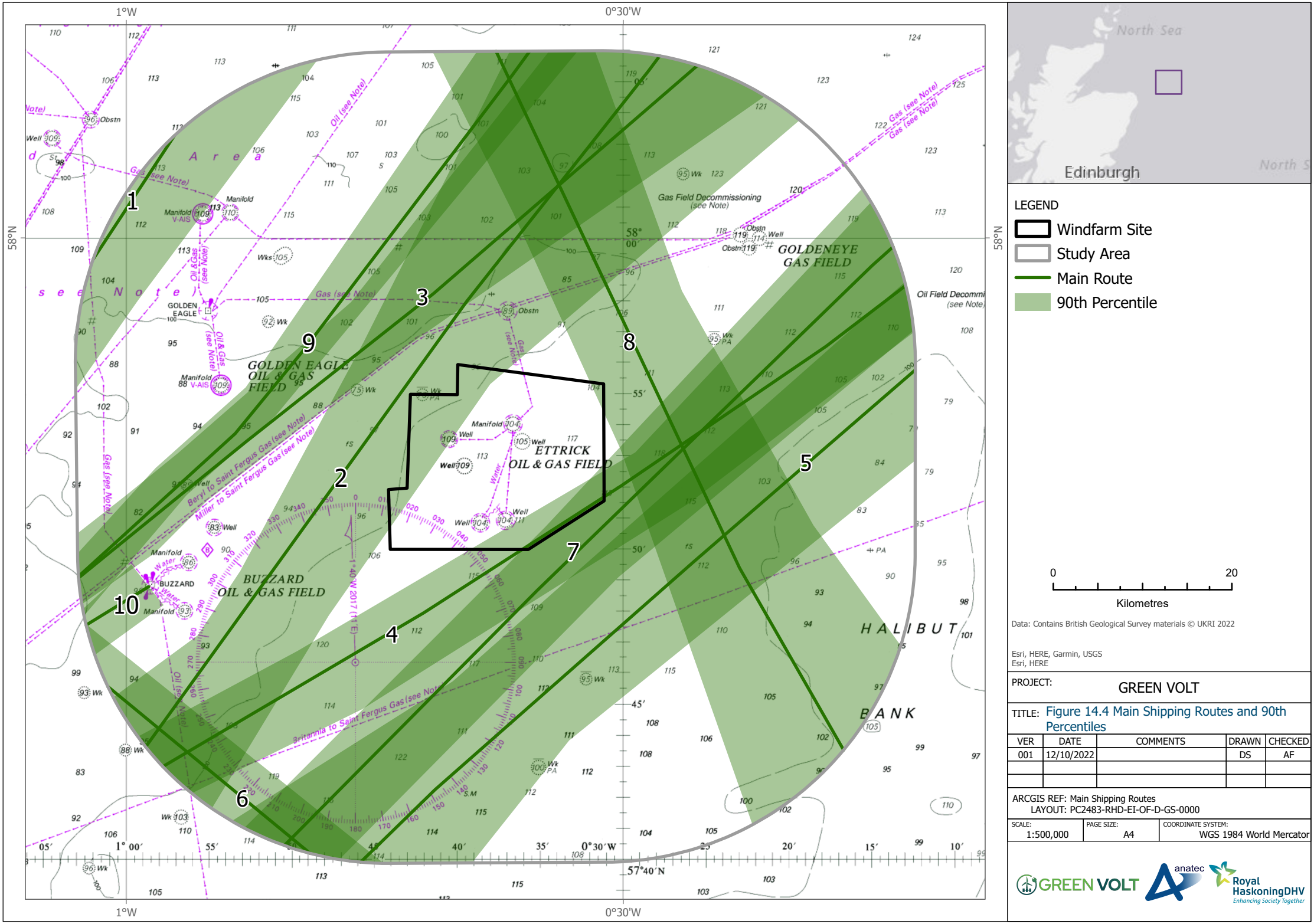
37. For the winter survey period (January 2022), an average of 14 unique vessels per day were recorded within the Study Area. The decrease when compared to summer was observed to be primarily associated with a decrease in fishing vessels. An average of three unique vessels per day recorded within the Windfarm Site itself. The main vessel types within the Study Area were oil and gas (62%), fishing (22%), and cargo (8%).

38. Analysis of long term fishing data showed an average of approximately one fishing vessel per day intersected the Windfarm Site whilst in transit, with intersections from vessels engaged in behaviour indicating potential fishing activity (i.e., gear deployed) being less common. The VMS data showed broad correlation with the long term data in terms of seasonal variation and areas where vessels were at lower speeds (indicating potential fishing activity).

39. Recreational activity was observed to be low in the vicinity of the Windfarm Site based on the data sources studied. However, consultation input indicated that recreational transits were likely to occur in the area from vessels running between the UK and Scandinavian ports.

40. No anchoring activity was identified within the Study Area or cable Study Area.

41. The vessel traffic survey data was used to identify the main commercial routes based on the principles set out in MGN 654 (MCA, 2021). The routes identified are shown in **Figure 14.4**, with associated details then provided in **Table 14.8**.



LEGEND

- Windfarm Site
- Study Area
- Main Route
- 90th Percentile

0 20

Kilometres

PROJECT: GREEN VOLT

TITLE: Figure 14.4 Main Shipping Routes and 90th Percentiles

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ARCGIS REF: Main Shipping Routes
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Table 14.8: Description of Main Commercial Routes

Route Number	Average Vessels per Day	Description
1	2	Aberdeen/Peterhead – Oil and Gas Fields. Primarily Oil and Gas Vessels (96%)
2	1	Aberdeen – Piper B Platform. Primarily Oil and Gas Vessels (88%)
3	1	Aberdeen/Peterhead – Scott Platform. Primarily Oil and Gas Vessels (>99%)
4	1	Peterhead – Donan Field. Primarily Oil and Gas Vessels (96%)
5	< 1	Aberdeen – Tiffany Field. Primarily Oil and Gas Vessels (91%)
6	< 1	Canadian Ports – German Ports. Primarily Cargo Vessels (79%)
7	< 1	Aberdeen – Brae Platforms. Primarily Oil and Gas Vessels (93%)
8	< 1	Sullom Voe – Rotterdam. Primarily Tankers (56%) and Cargo Vessels (30%)
9	< 1	Aberdeen – Harding Platform. Primarily Oil and Gas Vessels (89%)
10	< 1	Peterhead – Buzzard Platform Complex. All Oil and Gas Vessels (100%)

14.6.3 Emergency Response Resources and Historical Maritime Incidents

43. The SAR helicopter service is operated by the Bristow Group, with the nearest base being located at Inverness, approximately 94 nm to the west of the Windfarm Site. A review of helicopter tasking data indicated an average of between one and two taskings per year, however the significant majority of these were observed to be associated with the Golden Eagle and Buzzard Platform Complex.

44. An average of one incident every year was reported to the MAIB within the Study Area between 2010 and 2019. Incidents occurred primarily in proximity to oil and gas platforms in the region, with two incidents responded to within the Windfarm Site itself. Of the incidents responded to, two were related to accident to person, two to flooding/foundering, and one each to collision, fire/explosion, loss of control, and machinery failure. One incident was unspecified.

45. An average of one unique incident every year was responded to by the RNLI within the Study Area between 2010 and 2019, with one incident responded to within the Windfarm Site itself – a person in danger.

46. Further detailed analysis of these datasets is provided in the NRA.

14.7 Potential Impacts

47. **Table 14.9** presents the impacts that were proposed to be scoped out in the **Offshore Scoping Report** (**Appendix 1.2**) and the impacts that the **Scoping Opinion** (**Appendix 1.1**) require to be scoped in for the **Offshore EIA Report**.

Table 14.9 Potential impacts scoped in or out of the EIA for shipping and navigation

Potential Impact	Construction		O&M		Decommissioning	
	Scoping Report	Scoping Opinion	Scoping Report	Scoping Opinion	Scoping Report	Scoping Opinion
Displacement of vessels	✓	✓	✓	✓	✓	✓
Encounters and vessel to vessel collision	✓	✓	✓	✓	✓	✓
Allision risk	✓	✓	✓	✓	✓	✓
Snagging risk (anchored vessels)	✓	✓	✓	✓	✓	✓
Loss of WTG(s)	✓	✓	✓	✓	✓	✓
Reduced under keel clearance	✓	✓	✓	✓	✓	✓
Reduced Search and Rescue (SAR) capabilities	✓	✓	✓	✓	✓	✓
Navigation, communication, and position fixing equipment	✓	✓	✓	✓	✓	✓
Electromagnetic interference from export cables	✓	✓	✓	✓	✓	✓
Impacts to recreational boating*	x	✓	x	✓	x	✓

**Included throughout the assessment for the specific impacts given in Table 14.9*

48. The potential impacts from the Project during the construction, operation, maintenance and decommissioning phases, including cumulative impacts have been determined for shipping and navigation (**Table 14.10**),

Table 14.10 Potential Impact Pathways for Shipping and Navigation

Project Phase	Potential Impact
Construction	• Vessel Displacement • Restriction of Adverse Weather Routeing • Third Party to Third Party Vessel Collision • Third party to Project Vessel Collision • Vessel to Structure Allision • Reduced Port Access • Reduction of Emergency Response Capability
Operation and Maintenance	• Vessel Displacement • Restriction of Adverse Weather Routeing • Third Party to Third Party Vessel Collision • Third Party to Project Vessel Collision • Vessel to Structure Allision • Reduced Port Access

Project Phase	Potential Impact
	• Reduction of Under Keel Clearance • Anchor Snagging Interaction • Loss of Station • Reduction of Emergency Response Capability
Decommissioning	• Vessel Displacement • Restriction of Adverse Weather Routeing • Third Party to Third Party Vessel Collision • Third party to Project Vessel Collision • Vessel to Structure Allision • Reduced Port Access • Reduction of Emergency Response Capability

14.7.1 Embedded Mitigation

49. The FSA undertaken (see **Section 14.4**) assumes certain embedded mitigation will be in place. The embedded mitigation measures assumed are listed in **Table 14.11**, which includes details on how each mitigation will be secured.

Table 14.11: Embedded Mitigation Measures

Mitigation	Description	How Secured
Application for Safety Zones	Application to Marine Scotland for safety zones around structures as per relevant legislation (Energy Act 2004 and Electricity Regulations 2007).	Application undertaken in line with the Energy Act 2004, the Electricity Regulations 2007, and the The Department for Business, Energy and Industrial Strategy (BEIS) Guidance on Applying for Safety Zones (BEIS 2011).
Cable burial risk assessment	Implementation and monitoring of cable protection. This will include via burial, or external protection where adequate burial depth as identified via risk assessment is not feasible. Cable protection will be monitored as per cable suppliers' recommendations, and in agreement with power purchase customers. Cables, wherever possible, will be buried to a target depth of 0.6 - 1.5m in accordance with DECC Guidelines (2011) and other guidance as appropriate.	Standard consent condition.
Design Specification and Layout Plan	The layout of structures will be agreed with MCA and NLB as part of the DSLP process. This will include consideration of SAR and surface navigation.	Standard consent condition.
Display on charts	Provision of details to UKHO to facilitate appropriate marking of Project infrastructure on appropriate UKHO Admiralty Charts.	Standard consent condition.
Guard vessels	Use of guard vessel(s) where necessary as identified by risk assessment.	Consideration of use of guard vessels where necessary via risk assessment required under MGN 654.
Lighting and Marking Plan	Lighting and Marking Plan setting out how the Project will be lit and marked in agreement with NLB and in line with IALA Guidance G1162/R139 (IALA, 2021). This will include agreement on any construction buoyage requirements.	Standard consent condition.

Mitigation	Description	How Secured
Marine Coordination	Marine coordination and communication for the purposes of managing project vessel movements.	Approach details in the Vessel Management Plan which is a Standard consent condition.
Marine Pollution Contingency Plan	Implementation of a Marine Pollution Contingency Plan.	Standard consent condition.
MCA & HSE Regulatory Expectations Compliance	Compliance with the Regulatory Expectations on Moorings for Floating Wind and Marine Devices, in particular independent Third Party Verification (TPV) and monitoring / tracking.	MGN 654 requirement.
MGN 654 Compliance	Compliance with MGN 654 and its annexes including SAR annex 5 (MCA, 2021) and completion of a SAR checklist.	Standard consent condition.
Minimum blade clearance	Minimum blade clearance of 22m above mean sea level (in line with RYA policy (RYA, 2019) and MGN 654 (MCA, 2021)).	MGN 654 requirement and secured via Project Design.
Navigational Safety Plan	Implementation of a Navigational Safety Plan setting out the navigational safety measures that will be in place during the construction and operational phases.	Standard consent condition.
Project vessel compliance with international marine regulations	Compliance of all project vessels with international marine regulations as adopted by the Flag State, notably COLREGs (IMO, 1972/77) and SOLAS (IMO, 1974).	COLREGS and SOLAS requirements.
Promulgation of information	Promulgation of information via all usual means (e.g., Kingfisher bulletins, Notifications to Mariners).	Approach details in the Navigational Safety Plan which is a Standard consent condition.
Vessel Management Plan	Implementation of a Vessel Management Plan to ensure Project vessel movements are managed to minimise disruption to third party vessels.	Standard consent condition.

14.7.2 Proposed Monitoring

50. The Regulatory Expectations also require the provision of continuous monitoring either by Global Positioning System or other suitable means, The Applicant will put such a system in place, with each WTG continuously monitored, and with capability of being tracked via AIS in the event of a loss of station as detailed in MGN 654. Each WTG will 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 Applicant would be made aware, and would be able to track its position and make the necessary emergency arrangements. Further detail is provided in **Section 14.7.5.9**.

14.7.3 Worst Case

51. The worst case scenario assessed for shipping and navigation is presented by impact in **Table 14.12**. These worst case parameters have been based on the envelope presented in **Chapter 5: Project Description**.

52. Pre-construction surveys, including UXO clearance, geophysical and geotechnical may be required, resulting in potential short-term increased vessel traffic. As the surveys will be short term and localised

in nature, the magnitude of impact for potential pre-construction surveys is negligible, considering mitigation measures as outlined in **Section 14.7.1.**

Table 14.12: Worst Case Assumptions

Impact	Parameter	Notes
Construction		
Vessel Displacement.	• Maximum extent of Windfarm Site including any required construction buoyage; • Use of 500m construction safety zones and 50m pre-commissioning safety zones; • Up to four offshore export cables with total length 149 nm; • Construction phase up to three years; and • Up to 16 construction vessels.	Largest possible extent and greatest duration resulting in the maximum effect on vessel displacement.
Increased vessel to vessel collision risk between third-party vessels.	• Maximum extent of Windfarm Site including any required construction buoyage; • Use of 500m construction safety zones and 50m pre-commissioning safety zones; • Up to four offshore export cables with total length 149 nm; • Construction phase up to three years; and • Up to 16 construction vessels.	Largest possible extent and greatest duration resulting in the maximum effect on vessel displacement and hence collision risk.
Increased vessel to vessel collision risk between third-party vessels and Project Vessels.	• Maximum extent of Windfarm Site including any required construction buoyage; • Use of 500m construction safety zones and 50m pre-commissioning safety zones; • Up to four offshore export cables with total length 149 nm; • Construction phase up to three years; and • Up to 16 construction vessels.	Largest possible extent, greatest number of vessel movements and activities associated with the Project and greatest duration.
Vessel to structure allision risk.	• Full build out of Windfarm Site; • Up to 35 WTGs and one Offshore Substation Platform (OSP); • Semisubmersible substructures of surface dimensions 125 x 125m; • OSP topside of 43 x 33.5m; • Construction phase up to three years; and • Up to 16 construction vessels.	Largest possible extent, greatest number of surface structures and greatest duration resulting in the maximum effect on vessel to structure allision risk.
Reduced access to local ports.	• Up to four offshore export cables with total length 149 nm; • Construction phase up to three years; and • Up to 16 construction vessels.	Largest possible extent, greatest number of vessel movements and activities associated with the Project and greatest duration.
Reduction in Emergency Response Capability.	• Maximum extent of Windfarm Site including any required construction buoyage;	Largest possible extent, greatest number of vessel activities associated with the Project, greatest number of surface structures and greatest duration

Impact	Parameter	Notes
	• Up to 35 WTGs and one OSP; • Semisubmersible substructures of surface dimensions 125 x 125m; • OSP topside of 43 x 33.5m; • Up to four offshore export cables with total length 149 nm; • Construction phase up to three years; and • Up to 16 construction vessels.	resulting in the maximum effect on emergency response capability.
Operation		
Vessel Displacement.	• Full build out of Windfarm Site; • Use of 500m major maintenance safety zones; and • Operational life of 35 years.	Largest possible extent and greatest duration resulting in the maximum effect on vessel displacement.
Increased vessel to vessel collision risk between third-party vessels.	• Full build out of Windfarm Site; • Use of 500m major maintenance safety zones; • Up to eight unplanned maintenance vessel round trips; and • Operational life of 35 years.	Largest possible extent and greatest duration resulting in the maximum effect on vessel displacement and hence collision risk.
Increased vessel to vessel collision risk between third-party vessels and Project Vessels.	• Full build out of Windfarm Site; • Up to eight unplanned maintenance vessel round trips; and • Operational life of 35 years.	Largest possible extent, greatest number of vessel movements and activities associated with the Project and greatest duration.
Vessel to structure allision risk.	• Full build out of Windfarm Site; • Up to 35 WTGs and one substation; • Semisubmersible substructures of surface dimensions 125 x 125m; • OSP topside of 43 x 33.5m; and • Operational life of 35 years.	Largest possible extent, greatest number of surface structures and greatest duration resulting in the maximum effect on vessel to structure allision risk.
Reduced access to local ports.	• Full build out of Windfarm Site; • Up to four offshore export cables with total length 149 nm; • Up to eight unplanned maintenance vessel round trips; and • Operational life of 35 years.	Largest possible extent, greatest number of vessel movements and activities associated with the Project and greatest duration.
Reduction of under keel clearance.	• Full build out of Windfarm Site; • Up to 35 WTGs; • Barge substructures; • Up to six mooring lines; • Mooring line angle of descent of 14° from horizontal; • Up to four offshore export cables with total length 149 nm;	Maximum number of floating substructures with mooring lines of shallowest angle of descent. Maximum length of subsea cables.

Impact	Parameter	Notes
	• Up to 72 nm of inter array cables; • Burial of cables to between 0.6 and 1.5m where feasible, external protection used where target depths cannot be met; • Up to 3 km of cables requiring external protection, with a height of up to 1.5m; and • Operational life of 35 years.	
Anchor snagging interaction.	• Full build out of Windfarm Site; • Up to 35 WTGs; • Up to six mooring lines; • Up to four offshore export cables with total length 149 nm; • Up to 72 nm of inter array cables; • Burial of cables to between 0.6 and 1.5m where feasible, external protection used where target depths cannot be met; • Up to 3 km of cables requiring external protection, with a height of up to 1.5m; and • Operational life of 35 years.	Maximum extent of subsea infrastructure including subsea cables and mooring lines.
Loss of station.	• Full build out of Windfarm Site; • Up to 35 WTGs and one OSP; • Semisubmersible substructures of surface dimensions 125 x 125m; • OSP topside of 43 x 33.5m; and • Operational life of 35 years.	Maximum number of WTGs with greatest surface dimensions.
Reduction in Emergency Response Capability.	• Full build out of Windfarm Site; • Up to 35 WTGs and one OSP; • Semisubmersible substructures of surface dimensions 125 x 125m; • OSP topside of 43 x 33.5m; • Up to eight unplanned maintenance vessel round trips; and • Operational life of 35 years.	Largest possible extent, greatest number of vessel activities associated with the Project, greatest number of surface structures and greatest duration resulting in the maximum effect on emergency response capability.
Decommissioning		
Vessel Displacement.	• Assumed equivalent to construction phase.	Largest possible extent and greatest duration resulting in the maximum effect on vessel displacement.
Increased vessel to vessel collision risk between third-party vessels.	• Assumed equivalent to construction phase.	Largest possible extent and greatest duration resulting in the maximum effect on vessel displacement and hence collision risk.
Increased vessel to vessel collision risk between third-party vessels and Project Vessels.	• Assumed equivalent to construction phase.	Largest possible extent, greatest number of vessel movements and activities associated with the Project and greatest duration.

Impact	Parameter	Notes
Vessel to structure allision risk.	• Assumed equivalent to construction phase.	Largest possible extent, greatest number of surface structures and greatest duration resulting in the maximum effect on vessel to structure allision risk.
Reduced access to local ports.	• Assumed equivalent to construction phase.	Largest possible extent, greatest number of vessel movements and activities associated with the Project and greatest duration.
Reduction in Emergency Response Capability.	• Assumed equivalent to construction phase.	Largest possible extent, greatest number of vessel activities associated with the Project, greatest number of surface structures and greatest duration resulting in the maximum effect on emergency response capability.

14.7.4 Potential Impacts during Construction

14.7.4.1 Vessel Displacement

53. Based on operational experience of constructing wind farms, it is considered likely that commercial vessels will deviate to avoid the Windfarm Site during construction (which may be marked as a buoyed construction area as directed by NLB) noting that there will be no restrictions on entry other than through any active safety zones. This aligns with input received in the Hazard Workshop from commercial vessel representation.

54. The available datasets have been assessed within the NRA to identify the main routes within the Study Area using the principles set out in MGN 654 (MCA, 2021), as summarised in **Section 14.6.2**. A total of ten routes were identified, three of which were anticipated to potentially require deviation as a result of the Project. None of the deviations were observed to require large changes in routeing patterns, with the maximum increase in distance being 0.3 nm. Further, the relevant three routes were all considered low use, each used by a maximum of one vessel per day.

55. Smaller vessel types (e.g., fishing, recreation) may still choose to transit through the Windfarm Site during construction, noting this would be at the discretion of individual vessels. In this regard it should be considered that there is limited experience of deployment of large scale floating projects, and as such vessels may be less likely to transit through floating substructures than those on fixed foundations. However, there is considered to be sufficient searoom to accommodate any vessels that chose to avoid the Windfarm Site without unduly increasing vessel density around the site boundary.

56. There may be some displacement associated with the installation of the offshore export cables within the Offshore Export Cable Corridor, however any such displacement would be temporary and spatially limited.

57. The main consequence of vessel displacement will be increased journey times and distances for affected third-party vessels. However, as above any deviations are not anticipated to be large and can be safely accommodated by the surrounding searoom. Vessels are expected to comply with international and flag state regulations (including the COLREGs and SOLAS) and will be able to passage plan in advance given the promulgation of information relating to the Project and relevant nautical charts meaning any disruption can be minimised.

58. The frequency of occurrence in relation to displacement of vessel traffic is considered reasonably probable given that deviations are anticipated to occur albeit to a low number of vessels. Severity of consequence is considered negligible given any deviations will be minor and can be safely accommodated by the surrounding searoom. On this basis the significance of risk is assessed to be **broadly acceptable** and therefore not significant in EIA terms.

14.7.4.2 Adverse Weather Routeing

59. As detailed in the NRA, general concerns were raised during consultation around restriction of adverse weather routeing options in the area. A review of the vessel traffic survey data did not identify any adverse weather routeing occurring in the area, however it should be considered that in adverse weather conditions, vessels may choose to pass further from the ongoing construction activities in the Windfarm Site. As per **Section 14.7.4.1**, there is considered to be searoom available south of the Windfarm Site to accommodate such transits.

60. Details of the Project would be promulgated to facilitate advanced passage planning including in adverse conditions. Under COLREGS (IMO, 1972), vessels are also required to take appropriate measures with regards to determining a safe speed, taking into account various factors including the state of visibility, the state of the wind, sea, and current as well as the proximity of navigational hazards.

61. The frequency of occurrence in relation to restriction of adverse weather routeing is considered extremely unlikely given there is searoom available to accommodate vessel routeing. Severity of consequence is considered moderate. On this basis the significance of risk is assessed to be **broadly acceptable** and therefore not significant in EIA terms.

14.7.4.3 Increased Vessel-to-Vessel Collision Risk (third party to third party)

62. As discussed in **Section 14.7.4.1**, any deviations and displacement of third party traffic is anticipated to be low, both in terms of number of vessels affected and magnitude of deviations. On this basis it is considered unlikely that there will be a large increase in encounters and collision risk, noting that there is considered to be ample searoom to safely accommodate any displaced vessels.

63. This aligns with the findings of the vessel to vessel collision modelling undertaken in the NRA, which indicated that collision rates would remain low post wind farm, with a vessel being estimated to be involved in a collision once every 3,000 years based on anticipated post wind farm routeing patterns. This is reflective of the anticipated deviations being minor, and the low level of vessels affected.

64. As per **Section 14.7.4.1**, smaller vessels may also choose to avoid the Windfarm Site during construction (which may be marked as a buoyed construction area as directed by NLB) which could lead to increased encounters with larger commercial vessels. However, given the limited traffic levels, searoom available, and noting such encounters would be managed via COLREGS and SOLAS, it is considered unlikely that this would lead to any notable increase in collision risk between small vessels and larger commercial vessels.

65. It was raised during the Hazard Workshop that towing operations (e.g., of semisubmersibles, rigs) occur in the area. Any associated encounters would be managed as above via COLREGS, SOLAS.

66. In the event that an encounter does occur, it is likely to be very localised and occur for only a short duration, with collision avoidance action implemented by the vessels involved, in line with the COLREGs, thus ensuring that the situation does not develop into a collision incident. This is supported by experience at previous under construction wind farms, where no collision incidents involving two third-party vessels have been reported.

67. Historical collision incident data also indicates that the most likely consequences will be low should a collision occur, with minor contact between the vessels resulting in minor damage and no injuries to persons, with both vessels able to resume their respective passages and undertake a full inspection at the next port. As an unlikely worst case, one of the vessels could be foundered resulting in a Potential Loss of Life (PLL) and / or pollution.

68. Details of the Project will be promulgated in advance, and the infrastructure will be displayed on nautical charts. This will ensure vessels can passage plan in advance to minimise disruption and deviations, which will in turn minimise collision risk.

69. The frequency of occurrence in relation to third party to third party collision risk is considered negligible given that deviations are anticipated to occur to a low number of vessels. Severity of consequence is considered serious. On this basis the significance of risk is assessed to be **broadly acceptable** and therefore not significant in EIA terms.

14.7.4.4 Increased Vessel-to-Vessel Collision Risk (third party to project vessel)

70. The risk of encounters and collision risk associated with Project vessels will be managed by marine coordination. This will include the application of traffic management procedures such as indicative transit routes between the Windfarm Site and the construction ports used, which will be set out in the Vessel Management Plan. Project vessels will carry AIS and be compliant with Flag State regulations including IMO conventions such as the COLREGs, and information for fishing vessels will also be promulgated through ongoing liaison with fishing fleets including via the Fishing Liaison Officer (FLO).

71. An application for safety zones will also be made, which will include 500m safety zones around any structures where construction work is ongoing. These safety zones will make clear to passing third party traffic the areas which should be avoided to minimise collision risk with the construction vessels undertaking these works, noting such vessels may be Restricted in Ability to Manoeuvre (RAM). The Project may also utilise and promulgate advisory safe passing distances around ongoing works where identified as necessary via risk assessment. Details and locations of any safety zones and advisory safe passing distances will be promulgated including via Notice to Mariners and the Kingfisher Bulletin.

72. The Applicant will exhibit lighting and marking as required by NLB and MCA during the construction phase. This will further maximise mariner awareness when in proximity of the Windfarm Site of the potential for ongoing sensitive operations, both in day and night conditions including in poor visibility.

73. Third-party vessels may experience restrictions on ability to visually identify Project vessels entering and exiting the Windfarm Site during reduced periods of visibility. However, this hazard will be mitigated by the application of the COLREGs (reduced speeds) in adverse weather conditions, noting that Project vessels will also mandatorily carry AIS regardless of size.

74. Based on historical incident data as assessed within the NRA, there have been two instances of a third-party vessel colliding with a project vessel. In both incidents moderate vessel damage was reported with no harm to persons. It is noted that the two incidents occurred in 2011 and 2012, and awareness of offshore wind developments and application of the measures outlined above has improved and been refined considerably in the interim, with no further collision incidents reported since.

75. Should an encounter occur 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. It is noted that it was raised during the Hazard Workshop that towing operations (e.g., of semisubmersibles, rigs) occur in the area. Any associated encounters with a Project vessel would be managed as above via COLREGS, SOLAS and the marine coordination / vessel procedures in place.

76. Should a collision occur, the most likely consequences will be similar to that outlined for the case of a collision between two third-party vessels (see **Section 14.7.4.3**), namely minor contact between the vessels resulting in minor damage and no injuries to persons with both vessels able safely make their next port to undertake a full inspection. As an unlikely worst case, one of the vessels could be foundered resulting in a PLL and pollution. If pollution were to occur in proximity to the Project or involving a Project vessel, then the Marine Pollution Contingency Plan will be implemented to minimise the environmental risks.

77. The frequency of occurrence in relation to third party to Project Vessel collision risk is considered negligible noting the marine coordination and associated procedures that will be in place. Severity of

consequence is considered serious. On this basis the significance of risk is assessed to be broadly **acceptable** and therefore not significant in EIA terms.

14.7.4.5 Vessel-to-Structure Allision Risk

78. The spatial extent of the impact is considered small given that a vessel must be in close proximity to a structure in the Windfarm Site during construction for an allision incident to occur. The forms of allision considered are:

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

79. These are discussed separately in the following three subsections, with a combined effect significance ranking then provided, which represents the worst case of the three. Full details of the breakdown in rankings are provided in the NRA.

Powered Allision Risk

80. As per **Section 14.7.4.1**, it is likely that commercial vessels will deviate to avoid the Windfarm Site (which may be marked as a buoyed construction area as directed by NLB) following commencement of construction. As such, it is likely that associated allision risk would be highest to pre-commissioned structures on the periphery of the Windfarm Site. Smaller vessels may still choose to transit through, and as such may come in proximity to internal structures.

81. Operational mitigations (most notably including operational lighting and marking) will not yet be active during the construction phase. However, construction phase specific mitigation measures will be implemented including promulgation of information, charting of the Windfarm Site, and temporary lighting and marking (which may include buoyage as directed by NLB). Safety zones of radius 500m will be applied for around structures where construction is underway, with 50m pre-commissioning safety zones applied for around structures where work is not underway during the construction phase. These safety zones would make clear to passing mariners the areas which should be avoided to minimise allision risk.

82. Where identified as necessary via risk assessment (which will include consideration of the other mitigation measures in place), a guard vessel may also be used, which will alert passing vessels to the presence of the ongoing construction.

83. Should an allision occur, the consequences will depend on multiple factors including the energy of the impact, structural integrity of the vessel and sea state at the time of the impact. Fishing vessels and recreational vessels are considered most vulnerable to the impact given the potential for a non-steel construction and possible internal navigation within the Windfarm Site by such vessels. In such cases, the most likely consequences will be minor damage, with the vessel able to resume passage and undertake a full inspection at the next port. As an unlikely worst case, the vessel could be foundered resulting in a PLL and pollution. If pollution were to occur in proximity to the Project, then the Marine Pollution Contingency Plan will be implemented to minimise the environmental risks.

84. Additionally, commercial vessels are expected to comply with international and flag state regulations (including the COLREGs and SOLAS) and will be able to passage plan in advance given the promulgation of information relating to the Project including display of the Windfarm Site on nautical charts.

Drifting Allision Risk

85. As per **Section 14.7.4.1** and as discussed in relation to powered allision risk, it is likely that commercial vessels will deviate to avoid the Windfarm Site (which may be marked as a buoyed construction area as directed by NLB) following commencement of construction. As such, it is likely that associated allision risk would be highest to pre-commissioned structures on the periphery of the

Windfarm Site. Smaller vessels may still choose to transit through, and as such may come in proximity to internal structures.

86. A vessel drift scenario may only develop into an allision situation if in proximity to a structure within the Windfarm Site. This would only be the case where the vessel was either located internally within or in close proximity to the Windfarm Site, and the direction of the wind and/or tide directs the vessel towards a structure. In the event that a vessel starts to drift towards the Windfarm Site, the vessel will first initiate its own procedures for such an event, which may involve dropping anchor or the use of thrusters (depending on availability and power supply). This may include an emergency anchoring event which would involve checking relevant nautical charts to ensure that deployment of the anchor will not lead to other risks (such as anchor snagging on a subsea cable) in line with emergency procedures.

87. Further, any Project vessels on site may be able to provide assistance in liaison with MCA and as required under SOLAS obligations (IMO, 1974).

88. 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 and pollution. In the highly unlikely scenario of a drifting allision incident resulting in pollution, the implementation of the Marine Pollution Contingency Plan will minimise the environmental risk. Additionally, a drifting vessel is likely to transit at a reduced speed compared to a powered vessel dependent on conditions, thus reducing the energy of the impact, including in the case of a recreational vessel under sail.

Internal Allision

89. As discussed in **Section 14.7.4.1**, it is likely that only smaller vessels (e.g., fishing, recreation) may choose to transit through the Windfarm Site during construction (which may be marked as a buoyed construction area as directed by NLB). On this basis it is considered very unlikely that a commercial vessel would be involved in an internal allision.

90. Minimum spacing between structures of 1,540m is considered sufficient for safe internal navigation i.e., keeping clear of the structures in the Windfarm Site. It is noted that this spacing is greater than that associated with many other OWFs in the UK located near the coast where small vessel traffic would be expected to be of higher levels. The final layout will be agreed with both NLB and MCA, noting these discussions will include consideration of ensuring safe internal navigation.

91. As with any passage, any vessel navigating in or near the Windfarm Site is expected to passage plan in accordance with SOLAS Chapter V (IMO, 1974) and promulgation of information including through ongoing liaison via the FLO will ensure that such vessels have good awareness of the works being undertaken. Promulgation of information was noted as an important mitigation for both recreational and fishing vessels within the Hazard Workshop, in particular ensuring fishing vessels had access to plotter overlays.

92. The Applicant will apply for safety zones of radius 500m around structures where construction is underway, with 50m pre-commissioning safety zones applied for around structures where work is not underway during the construction phase. These safety zones would make clear to passing mariners the areas which should be avoided to minimise allision risk.

Significance

93. The frequency of occurrence is considered extremely unlikely. Severity of consequence is considered serious. On this basis the significance of risk is assessed to be **tolerable**

94. Assuming the implementation of ensuring plotter overlays are made available to fishing vessels including via FLO liaison, the effect is considered **tolerable with mitigation** and ALARP, and therefore not significant in EIA terms.

14.7.4.6 Reduced Access to Local Ports

95. The key port in the area is Peterhead, noting that the two potential landfall options for the Offshore Export Cable Corridor are located either side of the port.

96. Based on the distance offshore (in excess of 30 nm), there is considered to be no impact from the Windfarm Site itself on port access.

97. Vessels associated with the construction the Project are not anticipated to notably increase overall baseline traffic levels in the area, noting the number of vessels used is anticipated to be less than typical industry standards due to the majority of fabrication work being undertaken onshore. Marine coordination and vessel procedures will be in place to manage Project vessel movements and minimise disruption to third-party vessels. As such, no notable impact on port access is expected from Project vessels, noting any interactions with third party vessels would be managed via COLREGS in addition to the marine coordination procedures.

98. The Offshore Export Cable Corridor intersects the Peterhead Port Authority Harbour Limit (see **Section 14.6.1**), however is located in excess of 1 nm from the port entrance. On this basis there is unlikely to be any impact to port access from cable installation activities, noting any impact would be temporary and spatially limited, with third party vessels still able to safely access Peterhead.

99. The frequency of occurrence is considered extremely unlikely given Project vessel movements will be managed via marine coordination. Severity of consequence is considered minor. On this basis the significance of risk is assessed to be **broadly acceptable** and therefore not significant in EIA terms.

14.7.4.7 Reduction of emergency response capability

100. The construction of the Project will lead to an increased level of vessels and personnel in the area over baseline levels. On this basis there may be an increase in the number of incidents requiring emergency response over baseline rates.

101. Baseline incident rates are considered low in the area based on the data studied, with an average of between one and two incidents per year indicated within the MAIB, RNLI and helicopter taskings datasets. It is also noted that to date, there have only been 13 reported allision or collision incidents associated with OWFs in the UK as detailed in the NRA. While it should be considered that this only covers allisions and collisions, it is still not anticipated that the Project would notably increase the observed baseline incident rates.

102. It is noted that an average of one to two helicopter taskings per year were recorded in the Study Area (see **Section 14.6.3**). However, the significant majority of these were associated with rescue/recovery from the nearby Buzzard and Golden Eagle platforms. The frequency at which a helicopter tasking is required at the Project is considered likely to be less than this noting much lower personnel levels.

103. Further, the on-site vessels and resources associated with the Project will form additional resource to respond to any incidents in the area in liaison with the MCA, both in terms of incidents associated with the Project (i.e., self help resources), but also incidents occurring outside of the Windfarm Site to third party vessels. Any vessels at the nearby fields may also be able to assist. As required under MGN 654, the Applicant will produce and submit an ERCoP to the MCA detailing how they would cooperate and assist in the event of an incident including consideration of Project resources.

104. The frequency of occurrence in relation is considered extremely unlikely noting the limited anticipated effect on incidents rates and MGN 654 compliance. Severity of consequence is considered moderate. On this basis the significance of risk is assessed to be **broadly acceptable** and therefore not significant in EIA terms.

14.7.5 Potential Impacts during Operation

14.7.5.1 Vessel Displacement

105. Based on operational experience of constructing wind farms, it is considered likely that commercial vessels will deviate to avoid the operational structures within the Windfarm Site, noting that there will be no restrictions on entry other than through any active major maintenance safety zones. This aligns with input received in the Hazard Workshop from commercial vessel representation. As per **Section 14.7.4.1**, it is anticipated that during the construction phase, commercial vessels will also have been deviating to avoid the Windfarm Site (which may be marked as a buoyed construction area as directed by NLB). It is likely that these deviations established during the construction phase would remain in place during the operational phase.

106. The volume of vessel traffic passing within or in proximity to the Windfarm Site has been established within the NRA as summarised in **Section 14.6.2**. The available datasets were assessed to identify main commercial routes using the principles set out in MGN 654 (MCA, 2021). A total of ten routes were identified, three of which were anticipated to potentially require deviation as a result of the Project. None of the deviations were observed to require large changes in routeing patterns, with the maximum increase in distance being 0.3 nm. Further, the relevant three routes were all considered low use, each used by a maximum of one vessel per day.

107. As for the construction phase (see **Section 14.7.4.1**), smaller vessel types (e.g., fishing, recreation) may still choose to transit through the operational structures within the Windfarm Site, noting this would be at the discretion of individual vessels. In this regard it should be considered that there is limited experience of deployment of large scale floating projects, and as such vessels may be less likely to transit through floating substructures than those on fixed foundations. However, there is considered to be sufficient searoom to accommodate any vessels that chose to avoid the Windfarm Site without unduly increasing vessel density around the site boundary. The final layout will be agreed with the MCA and NLB post consent, and these discussions will include consideration of surface navigation.

108. It was noted that adverse weather routeing was raised at the Hazard Workshop, in particular that vessels may choose to avoid the Windfarm Site during periods of adverse weather. However, as in normal conditions there is considered to be sufficient searoom to accommodate adverse weather transits outside of the Windfarm Site.

109. There may be some displacement associated with any maintenance of the offshore export cables within the Offshore Export Cable Corridor, however any such displacement would be temporary and spatially limited.

110. The main consequence of vessel displacement will be increased journey times and distances for affected third-party vessels. However, as above any deviations are not anticipated to be large, and third party vessels are likely to utilise routeing already established during the construction phase. Vessels are expected to comply with international and flag state regulations (including the COLREGs and SOLAS) and will be able to passage plan in advance given the promulgation of information relating to the Project and relevant nautical charts meaning any disruption can be minimised. Further, as discussed above it is likely that vessels will be more familiar with the Project than during the construction phase.

111. The frequency of occurrence in relation to displacement of vessel traffic is considered remote given that deviations will already be established with a low number of vessels impacted. Severity of consequence is considered negligible given any deviations will be minor and can be safely accommodated by the surrounding searoom. On this basis the significance of risk is assessed to be **broadly acceptable** and therefore not significant in EIA terms.

14.7.5.2 Adverse Weather Routeing

112. General concerns were raised during consultation around restriction of adverse weather routeing options in the area. A review of the vessel traffic survey data did not identify any adverse weather routeing occurring in the area as detailed in the NRA, however it should be considered that in adverse weather conditions, vessels may choose to pass further from the Windfarm Site. As per **Section 14.7.5.1**, there is considered to be sea space available south of the Windfarm Site to accommodate such transits.

113. Lighting and marking will be defined in consultation with NLB as required and this will include consideration of requirements during periods of poor visibility (e.g., sound signals). Details of the Project would be promulgated to facilitate advanced passage planning including in adverse conditions. Under COLREGS (IMO, 1972), vessels are also required to take appropriate measures with regards to determining a safe speed, taking into account various factors including the state of visibility, the state of the wind, sea, and current as well as the proximity of navigational hazards.

114. The frequency of occurrence in relation to restriction of adverse weather routeing is considered extremely unlikely given there is searoom available to accommodate vessel routeing. Severity of consequence is considered moderate. On this basis the significance of risk is assessed to be **broadly acceptable** and therefore not significant in EIA terms.

14.7.5.3 Increased Vessel-to-Vessel Collision Risk (third party to third party)

115. As discussed in **Section 14.7.5.1**, any deviations and displacement of third party traffic is anticipated to be low. On this basis it is considered unlikely that there will be a large increase in encounters and collision risk, noting that there is considered to be ample searoom to safely accommodate the displaced vessels.

116. This aligns with the findings of the vessel to vessel collision modelling undertaken in the NRA which indicated that collision rates would remain low post wind farm, with a vessel being estimated to be involved in a collision once every 3,000 years based on anticipated post wind farm routeing patterns. This is reflective of the anticipated deviations being minor, and the low level of vessels affected. It is also noted that any required deviations are likely to be well established by the operational phase.

117. As per **Section 14.7.5.1**, smaller vessels may also choose to the Windfarm Site which could lead to increased encounters with larger commercial vessels. However, given the limited traffic levels, searoom available, and noting such encounters would be managed via COLREGS and SOLAS, it is considered unlikely that this would lead to any notable increase in collision risk between small vessels and larger commercial vessels.

118. In the event that an encounter does occur, it is likely to be very localised and occur for only a short duration, with collision avoidance action implemented by the vessels involved, in line with the COLREGs, thus ensuring that the situation does not develop into a collision incident.

119. Historical collision incident data also indicates that the most likely consequences will be low should a collision occur, with minor contact between the vessels resulting in minor damage and no injuries to persons, with both vessels able to resume their respective passages and undertake a full inspection at the next port. As an unlikely worst case, one of the vessels could be foundered resulting in a PLL and / or pollution.

120. Details of the Project will be promulgated in advance, and the infrastructure will be displayed on nautical charts. This will ensure vessels can passage plan in advance to minimise disruption and deviations, which will in turn minimise collision risk.

121. The frequency of occurrence in relation to third party to third party collision risk is considered negligible given that deviations are anticipated to occur to a low number of vessels. Severity of consequence is considered serious. On this basis the significance of risk is assessed to be **broadly acceptable** and therefore not significant in EIA terms.

14.7.5.4 Increased Vessel-to-Vessel Risk (third party to project vessel)

122. As with the equivalent construction phase hazard (see **Section 14.7.4.4**), encounter and collision risk involving a Project vessel will be mitigated including through marine coordination, the Vessel Management Plan, carriage of AIS, compliance with Flag State regulations, and promulgation of information including to local fishing fleets via the FLO.

123. An application for safety zones will also be made, which will include 500m safety zones around any structures where major maintenance is ongoing. These safety zones will make clear to passing third party traffic the areas which should be avoided to minimise collision risk with the major maintenance vessels undertaking these works, noting such vessels may be RAM. The Project may also utilise and promulgate advisory safe passing distances around ongoing maintenance works where identified as necessary via risk assessment (e.g., around any vessels associated with cable maintenance). Details and locations of any safety zones and advisory safe passing distances will be promulgated including via Notices to Mariners and the Kingfisher Bulletin.

124. The Applicant will exhibit lighting and marking as required by NLB and MCA during the operational phase, including lights and sound signals. This will further maximise mariner awareness when in proximity of the Windfarm Site of the potential for ongoing sensitive operations, both in day and night conditions and including in poor visibility.

125. Third-party vessels may experience restrictions on ability to visually identify Project vessels entering and exiting the Windfarm Site during reduced periods of visibility. However, this hazard will be mitigated by the application of the COLREGs (reduced speeds) in adverse weather conditions, noting that Project vessels will also mandatorily carry AIS regardless of size.

126. Based on historical incident data (as detailed in the NRA), there have been two instances of a third-party vessel colliding with a project vessel. In both incidents moderate vessel damage was reported with no harm to persons. It is noted that the two incidents occurred in 2011 and 2012, and awareness of offshore wind developments and application of the measures outlined above has improved and been refined considerably in the interim, with no further collision incidents reported since.

127. Should an encounter occur between a third-party vessel and a project vessel, it is likely to be very 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. It was also raised during the Hazard Workshop that towing operations (e.g., of semisubmersibles, rigs) occur in the area. Any associated encounters would be managed as above via COLREGS, SOLAS.

128. Should a collision occur, the most likely consequences will be similar to that outlined for the equivalent construction phase hazard (see **Section 14.7.4.4**), namely minor contact between the vessels resulting in minor damage and no injuries to persons with both vessels able safely make their next port to undertake a full inspection. As an unlikely worst case, one of the vessels could be foundered resulting in a PLL and pollution. If pollution were to occur in proximity to the Project or involving a Project vessel, then the Marine Pollution Contingency Plan will be implemented to minimise the environmental risks.

129. The frequency of occurrence in relation to third party to Project Vessel collision risk is considered negligible noting the marine coordination and associated procedures that will be in place. Severity of consequence is considered serious. On this basis the significance of risk is assessed to be **broadly acceptable** and therefore not significant in EIA terms.

14.7.5.5 Vessel-to-Structure Allision Risk

130. The spatial extent of the impact is considered small given that a vessel must be in close proximity to a structure in the Windfarm Site for an allision incident to occur. The forms of allision considered are:

- Powered allision risk;

- Drifting allision risk; and
- Internal allision risk.

131. These are discussed separately in the following three subsections, with a combined effect significance ranking then provided, which represents the worst case of the three. Full details of the breakdown in rankings are provided in the NRA.

Powered Allision Risk

132. Based on the quantitative powered allision assessment as undertaken in the NRA, it was estimated that a powered allision would occur once every 12,700 years. This is comparatively low against the allision frequencies of other UK OWF developments and is reflective of the low levels of traffic anticipated to be routeing in proximity to the Windfarm Site based on the baseline vessel traffic data assessment (see **Section 14.6.2**) and the anticipated post wind farm routeing as set out within the NRA.

133. Based on historical incident data, there have been two reported instances of a third-party vessel alliding with an operational wind farm structure in the UK (one in the Irish Sea and one in the 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.

134. Should an allision occur, the consequences will depend on multiple factors including the energy of the impact, structural integrity of the vessel and sea state at the time of the impact. Fishing vessels and recreational vessels are considered most vulnerable to the impact given the potential for a non-steel construction and possible internal navigation within the Windfarm Site by such vessels. In such cases, the most likely consequences will be minor damage with the vessel able to resume passage and undertake a full inspection at the next port. As an unlikely worst case, the vessel could be foundered resulting in a PLL and pollution. If pollution were to occur in proximity to the Project or involving a Project vessel, then the Marine Pollution Contingency Plan will be implemented to minimise the environmental risks.

135. Additionally, commercial vessels are expected to comply with international and flag state regulations (including the COLREGs and SOLAS) and will be able to passage plan in advance given the promulgation of information relating to the Project including display of the structure locations on nautical charts. It was noted during the Hazard Workshop that mariners in this area are likely to be experienced and well equipped noting the distance offshore.

136. The structures will also be lit and marked as directed by the MCA and NLB to ensure passing mariner awareness (e.g., lights, sound signals).

137. NLB noted during the Hazard Workshop that appropriate mitigations in the form of lighting and marking may need to be implemented if a WTG displaying an aid to navigation was towed back to shore for maintenance. In such an event consultation would be undertaken with NLB in advance to agree appropriate mitigation, noting this is anticipated likely to be an infrequent event.

Drifting Allision Risk

138. Based on the quantitative drifting allision assessment as undertaken in the NRA, it was estimated that a drifting allision would occur once every 90,000 years. This is comparatively low against the allision frequencies of other UK OWF developments and is reflective of the low levels of traffic anticipated to be routeing in proximity to the Windfarm Site based on the baseline vessel traffic survey data assessment (see **Section 14.6.2**) and the anticipated post wind farm routeing as set out within the NRA.

139. Based on historical incident data, there have been no instances of a third-party vessel alliding with a UK operational wind farm structure whilst Not Under Command. However, it is noted that instances of machinery failure were present in proximity to the Windfarm Site within the baseline incident data studied (see **Section 14.6.3**).

140. A vessel adrift scenario may only develop into an allision situation if in proximity to a structure within the Windfarm Site. This would only be the case where the vessel was either located internally within or in close proximity to the Windfarm Site, and the direction of the wind and/or tide directs the vessel towards a structure. In the event that a vessel starts to drift towards the Windfarm Site, the vessel will first initiate its own procedures for such an event, which may involve dropping anchor or the use of thrusters (depending on availability and power supply). This may include an emergency anchoring event which would involve checking relevant nautical charts to ensure that deployment of the anchor will not lead to other risks (such as anchor snagging on a subsea cable) in line with emergency procedures.

141. Further, any Project vessels on site may be able to provide assistance in liaison with MCA and as required under SOLAS obligations (IMO, 1974).

142. 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 and pollution. In the highly unlikely scenario of a drifting allision incident resulting in pollution, the implementation of the Marine Pollution Contingency Plan will minimise the environmental risk. Additionally, a drifting vessel is likely to transit at a reduced speed compared to a powered vessel dependent on conditions, thus reducing the energy of the impact, including in the case of a recreational vessel under sail.

Internal Allision Risk

143. As discussed in **Section 14.7.5.1**, it is likely that only smaller vessels (e.g., fishing, recreation) will transit through the Windfarm Site. On this basis it is considered very unlikely that a commercial vessel would be involved in an internal allision.

144. Based on the NRA modelling, the base case annual fishing vessel to structure internal allision frequency is estimated to be 1.46×10^{-1}, corresponding to a return period of approximately one in seven years. This is a high return period compared to that estimated for certain other UK OWF developments and is reflective of the volume of fishing vessel traffic in the area and the large worst case size at water level of the floating substructures. However, as detailed in the NRA it is important to note that this is based on a worst case conservative assumption that baseline activity will remain unchanged once the structures are in place i.e., no account is made for fishing vessels choosing to pass further from the structures or choosing to avoid the Windfarm Site altogether.

145. In this regard it is noted that the minimum spacing between structures of 1,540m is considered sufficient for safe internal navigation i.e., keeping clear of the structures in the Windfarm Site and that this spacing is greater than that associated with many other OWFs in the UK located near the coast where small vessel traffic would be expected to be of higher levels. The final layout will be agreed with both NLB and MCA, noting these discussions will include consideration of ensuring safe internal navigation

146. As with any passage, any vessel navigating within the Windfarm Site is expected to passage plan in accordance with SOLAS Chapter V (IMO, 1974) and promulgation of information including through ongoing liaison via the FLO will ensure that such vessels have good awareness of any maintenance works being undertaken. Promulgation of information was noted as an important mitigation for both recreational and fishing vessels within the Hazard Workshop, in particular ensuring fishing vessels had access to plotter overlays.

147. The Applicant will exhibit lights, marks, sounds, signals and other aids to navigation as required by NLB and MCA. This will include unique identification marking of each structure in the Windfarm Site in an easily understandable pattern to minimise the risk of a mariner navigating internally becoming disoriented. The use of safety zones to minimise allision risk will also be discussed with MCA, NLB and Marine Scotland Licensing Operations Team.

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

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 users to date when operating in proximity to existing offshore wind developments. For recreational vessels with a mast there is an additional allision risk when navigating internally associated with the WTG blades. However, the minimum blade tip clearance is 22m which is aligned with the minimum clearance the RYA recommend for minimising allision risk (RYA, 2019).

Significance

149. The frequency of occurrence is considered extremely unlikely. Severity of consequence is considered serious. On this basis the significance of risk is assessed to be **tolerable.**

150. Assuming the implementation of ensuring plotter overlays are made available to fishing vessels including via FLO liaison, the effect is considered **tolerable with mitigation** and ALARP, and therefore not significant in EIA terms.

14.7.5.6 Reduced Access to Local Ports

151. The key port in the area is Peterhead, noting that the two potential landfall options for the Offshore Export Cable Corridor are located either side of the port.

152. Based on the distance offshore (in excess of 30 nm), there is considered to be no impact from the structures in the Windfarm Site on port access.

153. Vessels associated with the operation and maintenance of the Project are not anticipated to notably increase overall baseline traffic levels in the area, and are likely to be less than during the construction phase. Marine coordination and vessel procedures will be in place to manage Project vessel movements and minimise any disruption to third-party vessels.

154. As such, no notable impact on port access is expected from Project vessels, noting any interactions with third party vessels would be managed via COLREGS in addition to the marine coordination procedures.

155. The Offshore Export Cable Corridor intersects the Peterhead Port Authority Harbour Limit (see **Section 14.6.1**), however is located in excess of 1 nm from the port entrance. On this basis there is unlikely to be any impact to port access from cable maintenance activities, noting any impact would be temporary, infrequent, and spatially limited, with third party vessels still able to safely access Peterhead.

156. The frequency of occurrence is considered extremely unlikely given Project vessel movements will be managed via marine coordination. Severity of consequence is considered minor. On this basis the significance of risk is assessed to be **broadly acceptable** and therefore not significant in EIA terms.

14.7.5.7 Reduction in Underkeel Clearance

157. In terms of underkeel clearance, a risk may arise where any Project infrastructure not visible from the surface reduces water depths. The relevant infrastructure is therefore the subsea cables, the mooring lines, and the subsea sections of the floating substructures. These are discussed separately in the following subsections, with a combined effect significance ranking then provided, which represents the worst case. Full details of the breakdown in rankings are provided in the NRA.

Subsea Cables

158. Where suitable burial is not possible, external remedial protection will be utilised where needed based on the cable burial risk assessment process. It is anticipated that this will be by either rock placement or concrete mattresses. It is estimated that up to 3 km of the export cable to shore may need external protection, and up to 1 km of the cable to the Buzzard Platform Complex, noting that actual extents will be confirmed via the cable burial risk assessment process.

159. In line with MGN 654, where any depth reduction exceeded 5%, the Applicant will undertake further assessment and consult with the MCA to determine whether any additional mitigation is required to ensure safety of navigation.

160. The key areas of risk are likely to be in areas where water depths are shallow i.e., the coastal / nearshore areas where only smaller vessels would be expected to transit. Input received at the Hazard Workshop was that concern over underkeel risk to recreational vessels was limited given the cable locations will be charted.

161. It is noted that there will be sections of cables between the seabed and the floating substructures. Interaction with these sections is considered an unlikely event given the surface presence of infrastructure.

162. Should an underwater allision occur, minor damage incurred is the most likely consequence, and foundering of the vessel resulting in a PLL and pollution the unlikely worst case consequences.

Floating Substructures and Mooring Lines

163. Vessels navigating in proximity to the floating substructures may be at risk of interaction with either the mooring lines, or any underwater elements of the floating substructures not visible from the surface including the subsea cables. The level of risk will depend on the clearance available above the subsea elements of the substructures (in particular the mooring lines).

164. There will be up to six mooring lines per floating substructure used to secure the substructures to the seabed. There are two substructures under consideration, namely barges and semi submersible. The highest risk areas in terms of potential underkeel clearance interaction will be the areas in the immediate vicinity of the floating substructures where the mooring lines are closest to the surface. The same applies for the subsea cables. Assuming semisubmersible floating substructures, the mooring lines will connect at a point at least 10m below the waterline. If barges are used, then the mooring lines will connect above the waterline.

165. As per **Section 14.7.5.1**, it is likely that larger commercial vessels will not enter into the Windfarm Site. Further, input received during the Hazard Workshop was that commercial vessels would likely view a floating development as higher risk than fixed foundation projects. On this basis, taking into consideration the baseline and anticipated post wind farm vessel routeing, it is considered unlikely that a commercial vessel would pass in close proximity to the floating substructures and hence be at risk of subsea interaction.

166. Therefore, it is likely that any vessels in proximity to the substructures will be small (e.g., fishing, recreation), noting that such vessels will typically have smaller draughts than larger commercial vessels. An assessment of fishing vessel draughts relative to the predicted mooring line descents was undertaken as part of the NRA, which showed that a typical fishing vessel in the area would have approximately 5m clearance assuming it remained in excess of 20m from the worst case substructure (the barge). This increased to 25m assuming the maximum fishing vessel draught recorded within the data. It is considered likely that any vessels passing in that close a proximity to the substructures will be transiting with caution noting that the surface section of the mooring lines will be visible above the waterline, and the relevant infrastructure will be charted. It will be necessary to confirm available underkeel clearance from the mooring lines post installation, in particular if semi taut mooring lines are used. The confirmed available clearance should be discussed with the MCA and NLB post installation to determine if any additional mitigation is required.

167. There is limited experience of deployment of large scale floating offshore wind projects in UK waters, however it is noted that the Hywind Scotland Pilot Park and Kincardine floating projects are both located off the Eastern Scottish Coast. To date there have been no reported underkeel interactions between passing vessels and the components associated with these projects. Further, input from the Hazard Workshop was that vessels do fish in proximity to oil and gas mooring lines / chains, and therefore will be familiar at an industry level of the proper procedures, assuming they are aware of the locations of the mooring lines.

168. Details of the infrastructure including the floating substructures, mooring lines and subsea cables will be promulgated to maximise awareness of the Project and any potential underkeel interaction risk. The locations of the floating substructures would be clearly shown on appropriate nautical charts, and the Applicant will also provide the locations of the anchors and mooring lines to the UKHO for charting purposes. Promulgation of information was noted as an important mitigation for fishing vessels within the Hazard Workshop, in particular ensuring fishing vessels had access to plotter overlays. This would ensure fishing vessels were aware of the locations of the mooring lines.

Significance

169. The frequency of occurrence is considered extremely unlikely. Severity of consequence is considered serious. On this basis the significance of risk is assessed to be **tolerable**.

170. Assuming the confirmation of available underkeel clearance in agreement with MCA and NLB post installation, and the implementation of ensuring plotter overlays are made available to fishing vessels including via FLO liaison the hazard is considered **tolerable with mitigation** and ALARP, and therefore not significant in EIA terms.

14.7.5.8 Anchor Snagging Interaction

171. Scenarios which may lead to anchor interaction with Project infrastructure include:

- Vessel dragging anchor over subsea cable following anchor failure;
- Vessel anchoring in an emergency over cable (e.g., to avoid drifting into a structure, of into an area of busy traffic);
- Vessel dropping anchor inadvertently (e.g., mechanical failure); or
- Planned anchoring where vessel unaware of presence of infrastructure.

172. Based on the vessel traffic assessment, baseline anchoring activity is low, with no vessels identified as being at anchor over the 28 days studied in proximity to the Windfarm Site or Offshore Export Cable Corridor (see **Section 14.6.2**). It is noted that the data collected is not comprehensive of non AIS vessels in the cable Study Area, however no anchorage areas in proximity were identified in the navigational features assessment (see **Section 14.6.1**). On this basis it is considered that anchoring in the area is limited.

173. In line with Regulation 34 of SOLAS (IMO, 1974), the charted location of any hazards should be taken into consideration as part of the decision making process of where to anchor. The locations of cables, structure locations and mooring lines will be provided to the UKHO for charting purposes, and as such mariners will be able to include the infrastructure within their decision making processes. Input at the Hazard Workshop was that there was limited concern for recreational vessel anchors interacting with nearshore areas of cable given they will be displayed on charts.

Subsea Cables

174. Should an anchor interaction incident occur with the cables, the most likely consequences will be low based on historical anchor interaction incidents, with no damage incurred to the cable or the vessel. As an unlikely worst case, a snagging incident could occur and/or the vessel's anchor and the cable could be damaged. However, with the mitigation measures above in place, this risk will be minimised. For commercial fishing vessels or recreational vessels the consequences may also include compromised stability of the vessel.

175. The cables would be protected via either burial or remedial external protection. The protection required will be assessed as part of the cable burial risk assessment process which will consider baseline traffic patterns over the cables, and ensure protection is suitable for the expected vessel types, sizes and numbers in the area.

176. It is noted that there will be sections of cables between the seabed and the floating substructures. Interaction with these sections is considered an unlikely event given water depths and the presence of infrastructure means anchoring is unlikely to be attempted in the vicinity of the Windfarm Site.

Mooring Lines and Floating Substructures

177. There is limited data available with regards to anchor interaction with mooring lines and floating substructures, however consequences are likely to be similar to that of the cables. Regardless, given water depths in the vicinity of the Windfarm Site and noting the visible presence of the surface aspects of the floating substructures and display on charts, it is considered unlikely that vessels would attempt to anchor in the vicinity of the mooring lines. This aligns with the findings of the baseline assessment which indicated baseline anchoring volumes were low.

Significance

178. The frequency of occurrence in relation to the risk of anchor interaction is considered extremely unlikely baseline anchoring is low and the cable burial risk assessment process will ensure the cables are protected. Severity of consequence is considered moderate. On this basis the significance of risk is assessed to be **broadly acceptable** and therefore not significant in EIA terms.

14.7.5.9 Loss of Station

179. 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 if any modifications to a system occur or if new information becomes available with regard to its reliability, additional TPV would be required.

180. 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 (based on current envelope there will be between three and six depending on the design chosen).

181. The Regulatory Expectations also require the provision of continuous monitoring either by Global Positioning System or other suitable means, The Applicant will put such a system in place, with each WTG continuously monitored, and with capability of being tracked via AIS in the event of a loss of station as detailed in MGN 654. Each WTG will 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 Applicant would be made aware, and would be able to track its position and make the necessary emergency arrangements.

182. The frequency of occurrence in relation to the risk of loss of station is considered negligible noting the TPV and associated requirements under the MCA regulatory expectations. Severity of consequence is considered serious. On this basis the significance of risk is assessed to be **broadly acceptable** and therefore not significant in EIA terms.

14.7.5.10 Reduction of emergency response capability

183. The operation of the Project will lead to an increased level of vessels and personnel in the area over baseline levels, however it is likely to be less than during the construction phase. On this basis there may be an increase in the number of incidents requiring emergency response over baseline rates.

184. Baseline incident rates are considered low in the area based on the data studied, with an average of between one and two incidents per year indicated within the MAIB, RNLI and helicopter taskings datasets. It is also noted that to date, there have only been 13 reported allision or collision incidents associated with OWFs in the UK (as detailed in the NRA). While it should be considered that this only covers allisions and collisions, it is still not anticipated that the Project would notably increase the observed baseline incident rates.

185. It is noted that an average of one to two helicopter taskings per year were recorded in the Study Area (see **Section 14.5.3.3**). However, the significant majority of these were associated with rescue/recovery from the nearby Buzzard and Golden Eagle platforms. The frequency at which a helicopter tasking is required at the Project is considered lower probability based on the lower personnel numbers that are likely to be on vessels within the Windfarm Site.

186. Further, the on-site vessels and resources associated with the Project will form additional resource to respond to any incidents in the area in liaison with the MCA, both in terms of incidents associated with the projects (i.e., self help resources), but also incidents occurring outside of the Windfarm Site to third party vessels. Any vessels at the nearby fields may also be able to assist. As required under MGN 654, the Applicant will produce and submit an ERCoP to the MCA detailing how they would cooperate and assist in the event of an incident including consideration of Project resources.

187. The final layout will be agreed with the MCA post consent and will comply with the requirements of MGN 654 ensuring suitable SAR access is maintained. As detailed above, the majority of helicopter taskings were associated with the Buzzard and Golden Eagle platforms, inshore of the Project.

188. The frequency of occurrence in relation is considered extremely unlikely noting the limited anticipated effect on incidents rates and MGN 654 compliance including in relation to layout design and SAR access. Severity of consequence is considered moderate. On this basis the significance of risk is assessed to be **broadly acceptable** and therefore not significant in EIA terms.

14.7.6 Potential Impacts during Decommissioning

14.7.6.1 Vessel Displacement

189. It is anticipated that this hazard will be similar in nature to the equivalent construction phase hazard (see **Section 14.7.4.1**) on the basis that the methods used to remove infrastructure are expected to be similar to those used for installation.

190. Therefore, route deviations will be similar to those established during the construction phase. As per **Section 14.7.4.1**, these deviations are anticipated to be minor, with only a limited number of vessels requiring to deviate.

191. As such, it is considered that risk will be within levels observed during the construction phase. On this basis the effect is assessed as **broadly acceptable** and therefore not significant in EIA terms.

14.7.6.2 Adverse Weather Routeing

192. General concerns were raised during consultation around restriction of adverse weather routeing options in the area. A review of the vessel traffic survey data did not identify any adverse weather routeing occurring in the area (as detailed in the NRA), however it should be considered that in adverse weather conditions, vessels may choose to pass further from the ongoing decommissioning activities in the Windfarm Site. As per **Section 14.7.6.1**, there is considered to be sea space available south of the Windfarm Site to accommodate such transits.

193. Details of the Project would be promulgated to facilitate advanced passage planning including in adverse conditions. Under COLREGS (IMO, 1972), vessels are also required to take appropriate measures with regards to determining a safe speed, taking into account various factors including the state of visibility, the state of the wind, sea, and current as well as the proximity of navigational hazards.

194. As such, it is considered that risk will be within levels observed during the construction phase given deviations and associated mitigations are similar. On this basis the effect is assessed as **broadly acceptable** and therefore not significant in EIA terms.

14.7.6.3 Increased Vessel-to-Vessel Collision Risk (third party to third party)

195. It is anticipated that this hazard will be similar in nature to the equivalent construction phase hazard (see **Section 14.7.4.3**) on the basis that the methods and vessels used to remove infrastructure are expected to be similar to those used for installation.

196. As for the other phases, the risk of encounters and collision risk associated with Project vessels will be managed by marine coordination. An application for safety zones during decommissioning will

also be made, and advisory safe passing distances will be used where necessary to ensure the area around sensitive operations is made clear to passing vessels.

197. As such, it is considered that risk will be within levels observed during the construction phase and the effect is therefore assessed as being **broadly acceptable** and not significant in EIA terms.

14.7.6.4 Increased Vessel-to-Vessel Collision Risk (third party to project vessel)

198. It is anticipated that this hazard will be similar in nature to the equivalent construction phase hazard (see **Section 14.7.4.4**) on the basis that the methods and vessels used to remove infrastructure are expected to be similar to those used for installation.

199. As for the other phases, the risk of encounters and collision risk associated with Project vessels will be managed by marine coordination. An application for safety zones during decommissioning will also be made, and advisory safe passing distances will be used where necessary to ensure the area around sensitive operations is made clear to passing vessels.

200. As such, it is considered that risk will be within levels observed during the construction phase, and the effect is therefore assessed as being **broadly acceptable** and not significant in EIA terms.

14.7.6.5 Vessel-to-Structure Allision Risk

201. Allision risk during decommissioning is likely to be similar to that during the construction phase (see **Section 14.7.4.5**) noting similar activities will be occurring and mitigations in place. Vessels are expected to comply with international and flag state regulations (including the COLREGs and SOLAS) and will be able to passage plan in advance given the promulgation of information relating to the decommissioning of the Project meaning allision risk will be minimised.

202. As such, it is considered that risk will be within levels observed during the construction phase and the effect is therefore assessed as being **tolerable with mitigation** and ALARP, and not significant in EIA terms.

14.7.6.6 Reduced Access to Local Ports

203. It is anticipated that this hazard will be similar in nature to the equivalent construction phase hazard (see **Section 14.7.4.6**) on the basis that the methods and vessels used to remove infrastructure are expected to be similar to those used for installation.

204. On this basis as discussed in **Section 14.7.4.6**, vessels associated with the decommissioning of the Project and the associated activities (including any required work associated with the Offshore Export Cable Corridor) are not anticipated to notably impact port access, noting marine coordination will be in place. The Windfarm Site is in excess of 30 nm from shore and as such will also not impact port access.

205. As such, it is considered that risk will be within levels observed during the construction phase, and the effect is therefore assessed as being **broadly acceptable** and not significant in EIA terms.

14.7.6.7 Reduction of Emergency Response Capability

206. It is anticipated that this hazard will be similar in nature to the equivalent construction phase hazard (see **Section 14.7.4.7**) on the basis that the methods and vessels used to remove infrastructure are expected to be similar to those used for installation, including in relation to increased personnel on site. This includes the assumption that the vessels on site associated with decommissioning will form additional resource to respond to any incidents in the area in liaison with the MCA, both in terms of incidents associated with the projects (i.e., self help resources), but also incidents occurring outside of the Windfarm Site to third party vessels.

207. As required under MGN 654, the Applicant will produce and submit an ERCoP to the MCA detailing how they would cooperate and assist in the event of an incident including during the decommissioning phase.

208. As such, it is considered that risk will be within levels observed during the construction phase, and the effect is therefore assessed as being **broadly acceptable** and not significant in EIA terms.

14.8 Cumulative Impacts

209. This section assesses relevant impacts to shipping and navigation users on a cumulative basis. **Table 14.13** provides a summary of which impacts have been screened into the Cumulative Impact Assessment (CIA), with rationale behind the screening for each included.

Table 14.13: Potential Cumulative Impacts

Impact	Potential for cumulative impact	Data confidence	Rationale
Vessel Displacement.	Yes	Low	As per the cumulative routeing assessment, cumulative deviations are anticipated.
Increased Vessel to Vessel Collision Risk (third party to third party).	Yes	Low	As per the cumulative routeing assessment, cumulative deviations are anticipated, and as such there may be a cumulative increase in collision risk.
Increased Vessel to Vessel Collision Risk (third party to Project vessel).	Yes	Low	There may be a cumulative increase in vessels associated with cumulative developments in the area.
Vessel to structure allision risk.	Yes	Low	There may be a cumulative increase in allision risk associated with other developments.
Reduced Access to local ports.	No	Low	There is anticipated to be limited impact on port access from the Project in isolation on the basis of anticipated Project vessel levels and as such no cumulative increases associated with the Project are expected.
Reduction of underkeel clearance.	No	Low	Hazard is localised to the area in the vicinity of each individual development.
Anchor snagging interaction.	No	Low	Hazard is localised to the area in the vicinity of each individual development.
Loss of station.	No	Low	Managed via Regulatory Expectations which will apply to all developers.
Reduction of emergency response capability.	Yes	Low	There may be a cumulative increase in incident rates associated with the cumulative developments.

210. The NRA has undertaken a screening process to assess which cumulative developments should be considered within the CIA. A summary of this process is provided in **Table 14.14**, noting that full details are provided in the NRA.

Table 14.14: Summary of Projects considered for the CIA in Relation to Shipping and Navigation

Project	Status	Development period	[1]Distance from Green Volt Site (nm)	Distance from Green Volt offshore cable route (nm)	Project definition	Data confidence	Included in CIA?	Rationale
Acorn Carbon Capture and Storage Site (CCS)	Under Development	Potential for construction activities for Acorn CCS to overlap temporally with Project.	1.0	6.0 nm	Based at the St Fergus gas terminal in northeast Scotland, Acorn CCS can repurpose existing gas pipelines to take CO_2 directly to the Acorn CO_2 Storage Site in the North Sea. The project is a designated European Project of Common Interest (PCI). The project received a CO_2 storage licence from the Oil and Gas Authority in December 2018 (the first if its kind issued in the UK), with the project looking to enter operation in the mid-2020s.	High	Yes	Project within 50 nm
MarramWind Floating Offshore Windfarm	Pre-scoping	Unlikely to progress prior to the Project.	4.8	10.0	Floating wind farm site located 75 km off the northeast coast of Scotland in water depths averaging 100 metres, the proposed MarramWind floating offshore windfarm could deliver up to 3 Gigawatt (GW) of power.	Low in terms of shipping and navigation	Yes	Project within 50 nm
Salamander Floating Windfarm	Pre-scoping	Potential for temporal overlap with all phases of Salamanders lifespan given the similar timespan for development between Salamander and the Project.	18.0	0	The Salamander project is a pre-commercial size project, up to 200 Megawatt (MW) capacity, located off Peterhead in the east coast of Scotland. The project is the planning stage currently and is aiming to secure a Contract for Difference (CfD) in 2025 if this is the route to market taken. The project is also looking at potential offtake agreements for hydrogen. Looking to begin construction in 2026 at the earliest. Salamander has signed a memorandum of understanding with ERM to utilise the Dolphyn electrolysis, desalination and hydrogen production concept for the project.	Low in terms of shipping and navigation	Yes	Project within 50 nm

[1] *Shortest distance between the considered project and Green Volt – unless specified otherwise.*

Project	Status	Development period	[1]Distance from Green Volt Site (nm)	Distance from Green Volt offshore cable route (nm)	Project definition	Data confidence	Included in CIA?	Rationale
Buchan Floating Offshore Windfarm	Pre-scoping	Unlikely to progress prior to the Project.	26.2	26.8	Floating offshore windfarm site off the northeast coast of Scotland with a proposed approximate capacity of 1 GW.	Low in terms of shipping and navigation	Yes	Project within 50 nm
Muir Mhòr Floating Wind Farm	Pre-scoping	Unlikely to progress prior to the Project.	21.3	15.9	Floating wind farm site located 67 km off the northeast coast of Scotland, the proposed floating offshore windfarm could deliver up to 11 GW of power by 2030.	Low in terms of shipping and navigation	Yes	Project within 50 nm
Broadshore Floating Offshore Windfarm	Pre-scoping	Unlikely to progress prior to the Project.	34.3	30.0	Floating wind farm site located 100 km off the northeast coast of Scotland in water depths averaging 77 m, the proposed MarramWind floating offshore windfarm could deliver up to 2 GW of power.	Low in terms of shipping and navigation	Yes	Project within 50 nm
CampionWind Floating Offshore Windfarm	Pre-scoping	Unlikely to progress prior to the Project.	25.1	25.4	One of three lease sites secured by Falck Renewables and BlueFloat Energy during the recent Scotwind leasing round, together all three sites could accommodate a total of approximately 3 GW of offshore wind capacity with the projects scheduled to be operational by the end of the decade, subject to securing consent, commercial arrangements and grid connections	Low in terms of shipping and navigation	Yes	Project within 50 nm

14.8.1 Vessel Displacement

211. The assessment of cumulative routeing as undertaken in the NRA showed that certain main routes in the area are likely to require deviations on a cumulative basis. However, there is searoom available to accommodate the deviations, and only low volumes of traffic would be affected. The closest project to the Windfarm Site is Marram, located 5 nm to the north. Vessels may choose to pass between the two projects, and there is considered to be sufficient room to accommodate such transits.

212. There may be some minor deviations required to avoid any construction or maintenance works associated with the Acorn Carbon Capture Storage to the north, however any impact would be temporary and spatially limited (all associated infrastructure is subsea, and as such there will be no deviations during normal operations).

213. On this basis, considering the size of the cumulative area assessed, cumulative displacement is assessed as being of negligible consequence in terms of navigational safety but of reasonably probable occurrence, meaning significance is **broadly acceptable** and therefore not significant in EIA terms.

14.8.2 Increased vessel to vessel collision risk (third party to third party)

214. As per **Section 14.8.1**, deviations on a cumulative basis are anticipated to occur. However, only a limited volume of traffic is expected to be impacted and as such a notable increase in collision rates is not anticipated. Further, there is searoom available to safely accommodate any increases in vessel density associated with the anticipated deviations. This includes the area between Marram and the Windfarm Site, with the spacing between the projects being 5 nm.

215. On this basis, considering the size of the cumulative area assessed, cumulative increase in collision risk is assessed as being of serious consequence in terms of navigational safety but of negligible occurrence, meaning significance is **broadly acceptable** and not significant in EIA terms.

14.8.3 Increased Vessel to Vessel Collision Risk (third party to Project vessel)

216. There is the potential that similar ports could be used by developments in terms of mobilising construction and / or maintenance vessels. On this basis, there may be a cumulative increase in project vessels within the general area, and as such the potential for increased encounters and collision risk. However, all developers should be establishing appropriate vessel management systems (e.g., marine coordination) and as such any encounters will be managed, including by COLREGS and SOLAS.

217. It is noted that there is already oil and gas vessel activity regularly occurring in the general area, and as such passing vessels will be familiar with ongoing operations being undertaken.

218. On this basis, taking into considering the size of the cumulative area assessed, cumulative increase in collision risk (third party to project vessel) is assessed as being of serious consequence in terms of navigational safety but of negligible occurrence, meaning significance is **broadly acceptable** and therefore not significant in EIA terms.

14.8.4 Vessel to Structure Allision Risk

219. The nearest screened in cumulative development is Marram Wind, located approximately 5 nm to the north. As per the cumulative routeing assessment undertaken in the NRA, certain vessels may choose to pass between the Windfarm Site and Marram and as such may experience increased cumulative allision risk at a localised level. All other screened in developments are at least 18 nm from the Windfarm Site and as such are unlikely to lead to notably increased cumulative allision risk given the localised spatial area of relevance of the hazard.

220. For vessels passing in between Marram and the Windfarm Site, there is considered to be sufficient searoom between the boundaries to safely accommodate vessel transits, with enough space for vessels to pass a safe distance from both developments.

221. All developments will be required to implement lighting and marking in agreement with NLB and in compliance with IALA G1162/O-139 (IALA, 2021). For each development these discussions will include consideration of the current cumulative understanding, thus minimising allision risk on a cumulative basis. Further, the developer of Marram will be required to agree layout with the MCA and NLB, with these agreements including consideration of navigational safety.

222. Allision hazards associated with internal navigation is localised to each individual development, however given the proximity of Marram, there may be increased cumulative allision risk.

223. On this basis, taking into considering the size of the cumulative area assessed, cumulative increase in allision risk is assessed as being of serious consequence in terms of navigational safety but of extremely unlikely occurrence, meaning significance is **tolerable** and ALARP, and therefore not significant in EIA terms.

14.8.5 Reduction of emergency response capability

224. Given the low baseline incident rates, and noting the additional resources that would be available at other projects (including both wind farms and oil and gas), there is not considered likely to be a notable effect on emergency response resources on a cumulative level. This takes account of historical data showing that allisions and collisions caused by wind farms do not occur at a high frequency (as detailed in the NRA).

225. All wind farm developments will be required to agree a layout with the MCA and considering the requirements of MGN 654, ensuring suitable SAR access is available. Regardless, SAR operations within a given development will be localised to the area of the operation. As such no cumulative impact on SAR access is anticipated.

226. The frequency of occurrence in relation is considered extremely unlikely noting the limited anticipated effect on incidents rates and MGN 654 compliance including in relation to layout design and SAR access. Severity of consequence is considered moderate. On this basis the significance of risk is assessed to be **broadly acceptable** and therefore not significant in EIA terms.

14.9 Transboundary Impacts

227. As per **Section 14.4.3**, transboundary impacts are considered to have been captured within the in isolation and CIAs.

14.10 Inter-Relationships

228. If a number of parameters or “sources” interact to affect a single receptor then this should be listed here. Given that offshore chapters are receptor based and inter-relationships covered as part of the assessment, this section serves as a sign-posting for inter-relationships.

229. A short chapter will be included which compiles the inter-relationships and provides some more narrative on the overall approach.

Table 14.15: Shipping and Navigation Inter-Relationships

Topic and description	Related Chapter	Where addressed in this Chapter
Impacts to fishing vessels	**Chapter 13: Commercial Fisheries**	**Section 14.6 and Section 14.7**
Impacts to recreational vessels	**Chapter 19: Socioeconomics, Tourism and Recreation**	**Section 14.6 and Section 14.7**
Impacts to vessels associated with other infrastructure	**Chapter 17: Infrastructure and other Marine Users**	**Section 14.6 and Section 14.7**

14.11 Summary

230. A summary of the impact assessment undertaken for shipping and navigation is presented in **Table 14.16**.

Table 14.16: Summary of Potential Impacts Identified for Shipping and Navigation

Potential Impact	Receptor	Frequency of Occurrence	Severity of Consequence	Significance	Additional Mitigation	Residual Effect
Construction						
Vessel Displacement	Third party vessels	Reasonably Probable	Negligible	Broadly Acceptable	n/a	Broadly Acceptable
Restriction of Adverse Weather Routeing	Third party vessels	Extremely Unlikely	Moderate	Broadly Acceptable	n/a	Broadly Acceptable
Third Party to Third Party Vessel Collision	Third party vessels	Negligible	Serious	Broadly Acceptable	n/a	Broadly Acceptable
Third party to Project Vessel Collision	Third party vessels	Negligible	Serious	Broadly Acceptable	n/a	Broadly Acceptable
Vessel to Structure Allision	Third party vessels	Extremely Unlikely	Serious	Tolerable	Vessel plotter overlay provision and guidance.	Tolerable with mitigation
Reduced Port Access	Third party vessels	Extremely Unlikely	Minor	Broadly Acceptable	n/a	Broadly Acceptable
Reduction of Emergency Response Capability	Emergency Response	Extremely Unlikely	Moderate	Broadly Acceptable	n/a	Broadly Acceptable
Operation						
Vessel Displacement	Third party vessels	Remote	Negligible	Broadly Acceptable	n/a	Broadly Acceptable
Restriction of Adverse Weather Routeing	Third party vessels	Extremely Unlikely	Moderate	Broadly Acceptable	n/a	Broadly Acceptable
Third Party to Third Party Vessel Collision	Third party vessels	Negligible	Serious	Broadly Acceptable	n/a	Broadly Acceptable
Third Party to Project Vessel Collision	Third party vessels	Negligible	Serious	Broadly Acceptable	n/a	Broadly Acceptable
Vessel to Structure Allision	Third party vessels	Extremely Unlikely	Serious	Tolerable	Vessel plotter overlay provision and guidance.	Tolerable with mitigation
Reduced Port Access	Third party vessels	Extremely Unlikely	Minor	Broadly Acceptable	n/a	Broadly Acceptable
Reduction of Under Keel Clearance	Third party vessels	Extremely Unlikely	Serious	Tolerable	Post construction validation of available underkeel clearance available over mooring lines in liaison with MCA and NLB. Vessel plotter overlay provision and guidance.	Tolerable with mitigation

Potential Impact	Receptor	Frequency of Occurrence	Severity of Consequence	Significance	Additional Mitigation	Residual Effect
Anchor Snagging Interaction	Third party vessels	Negligible	Minor	Broadly Acceptable	n/a	Broadly Acceptable
Loss of Station	Third party vessels	Negligible	Serious	Broadly Acceptable	n/a	Broadly Acceptable
Reduction of Emergency Response Capability	Emergency Response	Extremely Unlikely	Moderate	Broadly Acceptable	n/a	Broadly Acceptable
Decommissioning						
Vessel Displacement	Third party vessels	Reasonably Probable	Negligible	Broadly Acceptable	n/a	Broadly Acceptable
Restriction of Adverse Weather Routeing	Third party vessels	Extremely Unlikely	Moderate	Broadly Acceptable	n/a	Broadly Acceptable
Third Party to Third Party Vessel Collision	Third party vessels	Negligible	Serious	Broadly Acceptable	n/a	Broadly Acceptable
Third party to Project Vessel Collision	Third party vessels	Negligible	Serious	Broadly Acceptable	n/a	Broadly Acceptable
Vessel to Structure Allision	Third party vessels	Extremely Unlikely	Serious	Tolerable	Vessel plotter overlay provision and guidance.	Tolerable with mitigation
Reduced Port Access	Third party vessels	Extremely Unlikely	Moderate	Broadly Acceptable	n/a	Broadly Acceptable
Reduction of Emergency Response Capability	Emergency Response	Extremely Unlikely	Moderate	Broadly Acceptable	n/a	Broadly Acceptable
Cumulative						
Vessel Displacement	Third party vessels	Reasonably Probable	Negligible	Broadly Acceptable	n/a	Broadly Acceptable
Third Party to Third Party Vessel Collision	Third party vessels	Negligible	Serious	Broadly Acceptable	n/a	Broadly Acceptable
Third party to Project Vessel Collision	Third party vessels	Negligible	Serious	Broadly Acceptable	n/a	Broadly Acceptable
Vessel to Structure Allision	Third party vessels	Extremely Unlikely	Serious	Tolerable	Vessel plotter overlay provision and guidance.	Tolerable with mitigation
Reduction of Emergency Response Capability	Emergency Response	Extremely Unlikely	Moderate	Broadly Acceptable	n/a	Broadly Acceptable
Transboundary						
See **Section 14.9**.						

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