LLŶR FLOATING OFFSHORE WIND PROJECT

Llŷr 1 Floating Offshore Wind Farm

Environmental Statement

Volume 3: Chapter 25 - Shipping and Navigation

August 2024

Prepared by: Llŷr Floating Wind Ltd

FLOVENTIS ENERGY

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Acronyms and Abbreviations

Acronym or Abbreviation	Definition	Acronym or Abbreviation	Definition
AIS	Automatic Identification System	MMO	Marine Management Organisation
ALARP	As Low As Reasonably Practicable	MOD	Ministry of Defence
ARPA	Automatic Radar Plotting Aid	MPCP	Marine Pollution Contingency Plan
ATBA	Area to be Avoided	MSL	Mean Sea Level
CAA	Civil Aviation Authority	MW	Megawatt
CD	Chart Datum	NAVTEX	Navigational Telex
COLREGs	Convention on the International Regulations for Preventing Collisions at Sea	nm	Nautical Mile
DECC	Department of Energy and Climate Change	nm^2	Square Nautical Mile
DESNZ	Department for Energy Security and Net Zero	NPS	National Policy Statements
DfT	Department for Transport	NRA	Navigational Risk Assessment
dML	deemed Marine Licence	NSIP	Nationally Significant Infrastructure Project
EEA	European Economic Area	O&M	Operation and Maintenance
EIA	Environmental Impact Assessment	OWF	Offshore Wind Farm
EMF	Electromagnetic Field	PDA	Project Development Area
ERCoP	Emergency Response Cooperation Plan	PEXA	Practice and Exercise Area
ES	Environmental Statement	PINS	Planning Inspectorate
FLO	Fisheries Liaison Officer	PLL	Potential Loss of Life
GLA	General Lighthouse Authority	Radar	Radio Detection and Ranging
GPS	Global Positioning System	RAM	Restricted in Ability to Manoeuvre
GT	Gross Tonnage	RNLI	Royal National Lifeboat Institution
HM	His Majesty's	RYA	Royal Yachting Association
HSE	Health and Safety Executive	SAR	Search and Rescue
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities	SOLAS	International Convention for the Safety of Life at Se
IAM	Impact Assessment Matrix	SONAR	Sound Navigation and Ranging
IMO	International Maritime Organization	TCE	The Crown Estate
ITZ	Inshore Traffic Zone	TPV	Third Party Verification
km	Kilometres	TSS	Traffic Separation Scheme
kV	Kilovolt	UK	United Kingdom
LFW	Llŷr Floating Wind	UKHO	United Kingdom Hydrographic Office
LNG	Liquid Natural Gas	UN	United Nations
m	Metre	UNCLOS	United Nations Convention on the Law of the Sea
MAIB	Marine Accident Investigation Branch	VDF	Very High Frequency Direction Finding

Acronym or Abbreviation	Definition	Acronym or Abbreviation	Definition
MCA	Maritime Coastguard Agency	VHF	Very High Frequency
MGN	Marine Guidance Note	VTS	Vessel Traffic Service
MHPA	Milford Haven Port Authority	WTG	Wind Turbine Generators
MHWS	Mean High Water Springs		

Glossary of Terms

Term	Definition
Adverse Weather Route	Preferred routes by certain vessels during periods of adverse weather conditions.
The Applicant	The developer of the Project, Llŷr Floating Wind Ltd.
Allision	The act of striking or collision of a moving vessel against a stationary object.
Array Area	The area within which the Wind Turbine Generators (WTG) and inter array cables will be located.
Automatic Identification System (AIS)	A system by which vessels automatically broadcast their identity, key statistics including location, destination, length, speed and current status, e.g., under power. Most commercial vessels and United Kingdom/European Union fishing vessels over 15 m length are required to carry AIS.
Baseline	The existing conditions as represented by the latest available survey and other data which is used as a benchmark for making comparisons to assess the impact of the proposed Project.
Collision	The act or process of colliding (crashing) between two moving objects.
Cumulative Effects	Changes to the environment caused by a combination of present and future projects, plans or activities.
Embedded Mitigation Measure	Mitigation measures to avoid or reduce environmental effects that are directly incorporated into the design for the proposed Project.
Environmental Impact Assessment (EIA)	A statutory process whereby the environmental impacts of a given proposed project are assessed in accordance with the EIA Regulations.
Floventis Energy	A joint venture company between Cierco Ltd and SBM Offshore Ltd of which Llŷr Floating Wind Limited is a wholly owned subsidiary.
Formal Safety Assessment (FSA)	A structured and systematic process for assessing the risks and costs (if applicable) associated with shipping activity.
Future Case	The assessment of risk based on the predicted growth in future shipping densities and traffic types as well as foreseeable changes in the marine environment.
Landfall	The location where the offshore export cable(s) from the Array Area, as defined, are brought onshore and connected to the onshore export cables (as defined) via the transition joint bays (TJB).
Llŷr 1	The proposed Project, for which the Applicant is applying for Section 36 and Marine Licence consents. Including all offshore and onshore infrastructure and activities, and all project phases.

Term	Definition
Main Commercial Route	Defined transit route (mean position) of commercial vessels identified within each shipping and navigation study area.
Marine Guidance Note (MGN)	A system of guidance notes issued by the Maritime and Coastguard Agency which provide significant advice relating to the improvement of the safety of shipping at sea, and to prevent or minimise pollution from shipping.
Marine Licence	A licence required under the Marine and Coastal Access Act 2009 for marine works which is administered by Natural Resources Wales (NRW) Marine Licensing Team (MLT) on behalf of the Welsh Ministers.
Navigational Risk Assessment (NRA)	A document which assesses the hazards to shipping and navigation of a proposed Offshore Renewable Energy Installation based upon Formal Safety Assessment.
Offshore Development Area	The footprint of the offshore infrastructure and associated temporary works, comprised of the Array Area and the Offshore Export Cable Corridor, as defined, that forms the offshore boundary for the S36 Consent and Marine Licence application.
Offshore Export Cable	The cable(s) that transmit electricity produced by the WTGs to landfall.
Offshore Export Cable Corridor (OfECC)	The area within which the offshore export cable(s) will be located.
Offshore Export Cable Corridor (OfECC) Study Area	A buffer of two nautical miles (nm) applied around the OfECC.
Offshore Renewable Energy Installation (OREI)	As defined by Marine Guidance Note (MGN) 654 (Merchant and Fishing) Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response (Maritime and Coastguard Agency (MCA), 2021). For the purposes of this report and in keeping with the consistency of the Environmental Impact Assessment (EIA), OREI can mean offshore wind turbines and the associated electrical infrastructure such as offshore substations.
Onshore Export Cable(s)	The cable(s) that transmit electricity from the landfall to the onshore substation.
Onshore Export Cable Corridor (OnECC)	The area within which the onshore export cable circuit(s) will be located.
Onshore Substation	Located within the Onshore Development Area, converts high voltage generated electricity into low voltage electricity that can be used for the grid and domestic consumption.
Proposed Project	All aspects of the Llŷr 1 development (i.e. the onshore and offshore components).

Term	Definition
Radio Detection and Ranging (Radar)	An object-detection system which uses radio waves to determine the range, altitude, direction or speed of objects.
Regular Operator	Commercial operator whose vessel(s) are observed to transit through a particular region on a regular basis.
Scoping Opinion	The report adopted by the Natural Resources Wales.
Scoping Report	The report that was produced in order to request a Scoping Opinion from the Natural Resources Wales.
Section 36 consent	Consent to construct and operate an offshore generating station, under Section 36 (S.36) of the Electricity Act 1989. This includes deemed planning permission for onshore works.
Study Area	A buffer of ten nautical miles (nm) applied around the Array Area.
The Project	All aspects of Project Llŷr (both onshore and offshore).
Unique Vessel	An individual vessel identified on any particular calendar day, irrespective of how many tracks were recorded for that vessel on that day. This prevents vessels being over counted. Individual vessels are identified using their Maritime Mobile Service Identity (MMSI).

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25. SHIPPING AND NAVIGATION

25.1 Introduction

1. LFW (hereafter the Applicant) is proposing to develop the Llŷr 1 Floating Offshore Wind Farm (hereafter referred to as the proposed Project), located approximately 35 km off the coast of Pembrokeshire in the Celtic Sea.
2. The proposed Project is a test and demonstration wind farm development, comprising up to 10 wind turbine generators (WTGs). The proposed Project will make landfall at Freshwater West before connecting into Pembroke Dock power station and the national grid network.
3. The Applicant is seeking a Section 36 consent and Marine Licence for Llŷr 1, and this chapter forms part of the Environmental Statement (ES) which is submitted in support of those consent applications. This chapter describes the potential impacts and effects of the proposed Project on Shipping and Navigation during the construction, operation and maintenance and decommissioning phases, and includes mitigation and good practice measures to reduce the impacts of the proposed Project on Shipping and Navigation.
4. **Section 25.10** of this ES chapter provides a summary of the impact assessment undertaken and any residual significant effects on Shipping and Navigation following consideration of any mitigation measures.
5. The assessment presented in this chapter should be read in conjunction with following linked and supporting chapters:

    - **Chapter 5: Environmental Impact Assessment (EIA) Methodology** – provides further details of the general framework and approach to the EIA and CEA;
    - **Chapter 26: Commercial Fisheries** – assesses risks associated with commercial fisheries and in particular when active fishing activity; and
    - **Chapter 31: Inter-related Effects Assessment** – assesses risks associated with environmental interactions with other receptors within the proposed Project.

6. Additional information to support the assessment includes:

    - **Appendix 25A: Navigational Risk Assessment (NRA)** – provides the technical assessment of risks associated with shipping and navigation used to inform this chapter.

7. The assessment has been undertaken by Anatec Ltd. Further details of the Project Team's competency are provided in **(Appendix 1A: Statement of Competence)**.

25.2 Legislation, Policy and Guidance

8. The following sections identify specific legislation, policy and guidance that is applicable to the assessment of Shipping and Navigation. Further detail on the wider legislation, policy and guidance relevant to this ES is provided in **Chapter 02: Regulatory and Planning Policy Context**.

25.2.1. Legislation

9. The legislation that is applicable to the assessment of Shipping and Navigation is summarised below.

    - United Nations Convention on the Law of the Sea (UNCLOS) Article 60(7) (United Nations (UN), 1982) – UNCLOS states that "artificial islands, installations and structures and the safety zones around them may not be established where interference may be caused to the use of recognised sea lanes essential to international navigation";

- Convention on the International Regulations for Preventing Collisions at Sea (COLREGs) (International Maritime Organization (IMO)), 1972 / 77) – due consideration has been given to the COLREGs such as Rule 8 (action to avoid a collision) and Rule 19 (conduct of vessels in restricted visibility); and
- International Convention for the Safety of Life at Sea (SOLAS) (IMO, 1974) – due consideration has been given to SOLAS such as Regulation 33 (distress messages) and Regulation 34 (safe navigation and avoidance of dangerous situations).

25.2.2. National Planning Policy

10. Key national planning policy relevant to the assessment of impacts relating to shipping and navigation is outlined in **Table 25-1**. This includes the National Policy Statements (NPS) – although the proposed Project is not a Nationally Significant Infrastructure Project (NSIP), elements of the NPSs are relevant to take into consideration.

Table 25-1. A summary of national planning policy relevant to Shipping and Navigation

Summary of policy	How and where it is considered in the chapter
National Policy Statement (NPS) for Renewable Energy Infrastructure (EN-3) (Department for Energy, Security & Net Zero (DESNZ), 2023)	
Paragraph 2.8.169 advises that to ensure safety of shipping applicants should reduce risks to navigational safety to as low as reasonably practicable (ALARP).	ALARP principles have been applied to the assessment methodology in lie with the Formal Safety Assessment (FSA) process prescribed in MGN 654 (see **Section 25.4**).
Paragraph 2.8.174 advises that applicants should engage with interested parties in the navigation sector early in the pre-application phase of the proposed offshore wind farm or offshore transmission to help identify mitigation measures to reduce navigational risk to ALARP, to facilitate proposed offshore wind development. This includes the Marine Management Organisation (MMO) or Natural Resources Wales (NRW) in Wales, MCA, the relevant General Lighthouse Authority (GLA), such as Trinity House, the relevant industry bodies (both national and local) and any representatives of recreational users of the sea, such as the Royal Yachting Association (RYA), who may be affected. This should continue throughout the life of the development including during the construction, operation and decommissioning phases.	Consultation with relevant stakeholders has been a key input to the assessment of environmental effects and includes enagement with the MCA, Trinity House (as the relevant GLA), UK Chamber of Shipping, Milford Haven Port Authority (MHPA), Ministry of Decence (MOD), RYA, UK Major Ports Group, and GP Shipping.
Paragraph 2.8.176 advises that the presence of the wind turbines can also have impacts on communication and shipborne and shore-based Radar systems.	Impacts relating to navigation, communication, and position fixing equipment have been considered (see Section 13 of **Appendix 25A: Navigational Risk Assessment**).

Summary of policy	How and where it is considered in the chapter
Paragraph 2.8.177 advises that prior to undertaking assessments applicants should consider information on internationally recognised sea lanes, which is publicly available.	Main commercial routes have been identified as part of the existing baseline in **Section 25.5.11**, including in relation to IMO routeing measures.
Paragraph 28.179 advises that applicants must undertake an NRA in accordance with relevant government guidance prepared in consultation with the MCA and the other navigation stakeholders listed above [Paragraph 2.8.174].	An NRA has been undertaken in line with MGN 654 and has been informed by consultation with shipping and navigation stakeholders (see **Appendix 25A: Navigational Risk Assessment**).
Paragraph 2.8.180 advises that the NRA will for example necessitate: A survey of vessel traffic in the vicinity of the proposed wind farm. A full NRA of the likely impact of the wind farm on navigation in the immediate area of the wind farm in accordance with the relevant guidance. Cumulative and in-combination risks associated with the development and other developments (including other wind farms) in the same area of sea.	Vessel traffic surveys have been undertaken for the Array Area (see **Section 25.4**). An NRA has been undertaken in line with MGN 654 (see **Appendix 25A: Navigational Risk Assessment**). Inter-related and cumulative effects have been assessed with consideration of other developments including offshore wind farms (see **Section 25.11**).
Paragraph 2.8.185 advises that applicants should undertake a detailed NRA, which includes Search and Rescue (SAR) Response Assessment and emergency response assessment prior to applying for consent. The specific SAR requirements will then be discussed and agreed post-consent.	An impact relating to the reduction of emergency response capability including SAR has been scoped into the assessment of environmental effects and acknowledged the need to complete a SAR Checklist (see **Section 25.8**).
Paragraph 2.8.249 advises that mitigation measures will include site configuration, lighting and marking of projects to take account of any requirements of the GLA.	Lighting and marking is included as an embedded mitigation measure (see **Section 25.7**) and the final array layout will be agreed in consultation with MCA and Trinity House post consent.
NPS for Ports (2012)	
Paragraph 5.14.2 of the NPS for Ports (Department for Transport (DfT), 2012) states that where likely to occur, socio-economic impacts should be incorporated.	Socio-economic impacts are assessed in **Chapter 16: Socio-economics, Recreation and Tourism** in **Section 16.8**.
Paragraph 5.14.4 states that the existing socio-economic conditions should be described, and the impact correlated with local planning policies,	

Summary of policy	How and where it is considered in the chapter
Paragraph 5.14.5 states that socio-economic impacts may be linked to other impacts.	
UK Marine Policy Statement (MPS) (2011)	
Paragraph 3.4.7 of the United Kingdom (UK) Marine Policy Statement (His Majesty's Government (HM Government), 2011) states that decision makers should account for and seek to minimise any negative impacts on navigational safety and freedom of navigation.	Impacts relating to navigational safety have been considered in the assessment of environmental effects undertaken in **Section 25.8**.
Welsh National Marine Plan (2019)	
Safeguarding Policy SAF_01 within the Welsh National Marine Plan (Welsh Government, 2019) states that Proposals which may have significant impacts on established activities should demonstrate how compatibility issues will be addressed including through avoidance of significant impacts, minimising them where unavoidable and / or mitigation.	The assessment of environmental effects undertaken in **Section 25.8** determines the significance of effect associated with impacts relating to shipping and navigation. This includes consideration of embedded and good practice measures to ensure that the significance of effect is reduced to As Low As Reasonably Practicable (ALARP) levels, in line with the requirements of the IMO Formal Safety Assessment (FSA) process.

25.2.3. Regional Planning Policy

11. Key regional planning policy relevant to the assessment of impacts relating to shipping and navigation is outlined in **Table 25-2**.

Table 25-2. A summary of regional planning policy relevant to Shipping and Navigation

Summary of policy	How and where it is considered in the chapter
South West Inshore and South West Offshore Marine Plan (2021)	
Policy SW-PS-1 within the South West Inshore and South West Offshore Marine Plan (HM Government, 2021) states that proposals within statutory harbour authority areas or their approaches that detrimentally and materially affect safety of navigation, or the compliance by statutory harbour authorities with the Open Port Duty or the Port Marine Safety Code, will not be authorised unless there are exceptional circumstances.	An impact relating to the effects on port access – principally to the Port of Milford Haven – has been assessed (see **Section 25.8**).
Policy SW-PS-2 states that proposals that require static sea surface infrastructure or that significantly reduce under keel	IMO routeing measures have been identified in the region (see Section 25.5.11) and receptors utilising these

Summary of policy	How and where it is considered in the chapter
clearance must not be authorised within or encroaching upon IMO routeing systems unless there are exceptional circumstances.	measures have been considered in the assessment of environmental effects (see **Section 25.8**).
Policy SW-PS-3 states that proposals that require static sea surface infrastructure or that significantly reduce under keel clearance which encroaches upon high density navigation routes, strategically important navigation routes, or that pose a risk to the viability of passenger services, must not be authorised unless there are exceptional circumstances.	Main commercial routes in proximity to the Project have been identified (see **Section 25.5.11**) and an impact relating to the displacement of commercial vessels have been assessed (see **Section 25.8**).

25.2.4. Local Planning Policy

12. No local planning policy has been identified as relevant to shipping and navigation.

25.2.5. Guidance

13. Key guidance relevant to the assessment of impacts relating to shipping and navigation is outlined in **Table 25-3**.

Table 25-3. A summary of guidance relevant to shipping and navigation

Summary of Guidance	How and where it is considered in the chapter
Marine Guidance Note (MGN) 654 and its annexes (MCA, 2021) highlights the issues that need to be considered when assessing the impact on navigational safety and emergency response (Search and Rescue (SAR), salvage and towing, and counter pollution) caused by Offshore Renewable Energy Installation (OREI) developments and provides a methodology for the assessment (Annex 1).	The NRA has been undertaken in compliance with the requirements of MGN 654. This includes completion of the MGN 654 Checklist (Appendix A) and an embedded mitigation measure to ensure compliance with MGN 654 as the proposed Project progresses (see **Section 25.7**).
The Revised Guidelines for FSA for Use in the IMO Rule-Making Process (IMO, 2018) outline the FSA methodology as a tool.	The FSA approach has been adopted in the methodology for the impact assessment (see **Section 25.2**).
MGN 372 Amendment 1 highlights the issues to be considered when planning and undertaking voyages in the vicinity of OREIs off the UK coast.	The ability of mariners for third-party vessels to comply with MGN 372 in the presence of the proposed Project has been considered.
International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Recommendation O-139 The Marking of Man-Made Structures (IALA, 2021) and IALA Guideline G1162 The Marking of Offshore Man-Made	IALA Recommendation O-139 and Guideline G1162 will be considered when determining the lighting and marking for the proposed Project post consent in consultation with Trinity House, MCA and the Civil Aviation Authority (CAA). This is captured as an embedded mitigation measure (see **Section 25.7**).

Summary of Guidance	How and where it is considered in the chapter
Structures (IALA, 2021) provide recommendations for developers about the marking of structures fixed in position, which extend above or below the surface of the sea and which are obstructions to navigation (including OREIs).	
The RYA's Position on Offshore Renewable Energy Developments: Paper 1 (of 4) – Wind Energy (RYA, 2019) enables developers to account for recreational boating concerns when developing their ESs and NRAs.	The RYA's position paper has been considered; in particular, guidance relating to changes in charted water depth and minimum blade tip clearance has been noted in the assessment of environmental effects (see **Section 25.8**) and is captured in the embedded mitigation measures (see **Section 25.7**).
The Standard Marking Schedule for Offshore Installations (Department of Energy & Climate Change (DECC), 2011)	The schedule will be considered when defining the lighting and marking for the proposed Project alongside IALA Recommendation O-139 and Guideline G1162.
The Regulatory Expectations on Moorings for Floating Wind and Marine Devices (MCA and Health and Safety Executive (HSE), 2017) provides expectations for ensuring the health and safety of persons and affected parties in the presence of a floating device.	The regulatory expectations will be considered when determining the final project design. This is captured as an embedded mitigation measure (see **Section 25.7**).

25.3 Stakeholder Engagement and Consultation

14. Consultation with statutory and non-statutory organisations is a key element of the EIA process. Consultation with regards to Shipping and Navigation has been undertaken to inform the approach to, and scope of, the assessment.

15. Stakeholders for the proposed Project include statutory consultees, landowners, local communities and other sea users. In addition to the statutory consultation process, there has been ongoing engagement with statutory and non-statutory consultees to steer the development of the proposed Project and this is detailed in **Table 25-4**. It should be noted that consultation has largely considered both Llŷr 1 and the proposed Llŷr 2 Floating Offshore Wind Project (Llŷr 2), of which separate Section 36 and marine licence applications will be undertaken later, including a separate ES. Therefore, only feedback pertinent to Llŷr 1 is considered.

25.3.6. Summary of Stakeholder Consultations

Table 25-4. Summary of the key issues raised by consultees and how each issue was addressed

Consultee	Consultation type and date	Comment raised	How issue has been addressed and location of response in chapter
Scoping			
MCA	Scoping Opinion 05 July 2022	The EIA should include collision risk, navigational safety, visual and noise pollution, risk	The impacts outlined have been considered in the assessment of environmental effects (see **Section 25.8**).

Consultee	Consultation type and date	Comment raised	How issue has been addressed and location of response in chapter
		management, emergency response, safety marking and lighting, effects on small craft navigation / communication equipment, risk to drifting craft, and the potential for greater proximity with recreational and commercial vessels.	
		Routeing should prevent large-scale deviations in safe vessel passage into the Port of Milford Haven.	Vessel displacement has been considered in the assessment of environmental effects (see **Section 25.8**).
		Cumulative and in combination effects for routeing in proximity to the proposed project and other sites should be included with special attention paid to Erebus and Valorous.	Cumulative effects have been considered with other offshore wind farm developments included in the screening exercise (see **Section 25.11**).
		The MGN 654 Checklist should be utilised when conducting the NRA.	The MGN 654 Checklist has been completed (see Appendix A of **Appendix 25A: Navigational Risk Assessment**.
		The NRA should include a minimum of 28 days of seasonal vessel traffic data featuring Automatic Identification System (AIS), Radio Detection and Ranging (Radar) and visual observations.	AIS, Radar and visual observations covering a 28-day period across summer and winter has been used to inform the existing baseline for the Array Area (see **Section 25.5.11**).
		The layout design will require MCA approval to prevent potential adverse effects on surface vessels and SAR aircraft.	An Outline Project (Array) Layout Plan agreed with the MMO following appropriate consultation with Trinity House and the MCA is included as an embedded mitigation measure (see **Section 25.7**).
		A maximum 5% reduction in depth relative to Chart Datum (CD) is acceptable	The guidance included in MGN 654 in relation to under keel clearance and changes to

Consultee	Consultation type and date	Comment raised	How issue has been addressed and location of response in chapter
		especially in shallow depths.	charted water depths will be adhered to and is included as an embedded mitigation measure (see **Section 25.7**).
Trinity House	Scoping Opinion 05 July 2022	An NRA is expected including comprehensive vessel traffic analysis in accordance with MGN 654, an assessment of cumulative and in combination effects on routeing and assessment of the potential 'corridor' between Llŷr 1 and Llŷr 2.	An NRA has been undertaken and is compliant with MGN 654. Cumulative effects including in relation to commercial routeing have been considered (see **Section 25.11**). Any separation between Llŷr 1 and Llŷr 2 will be assessed in a separate EIA for Llŷr 2.
		Use of marine aids to navigation in accordance with IALA Guideline G1162, additional aids such as buoys during construction, and agreement of all marine navigational marking with Trinity House is recommended.	Lighting and marking as required by Trinity House, MCA and CAA is included as an embedded mitigation measure (see **Section 25.7**).
UK Chamber of Shipping	Scoping Opinion 05 July 2022	Further engagement is required with the Chamber and wider shipping industry.	Further consultation has been undertaken with shipping and navigation stakeholders including via a Hazard Workshop (see later entries in **Table 25-4**).
		Concerned with potential for export cables to impede navigation into the Port of Milford Haven.	Milford Haven Port Authority (MHPA) have confirmed that installation activities associated with the offshore export cable corridor (OfECC) could be managed through the Milford Haven vessel traffic service (VTS) (see later entries in **Table 25-4**).
Pre-application			
MCA	Consultation meeting 23 February 2023	With Erebus consented the option to displace traffic west of the Array Area is less feasible.	Cumulative effects including in relation to commercial routeing with Erebus in situ have been considered (see **Section 25.11**).

Consultee	Consultation type and date	Comment raised	How issue has been addressed and location of response in chapter
		Suggested it would be helpful to understand more fully the nature of the tankers awaiting orders, as could be slow moving and wish to avoid anchoring.	Additional information relating to tanker activity has been gathered during consultation including the Hazard Workshop (see later entries in **Table 25-4**).
	Hazard Workshop 22 August 2023	Content with the data being considered.	This is acknowledged in **Section 25.4.10**.
		The Pembrokeshire Demonstration Zone should be considered in the cumulative risk assessment.	The Pembrokeshire Demonstration Zone has been screened into the assessment of cumulative effects (see **Section 25.11**).
	Consultation meeting 09 January 2024	The additional time between surpassing of 24-month requirement in MGN 654 for survey data collection (March 2024) and the submission (at that time April 2024) is permitted.	This is acknowledged in **Section 25.4.10** noting that further data agreement was received from the MCA in June 2024.
		Content with approach of using collision and allision risk modelling results for alternative array layout (14 WTGs) as input to impact assessment of the indicative array layout.	This is noted.
	Consultation meeting 11 June 2024	No further comments on the amendment to the OfECC and welcome the updated study area to accommodate it.	This is noted.
		Traffic data collected is deemed acceptable in this case noting the justification provided for the deviation from MGN 654 requirements.	This is acknowledged in **Section 25.4.10**.
Trinity House	Consultation meeting 23 February 2023	The need to assess risks for existing aids to navigation relates primarily to those aids when headed into Milford Haven along the	MHPA have not raised any concerns relating to use of existing aids to navigation including during the Hazard Workshop (see later entries in in **Table 25-4**).

Consultee	Consultation type and date	Comment raised	How issue has been addressed and location of response in chapter
		OfECC and should be discussed with MHPA.	
	Hazard Workshop 22 August 2023	Confirmed that the changes to the Array Area have been a positive step.	This is noted.
		This is not a busy area although larger vessels are tidally constrained.	Considered in the assessment of vessel displacement and reduced access to local ports and harbours (see **Section 25.8**).
		With Erebus in situ the chances of displaced tanker routeing passing east of the Array Area is low.	Cumulative effects including in relation to commercial routeing with Erebus in situ have been considered (see **Section 25.11**).
	Consultation meeting 09 January 2024	Content with approach of using collision and allision risk modelling results for alternative array layout (14 WTGs) as input to impact assessment of the indicative array layout.	This is noted.
	Consultation meeting 12 June 2024	Content with the approach to vessel traffic data collection including the deviation from MGN 654 requirements.	This is acknowledged in **Section 25.4.10**.
UK Chamber of Shipping	Consultation meeting 10 February 2023	Highlighted the need for engagement with the MCA, Trinity House, MHPA, and regular operators.	Further consultation has been undertaken with shipping and navigation stakeholders including via a Hazard Workshop (see later entries in **Table 25-4**). Regular Operators identified from the vessel traffic survey data have been consulted (see Appendix D of **Appendix 25A: Navigational Risk Assessment**).
		Given the navigational concerns for the development use of longer term AIS data would be helpful for assessing seasonality and is	Long-term vessel traffic data for the Array Area covering a 12-month period (2022) has been used to validate the vessel traffic survey data (see **Section 25.4.10** and Appendix E of **Appendix 25A:**

Consultee	Consultation type and date	Comment raised	How issue has been addressed and location of response in chapter
		preferable over any shorter periods.	**Navigational Risk Assessment**).
		In the future case vessel draughts could increase and the presence of the development could have negative implications for the operation and viability of Milford Haven.	This is acknowledged in the consideration of the future baseline (see **Section 25.5.12**).
	Hazard Workshop 22 August 2023	Suggest that tanker routeing passing east and west of the Array Area requires modelling, noting the potential for hotspots with crossing traffic out of the Bristol Channel.	Collision risk modelling has been undertaken to account for both scenarios (see **Section 25.8** and Section 16.4 of **Appendix 25A: Navigational Risk Assessment**).
		Routeing vessels may interact with the OfECC including should emergency anchoring occur.	This is considered in the assessment of anchor interaction with subsea cables (see **Section 25.8**).
		There will be additional vessels associated with other future offshore wind farms and these could indicatively feature 1,000 to 2,000 vessels per year.	This is acknowledged in the consideration of the future baseline (see **Section 25.5.12**).
	Consultation meeting 19 December 2023	Content with approach of using collision and allision risk modelling results for alternative array layout (14 WTGs) as input to impact assessment of the indicative array layout.	This is noted.
	Email correspondence 04 March 2024	Update to OfECC is a welcome change and appreciate the continued constructive engagement.	This is noted.
MHPA	Hazard Workshop 22 August 2023	The year of 2022 was busy for Milford Haven and therefore provides a good insight into current volumes.	This is acknowledged in **Section 25.4.10**.
		There is seasonality in tanker routeing with greater volumes in winter	This shows good agreement with vessel traffic survey data analysed for the existing

Consultee	Consultation type and date	Comment raised	How issue has been addressed and location of response in chapter
		due to the presence of Liquid Natural Gas (LNG) tankers while produce tankers are steady year round.	baseline (see **Section 25.5.11**).
		Tanker waiting activity is for coming into Milford Haven. If asked to wait due to berth availability or weather, smaller tankers and cargo vessels coming in (8 to 10 metre (m) draught) tend to anchor in Saint Bride's Bay while larger tankers including LNG will drift or anchor more than 10 nautical mile (nm) off.	This shows good agreement with vessel traffic survey data analysed for the existing baseline (see **Section 25.5.11**).
		Belgian fishers are not currently landing at Milford Haven whereas prior to Brexit there were 30 to 40 per month.	This is noted and acknowledged in the consideration of the future baseline (see **Section 25.5.12**).
		The number of calls at Milford Haven is up and plans are being considered to increase capacity in the next 10 to 15 years.	This is acknowledged in the consideration of the future baseline (see **Section 25.5.12**).
		Two distinct routeing options for tankers (east and west of the Array Area) may deconflict tidal constraints.	This is considered in the assessment of vessel displacement and reduced access to local ports and harbours (see **Section 25.8**).
		The separation of tanker routeing if all passing east of the Array Area would likely occur at the southern edge of the Array Area.	This is considered in the assessment of collision risk (see **Section 25.8**).
		Waiting tankers are unlikely to shift east following the construction of Erebus but some of the larger loops observed will no longer occur.	Cumulative effects including in relation to commercial routeing with Erebus in situ have been considered (see **Section 25.11**).
		Installation activities relating to the OfECC could	This is considered in the assessment of vessel

Consultee	Consultation type and date	Comment raised	How issue has been addressed and location of response in chapter
		be managed through the Milford Haven VTS noting that there is a statutory duty to keep the port open.	displacement and reduced access to local ports and harbours (see **Section 25.8**).
	Consultation meeting 19 December 2023	Content with approach of using collision and allision risk modelling results for alternative array layout (14 WTGs) as input to impact assessment of the indicative array layout.	This is noted.
RYA	Hazard Workshop 22 August 2023	Recent data may not be representative of long-term volumes for recreational traffic due to COVID recovery and Brexit although routeing patterns are largely representative. Non-UK yachts have been less prominent since Brexit.	This is noted and acknowledged in the consideration of the future baseline (see **Section 25.5.12**).
		North-south recreational routeing is primarily between Milford Haven and either Padstow or the Inshore Traffic Zone (ITZ) off Land's End.	This is acknowledged in the existing baseline (see **Section 25.5.11**).
		A cautious approach to internal navigation by recreational users can be expected. Internal passages are not common currently at existing arrays but views are slowly changing.	Creation of allision risk including internally within the Array Area has been considered in the assessment of environmental effects (see **Section 25.8**).
		Under keel clearance needs to be considered but greater than 3 m should largely be sufficient for recreational vessels.	Reduction in under keel clearance has been considered in the assessment of environmental effects (see **Section 25.8**).
		Expect that yachtsman will pass between the Array Area and Erebus particularly where this may	Cumulative effects including in relation to recreational transits with Erebus in situ have been considered (see **Section 25.11**).

Consultee	Consultation type and date	Comment raised	How issue has been addressed and location of response in chapter
		allow the avoidance of tanker routeing.	
	Email correspondence 29 September 2023	Capacity at Milford Haven may increase more than 30% but there is limited information which can be shared publicly.	This is acknowledged in the consideration of the future baseline (see **Section 25.5.12**).
Irish Ferries	Regular Operator consultation 18 July 2023	Not likely to be a direct impact on the routeing of Irish Ferries operated vessels.	Vessel displacement has been considered in the assessment of environmental effects (see **Section 25.8**).
		The shift of other traffic towards Irish Ferries operated routes including Rosslare-Pembroke and Dublin-Cherbourg is the principal concern.	Vessel displacement and collision risk has been considered in the assessment of environmental effects (see **Section 25.8**).
		Adverse weather routeing is not an issue.	This is noted and acknowledged in the analysis of adverse weather routeing (see Section 12 of **Appendix 25A: Navigational Risk Assessment**).
		Installation activities associated with the export cables will likely impact routeing to / from Pembroke.	Reduced access to local ports and harbours has been considered in the assessment of environmental effects (see **Section 25.8**).
		There are increased concerns around shifting traffic in the cumulative scenario.	Cumulative effects including in relation to commercial routeing have been considered (see **Section 25.11**).
Stena Line	Regular Operator consultation 16 June 2023	Other proposed projects either directly adjacent or transboundary may have a cumulative impact on operations and these should be evaluated collectively in the NRA.	Cumulative effects including in relation to commercial routeing have been considered (see **Section 25.11**).

25.4 Approach to Assessment

25.4.7. Assessment Methodology

16. **Chapter 05 EIA Approach and Methodology** provides a summary of the general impact assessment methodology applied in this ES. The following sections provide further detail on the specific methodology used to assess the potential impacts on Shipping and Navigation.

17. The approach to the assessment of cumulative impacts, transboundary impacts and interrelated effects is provided in Sections 25.11, 25.13 and 25.12, respectively.

18. The IMO FSA methodology (2018) is the internationally recognised approach for assessing impacts on shipping and navigation receptors, and is the approach required under MGN 654. This systematic methodology applies risk analysis to reduce impacts to ALARP and requires consideration of each impact in terms of severity of consequence and frequency of occurrence which are then used to determine impact significance. The definitions for 'severity of consequence' and 'frequency of occurrence' are provided in **Table 25-5** and **Table 25-6**.

19. Inputs used to inform the assessment include:

- Existing baseline – providing insight into the existing environment including relevant navigational features, vessel traffic movements, and maritime incidents, thus allowing Shipping and Navigation receptors to be suitably identified;
- Future baseline – consideration of future changes to the baseline in the absence of the proposed Project with particular focus on increases in vessel movements based on current trends and future developments;
- Outputs of collision and allision risk modelling – quantification of the likelihood of key Shipping and Navigation hazards arising without and with the presence of the proposed Project;
- Level of stakeholder concern including outputs of the Hazard Workshop – feedback received from Shipping and Navigation stakeholders including local parties highlighting key issues which should be addressed;
- Time and / or distance of any deviation – qualification of disruption to routeing by commercial vessels;
- Number of transits of specific vessels and / or vessel types – analysis of relevant Shipping and Navigation receptors;
- Lessons learnt from existing offshore developments – learnings from historical incidents relating to offshore wind farms; and
- Expert opinion – marine experience of Anatec Ltd as a Shipping and Navigation specialist.

25.4.8. Significance Criteria

Severity of Consequence

20. The criteria for defining severity of consequence for the purpose of the assessment on Shipping and Navigation are provided in **Table 25-4**.

Table 25-5.A Summary of the severity of consequence criteria that are associated to specific impacts

Severity of Consequence Criteria	Definitions
Major	More than one fatality, total loss of property, tier 3 national assistance required and international reputational effects.
Serious	Multiple serious injuries or single fatality, damage resulting in critical impact on operations, tier 2 regional assistance required, and national reputational effects.

Severity of Consequence Criteria	Definitions
Moderate	Multiple minor or single serious injury, damage no critical to operations, tier 2 limited external assistance required, and local reputational effects.
Minor	Slight injury to people, minor damage to property, tier 1 local assistance required, and minor reputational effects limited to receptors.
Negligible	No perceptible impact on people, property, environment. And business.

Frequency of Occurrence

21. The criteria for defining frequency of occurrence for the purpose of the assessment on Shipping and Navigation are provided in **Table 25-5**.

Table 25-6.A Summary of the frequency of occurrence criteria that are associated to specific impacts

Frequency of Occurrence Criteria	Definitions
Frequent	Yearly.
Reasonably Probable	One occurrence per 1 to 10 years.
Remote	One occurrence per 10 to 100 years.
Extremely Unlikely	One occurrence per 100 to 10,000 years.
Negligible	Less than one occurrence per 10,000 years.

Significance of Effect

22. As set out in **Chapter 05 EIA Approach and Methodology**, an Impact Assessment Matrix (IAM) is used to determine the significance of effect which is a function of the sensitivity of the receptor and the magnitude of the impact. For Shipping and Navigation, given the application of the FSA methodology, an alternative IAM to that appearing in other topic chapters is applied to determine the significance of effect as a function of the severity of consequence and frequency of occurrence associated with the impact, as shown in **Table 25-6**.

Table 25-7.Significance matrix

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

23. The matrix provides levels of effect significance of unacceptable, tolerable with mitigation and broadly acceptable. Assignment of significance is carried out with consideration of embedded mitigation measures. Embedded mitigation measures (including project design measures and best practice) are presented within **Section 25.7**. Details on additional mitigation measures and associated definitions can be found in **Section 25.9**.

24. For the purposes of this assessment, Unacceptable levels of significance are defined as significant (in EIA terms), and will require additional mitigation measures, whilst Tolerable with Mitigation or Broadly Acceptable impacts are defined as not significant (in EIA terms).

25. Differences in terminology between this chapter (which uses EIA terminology where possible to ensure consistency in the EIA process) and **Appendix 25A: Navigational Risk Assessment** (which uses FSA terminology) are summarised in **Table 25-8**.

Table 25-8.Summary of differences in terminology between EIA and NRA

EIA Term	NRA Term	Definitions
Impact	Hazard	A potential threat to human life, health, property, or the environment.
Effect	Risk	The combination of frequency of occurrence and severity of consequence of an impact.
Receptor	User	Sufferer of effect.

EIA Term	NRA Term	Definitions
Embedded mitigation measure / designed-in measure	Embedded mitigation measure	A commitment made by the Applicant to reduce and / or eliminate the potential for significant effects, and which is incorporated in the design of the proposed Project.

25.4.9. Study Area

26. The study areas for the assessment of Shipping and Navigation have been defined on the basis of the need to provide local context to the analysis of significance of effect by capturing the relevant routes, vessel traffic movements and historical incident data within and in proximity to the proposed Project.

27. A minimum 10 nm buffer has been applied around the boundary of the Array Area, hereafter termed the 'Study Area'; this is an industry-standard radius that has been used in the majority of UK offshore wind farm (OWF) NRAs. A 2 nm buffer has also been applied around the boundary of the OfECC, hereafter the 'OfECC Study Area', an industry standard radius for UK OWF NRAs. These study areas are presented in **Figure 25-1** and have been agreed during consultation with key stakeholders.

28. It is acknowledged that the Shipping and Navigation Array Area differs from the Array Area assessed across the ES, in that it represents a worst case scenario (i.e. a larger Array Area) established prior to further refinement and reduction of the Array Area. Further information is provided in Section 3.4 of **Appendix 25A: Navigational Risk Assessment.**

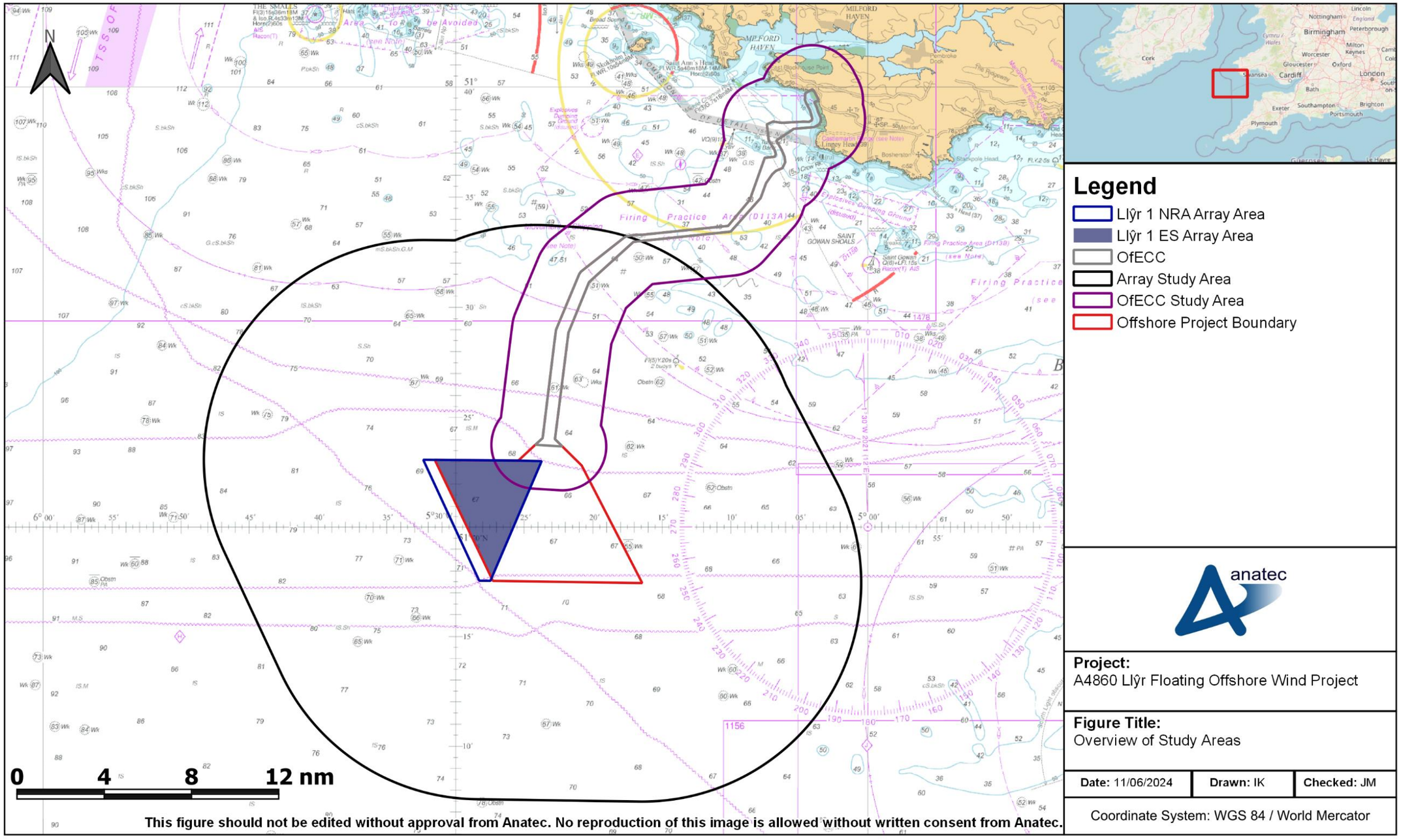


Figure 25-1. Overview of shipping and navigation study areas

25.4.10. Data Sources

Site Specific Surveys

29. To provide site specific information on which to base the impact assessment for Shipping and Navigation, site specific surveys were conducted. These consisted of two 14-day AIS, Radar, and visual observation surveys undertaken in winter 2022 (05 to 19 March 2022) and summer 2023 (09 to 25 July 2023), providing a total of 28 full days.

30. Although the winter vessel traffic data was collected in March 2022 and so is outdated in relation to MGN 654 requirements, it was agreed by the MCA and Trinity House in June 2024 that in this instance this data is acceptable for use as a primary source with no further data collection required. The basis for this exemption from the MGN 654 requirements was:

- A total of 42 days of dedicated vessel traffic survey data has been collected (exceeding the minimum 28-day requirement);
- Other sources including long-term vessel traffic data (see the NRA) and consultation feedback (see **Section 25.3**) have ensured that understanding of the baseline is comprehensive;
- Non-AIS presence in winter is very limited based on the winter 2022 survey; and
- There are no developments since winter 2022 which would be expected to affect the baseline already established.

31. Full details of the surveys undertaken are presented within Section 5 of **Appendix 25A: Navigational Risk Assessment**.

32. A further 14-day site specific survey was also undertaken in summer 2022 (12 to 26 August 2021), however, due to the time elapsed between the survey being undertaken and the submission of this ES, this dataset is not MGN 654 compliant. Nevertheless, it has been used to validate the vessel traffic movements identified in the March and July (2023) site specific surveys.

33. Several vessel tracks recorded during the site specific surveys were classified as temporary (non-routine) and were therefore excluded from the analysis to ensure the baseline is reflective of standard vessel traffic movements. This included the survey vessel itself, other survey vessels observed, including a vessel surveying the proposed White Cross OWF, as well as a guard vessel.

Desk Study

34. A comprehensive desk-based review was undertaken to inform the baseline for Shipping and Navigation. Key data sources used to inform the assessment are set out in **Table 25-9**.

Table 25-9. Summary of key desktop sources

Title	Source	Year	Brief description	Author
Winter vessel traffic survey data for OfECC Study Area	Onshore receivers and dedicated survey vessel	2022	AIS data for winter 2022 (14 days, 07 to 20 March 2022) recorded from onshore receivers and the dedicated survey vessel for the Array Area.	Anatec

Title	Source	Year	Brief description	Author
Summer vessel traffic survey data for OfECC Study Area	Onshore receivers and dedicated survey vessels	2022	AIS data for summer 2022 (14 days, 12 to 25 July 2023) recorded from onshore receivers and the dedicated survey vessel for the Array Area.	Anatec
Long-term vessel traffic data for Array Area	Onshore receivers	2022	AIS data for 2022 (12 months) recorded from onshore receivers and considered by MHPA to provide good insight into current volumes.	Anatec
ShipRoutes database	Various vessel traffic data	2023	Anatec's in-house database of main commercial routes identified and updated based on vessel traffic data analysed throughout the North Sea.	Anatec
Marine Accident Investigation Branch (MAIB) marine accidents database	MAIB	2002 to 2021	Database of marine incidents reported to the MAIB involving UK vessels worldwide and other vessels in UK territorial waters, period of over 10 years considered in line with request from the UK Chamber of Shipping.	MAIB
Royal National Lifeboat Institution (RNLI) incident data	RNLI	2012 to 2021	Database of RNLI responses to incidents with hoaxes and false alarms excluded.	RNLI
UK civilian SAR helicopter taskings	DfT	2015 to 2022	Database of civilian SAR helicopter operations in the UK.	DfT
UK Coastal Atlas of Recreational Boating 2.1 (RYA, 2019)	RYA	2019	Dataset to help identify and protect areas of importance to recreational boaters, to advise on new development proposals, and in discussions over navigational safety.	RYA

Title	Source	Year	Brief description	Author
United Kingdom Hydrographic Office (UKHO) Admiralty charts (UKHO, 2022)	UKHO	2023	Provides coverage of the world's commercial shipping routes and ports, including information pertaining to navigational features and tidal streams.	UKHO
Admiralty Sailing Directions West Coasts of England and Wales Pilot NP37 (UKHO, 2022)	UKHO	2022	Provides essential information to support port entry and coastal navigation for all classes of vessel at sea.	UKHO
Metocean Criteria – Llŷr 1 & Llŷr 2 Offshore Floating Wind Turbines (Aktis Hydraulics, 2023)	Aktis Hydraulics	2023	Hindcasting and analysis of metocean data including wind direction and significant wave height.	Aktis Hydraulics
Case studies of past weather events (Met Office, 2022)	Met Office	2022	Case studies of past weather events in the UK which have been used when investigating adverse weather traffic movements in the long-term vessel traffic data.	Met Office

25.5 Baseline

35. The following sections describe the baseline environment relating to Shipping and Navigation.

25.5.11. Existing Baseline

Navigational Features

36. A plot of the navigational features within and in proximity to the proposed Project is presented in **Figure 25-2**.

37. There are three Traffic Separation Schemes (TSSs) in the vicinity of the proposed Project, namely:

- TSS Off Smalls, located approximately 21 nm to the northwest of the Array Area;
- TSS Off Land's End, located approximately 60 nm to the southwest of the Array Area; and
- TSS West of Scilly Isles, located approximately 87 nm to the southwest of the Array Area.

38. The main location for port facilities is within the Milford Haven Waterway, a natural harbour whose entrance is located approximately 21 nm to the northeast of the Array Area. There is a pilot boarding station in front of this entrance, located approximately 15 nm to the north of the Array Area and 3.0 nm to the north of the OfECC. The Port of Milford Haven is described by the Admiralty Sailing Directions as a "large sheltered deep-water inlet" and caters primarily for oil and LNG tankers.

39. There are five operational subsea telecommunications cables within 10 nm of the Array Area, whilst the Green Link Interconnector is at the pre-construction phase.

40. There is a single charted aid to navigation located within 10 nm of the Array Area, a pair of flashing yellow buoys approximately 8 nm to the northeast. There are none within the OfECC. As described in the Admiralty Sailing Directions, the approaches to Milford Haven include a "VTS with Information and Traffic Organisation Services and full Radar surveillance" which is maintained for the control of shipping. This is mandatory for all vessels over 20 m.

41. There is one anchorage area in the vicinity of the Array Area – the anchorage off the east coast of Lundy Island, approximately 31 nm southeast of the Array Area. An Area to be Avoided (ATBA) is located approximately 18 nm to the north of the Array Area.

42. Further details of navigational features are provided in Section 7 of **Appendix 25A: Navigational Risk Assessment**, including in relation to explosives dumping grounds, charted wrecks, and military Practice and Exercise Areas (PEXA).

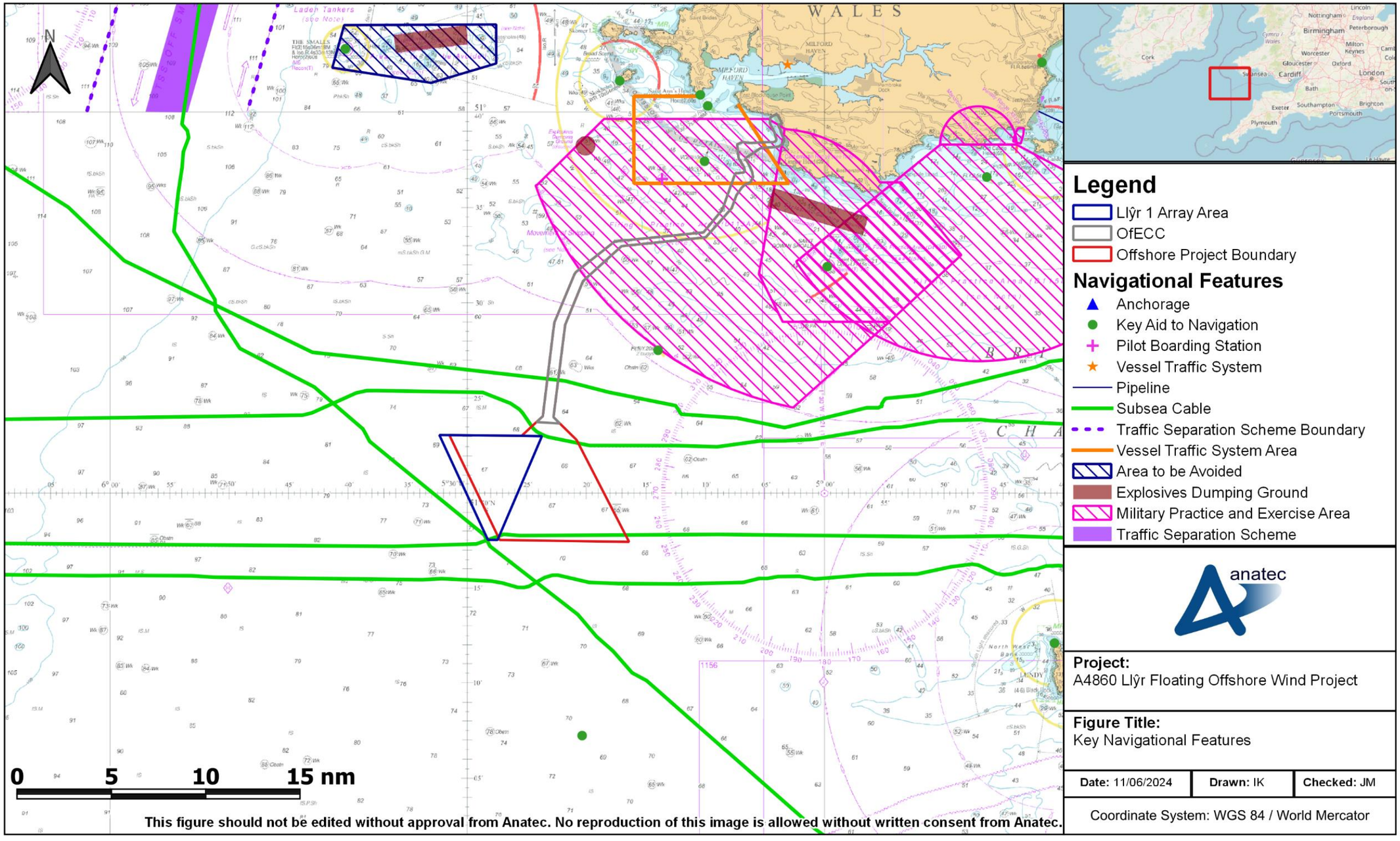


Figure 25-2. Overview of navigational features

Vessel Traffic Movements – Array Area

43. A plot of the vessel traffic recorded within the Study Area via AIS, Radar, and visual observations over 28 full days in winter 2022 and summer 2023 is presented in **Figure 25-3**, colour-coded by vessel type.

44. For the 14 days analysed during the winter survey period, there was an average of 10 unique vessels recorded per day within the Study Area and three unique vessels per day within the Array Area itself. Throughout the winter survey period, the most common vessel types within the Study Area were tankers (66%) and cargo vessels (26%).

45. For the 14 days analysed during the summer survey period, there was an average of 19 unique vessels recorded per day within the Study Area and two unique vessels per day within the Array Area itself. Throughout the summer survey period, the most common vessel types within the Study Area were fishing vessels (30%), tankers (28%), and recreational vessels (27%).

46. Tankers were mainly observed either waiting for orders or transiting to / from Milford Haven. For routeing tankers, a separation by course was identified, with tankers routeing northbound tending to transit slightly further east than their counterparts routeing southbound. LNG tankers were more frequently recorded in the winter survey period, in line with feedback from MHPA during consultation (see **Section 25.3.6**).

47. Main commercial routes have been identified using the principles set out in MGN 654 (MCA, 2021). Further details of the process for identifying main commercial routes is provided in Section 11 of **Appendix 25A: Navigational Risk Assessment**. A total of 14 main commercial routes were identified within the Study Area. A plot of the routes is presented in **Figure 25-4** and a description of each route is provided in **Table 25-10**.

Table 25-10. Main commercial route descriptions

Route Number	Average Vessels per Week	Description
1	5	Milford Haven – Off Land's End Traffic Separation Scheme (TSS) (one-way). Mainly tankers.
2	3	Milford Haven – Mediterranean ports. Entirely tankers.
3	3	Off the Scilly Isles TSS – Milford Haven (one-way). Almost entirely tankers.
4	3	Off Land's End TSS – Milford Haven (one-way). Mainly tankers.
5	2-3	Newport – Rosslare. Mainly cargo vessels.
6	1-2	Milford Haven – Off the Scilly Isles TSS (one-way). Almost entirely tankers.
7	1-2	Newport – Rosslare. Mainly cargo vessels.
8	1	Milford Haven – US ports. Mainly tankers.
9	1	Swansea – Limerick. Mainly cargo vessels.
10	1	Swansea – Ringaskiddy. Mainly cargo vessels.
11	1	Bristol – Liverpool. Mainly cargo vessels.
12	1	Swansea – Cork. Mainly cargo vessels.
13	1	Avonmouth - Dutch ports. Mainly cargo vessels.
14	0-1	Milford Haven - US ports. All tankers.

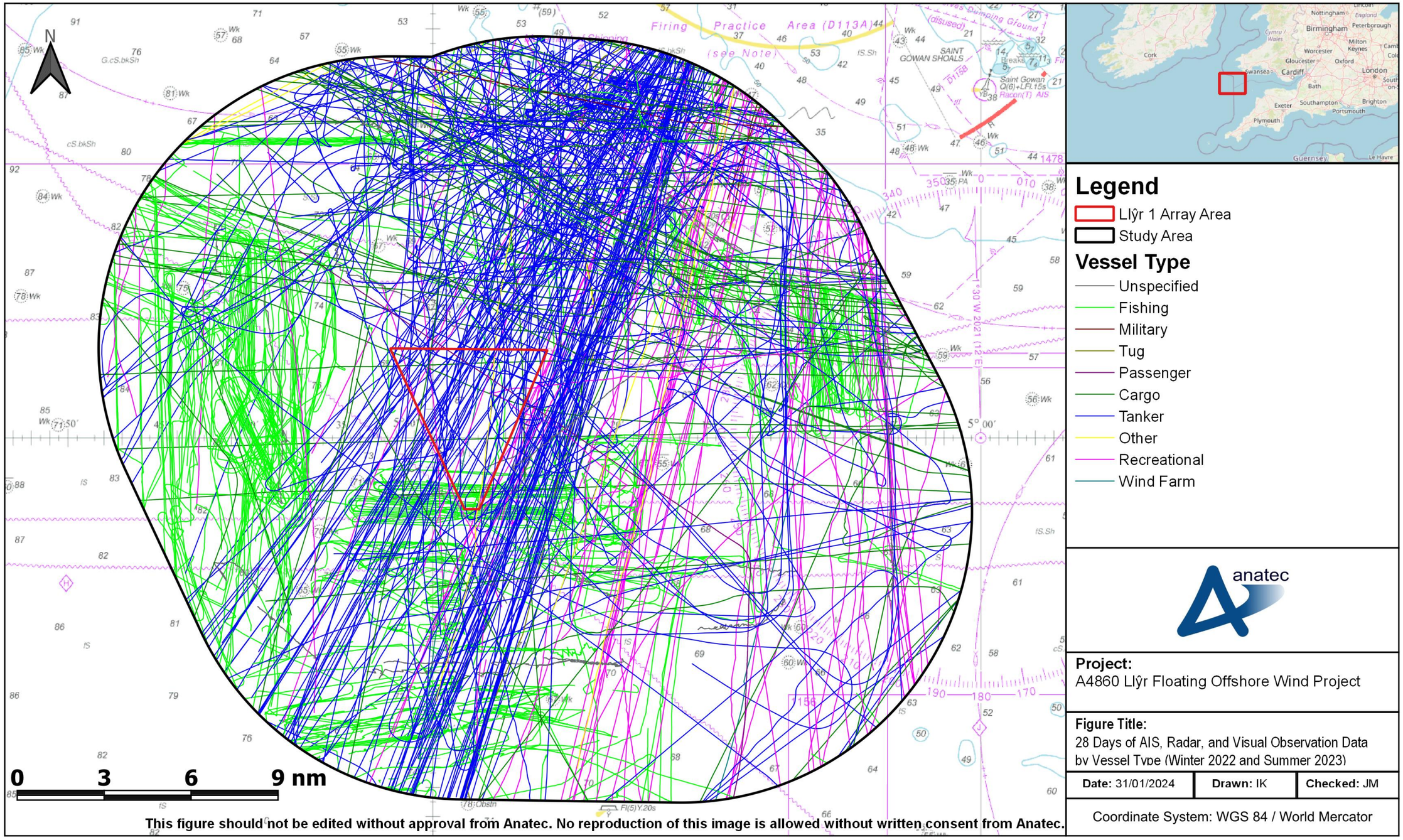


Figure 25-3. Array Area 28 days of AIS, Radar, and visual observations by vessel type (winter 2022 and summer 2023)

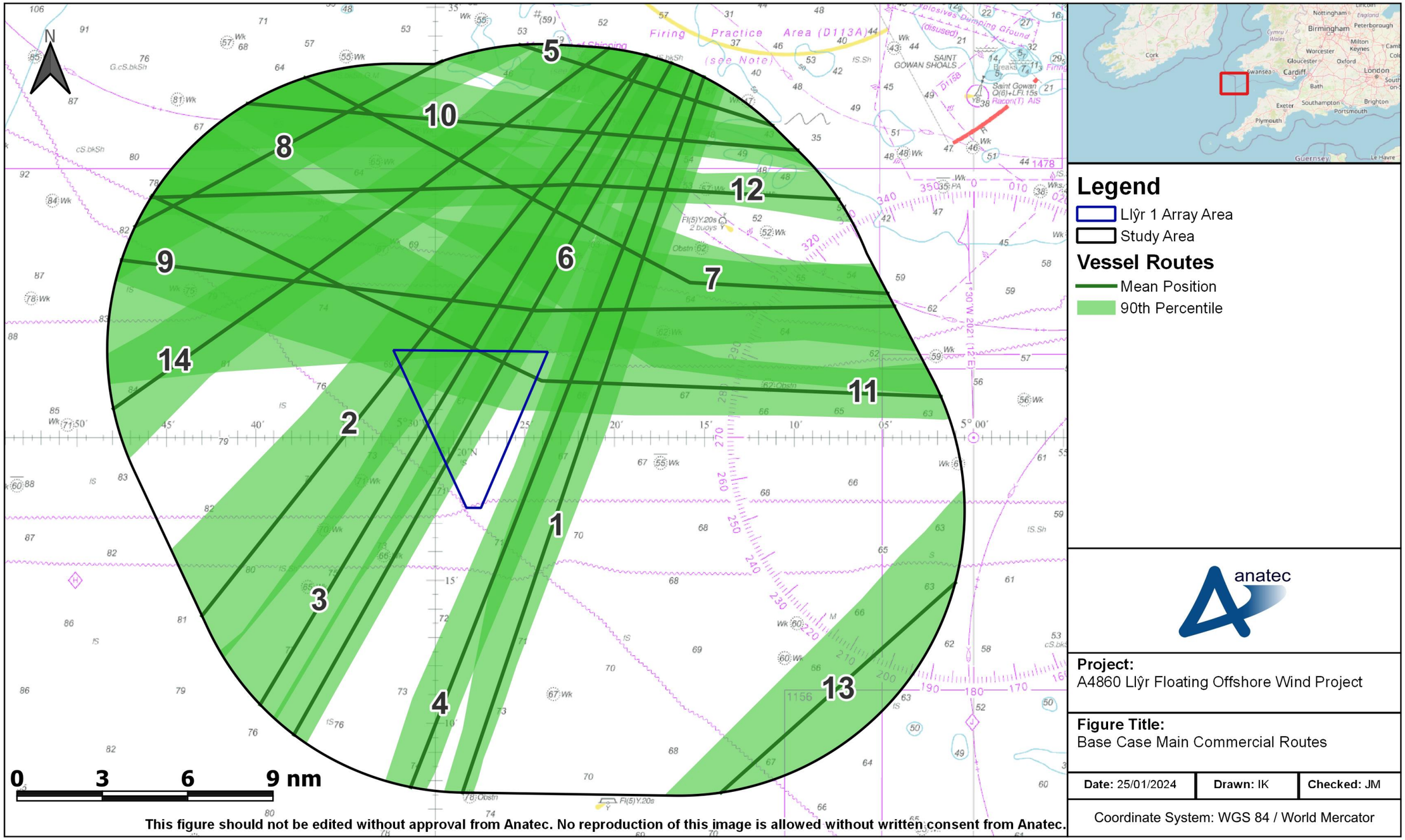


Figure 25-4. Base case main commercial routes

48. Active fishing was recorded at various locations within the Study Area, predominantly to the south, west, and northeast of the Array Area. Fishing vessel activity was highly seasonal, with 98% of fishing vessel tracks recorded during the summer survey period. Of those fishing vessels for which a gear type could be identified, all were beam trawlers other than one scallop dredger. Of those fishing vessels for which a nationality could be identified, 68% were Belgian flagged and the remaining 32% UK flagged.

49. Recreational vessels were mainly seen in north-south transits through the Study Area to the east of the Array Area, with the RYA confirming that such passages are largely between Milford Haven and either Padstow or the ITZ off Land's End. Again, recreational vessel activity was highly seasonal, with 95% of recreational vessel tracks recorded during the summer survey period.

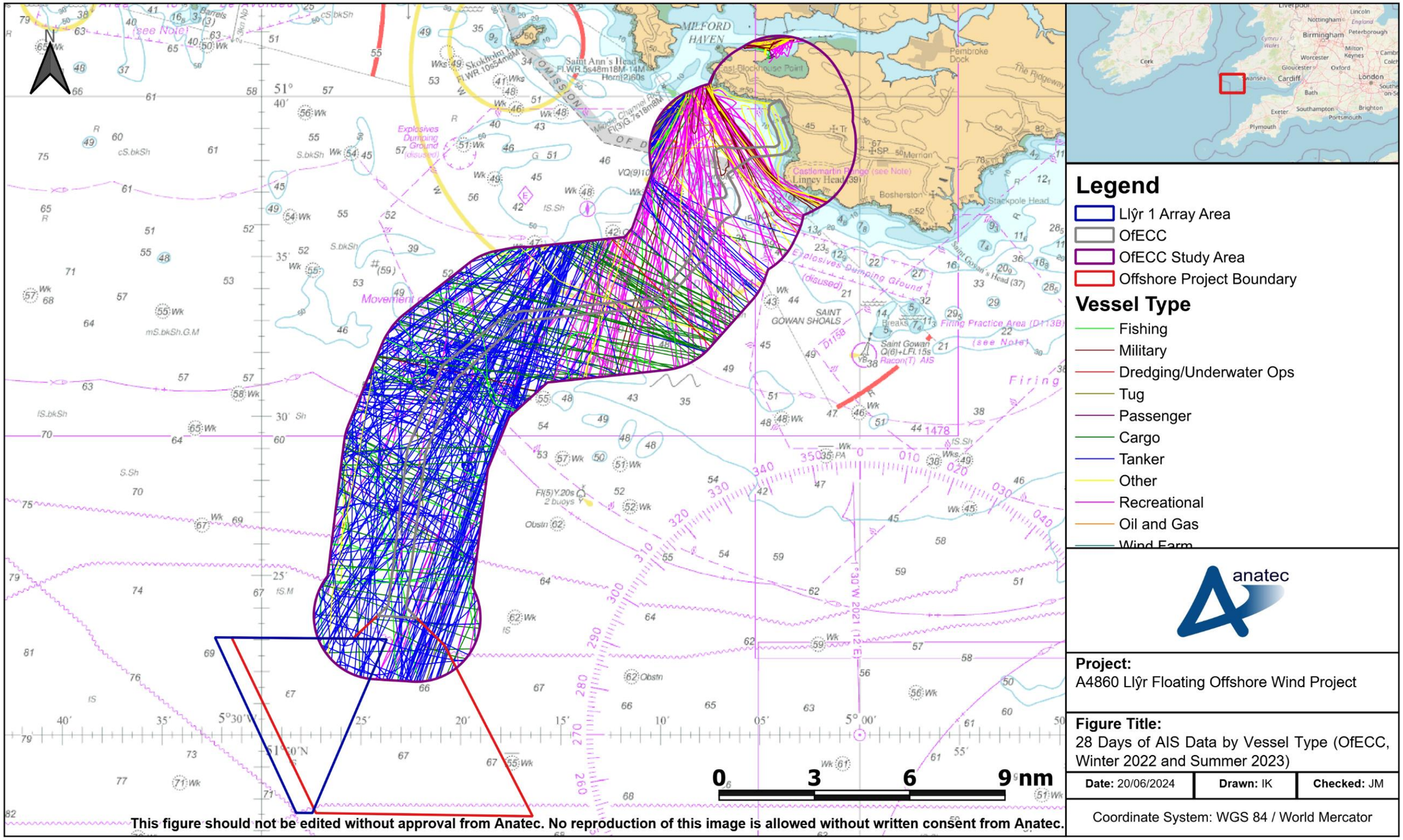
Vessel Traffic Movements – Offshore Export Cable Corridor

50. A plot of the vessel traffic recorded within the OfECC Study Area via AIS over 28 full days in winter 2022 and summer 2023 is presented in **Figure 25-5**, colour-coded by vessel type.

51. For the 14 days analysed during the winter survey period, there was an average of 27 unique vessels recorded per day within the OfECC Study Area and eight to nine unique vessels per day within the OfECC itself. Throughout the winter survey period, the most common vessel types within the Study Area were tankers (34%) and tugs (25%).

52. For the 14 days analysed during the summer survey period, there was an average of 39 unique vessels recorded per day within the OfECC Study Area and 13 unique vessels per day within the OfECC itself. Throughout the summer survey period, the most common vessel types within the Study Area were recreational vessels (36%) and tankers (23%).

53. Tankers were again mainly observed either waiting for orders or transiting to / from Milford Haven. Fishing vessel movements were limited, with the majority of transits in and out of Milford Haven passing north and west of the OfECC Study Area. Recreational vessel movements were a combination of north-south transits (crossing the OfECC) and nearshore transits (also crossing the OfECC).



Legend

- Llŷr 1 Array Area
- OfECC
- OfECC Study Area
- Offshore Project Boundary

Vessel Type

- Fishing
- Military
- Dredging/Underwater Ops
- Tug
- Passenger
- Cargo
- Tanker
- Other
- Recreational
- Oil and Gas
- Wind Farm

anatec

Project:
A4860 Llŷr Floating Offshore Wind Project

Figure Title:
28 Days of AIS Data by Vessel Type (OfECC, Winter 2022 and Summer 2023)

Date: 20/06/2024	**Drawn:** IK	**Checked:** JM

Coordinate System: WGS 84 / World Mercator

Figure 25-5. OfECC 28 days of AIS data by vessel type (winter 2022 and summer 2023)

Maritime Incidents

54. A plot of the locations of the incidents reported to the MAIB that occurred within the Study Area during the 10-year period between 2012 and 2021 is presented in **Figure 25-6**, colour-coded by incident type.

55. A total of nine incidents were recorded by the MAIB within the Study Area between 2012 and 2021, which corresponds to an average of one incident per year. No incidents occurred within the Array Area during the 10-year period.

56. Four of the nine incidents were an "accident to person" and two were "machinery failure". The most common casualty types were cargo vessel, fishing vessel, recreational craft and tanker, two of each being involved in an incident.

57. A total of 21 incidents were recorded by the MAIB within the OfECC Study Area between 2012 and 2021, which corresponds to an average of two incidents per year. No incidents occurred within the OfECC during the 10-year period.

58. The most common incident types were "machinery failure" (52%) and "accident to person" (14%). The most common casualty types were fishing (38%), cargo (24%) and tanker (14%).

59. A review of older MAIB incident data within the Study Area and OfECC Study Area between 2002 and 2011 indicates that the number has remained consistent within the Study Area over time with eight incidents recorded and has decreased in the OfECC Study Area with 2 unique incidents recorded in the 10-year period, corresponding to an average of two to three incidents per year.

60. Analysis of RNLI incident data and SAR helicopter taskings data is provided in Section 9 of **Appendix 25A: Navigational Risk Assessment**.

25.5.12. Future Baseline

Increases in Commercial Vessel Activity

61. There is uncertainty associated with long-term predictions of vessel traffic growth including the potential for any other new developments in UK or transboundary ports and the long-term effects of Brexit. This is particularly relevant in relation to Milford Haven given the influence of seasons and oil prices, with global markets having the potential to cause fluctuations in volumes of tanker movements.

62. However, MHPA acknowledged in the Hazard Workshop (August 2023) that plans are being considered to increase capacity in the next 10 to 15 years. This could be more than 30% although there is limited information that can be shared publicly at present. The UK Chamber of Shipping have also noted during a consultation meeting (February 2023) that vessel draughts could increase, although this would be constrained by the nature of any future development at Milford Haven (which has not been determined at this time).

63. Therefore, two independent scenarios of potential growth in commercial vessel movements of 10% and 20% have been estimated throughout the lifetime of the proposed Project, noting the lack of certainty over any greater increases.

Increases in Commercial Fishing Vessel and Recreational Vessel Activity

64. There is similar uncertainty associated with long-term predictions for commercial fishing vessel and recreational vessel transits given the limited reliable information on future trends upon which any firm assumption could be made.

65. This is epitomised by the effects of Brexit, with MHPA acknowledging in the Hazard Workshop (August 2023) that Belgian fishers are not currently landing at Milford Haven whereas prior to

Brexit there was 30 to 40 landings per month. Similarly, the RYA acknowledged that the effects of the COVID-19 pandemic reduced recreational vessel volumes, and these have not yet recovered fully (particularly in the case of non-UK yachts).

66. Therefore, two independent scenarios of potential growth in commercial fishing vessel and recreational vessel movements of 10% and 20% have been estimated throughout the lifetime of the proposed Project.

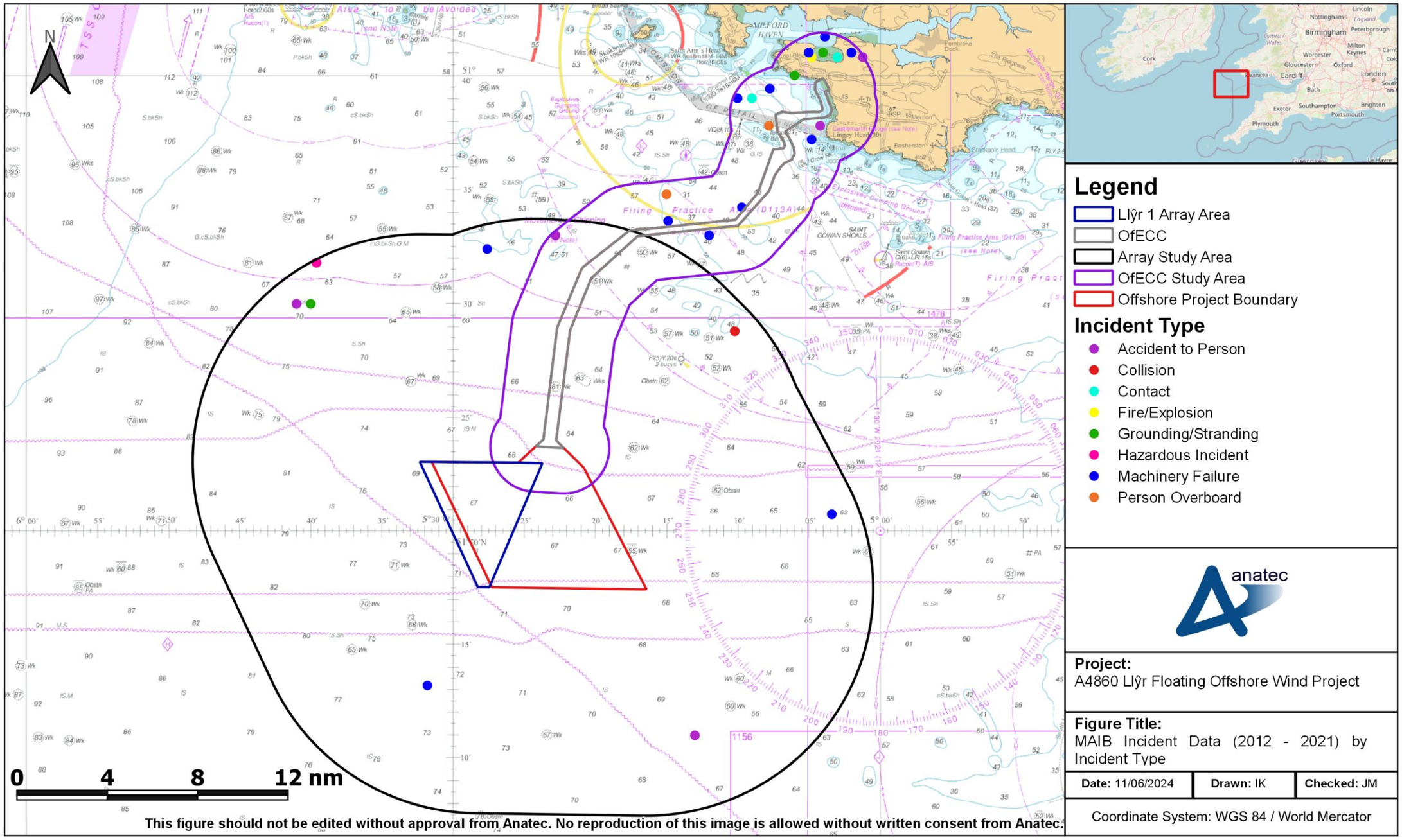


Figure 25-6. MAIB incident data (2012 to 2021) by incident type

Increases in Traffic Associated with Offshore Wind Farm Operations

67. During the operation and maintenance phase, up to 120 annual round trips to port would be made by vessels involved in the operation and maintenance of the proposed Project. However, other cumulative developments may also have associated activities, with the UK Chamber of shipping noting during the Hazard Workshop (August 2023) that this could indicatively result in 1,000 to 2,000 additional vessel movements per year.

68. Noting the low data confidence associated with a number of the other cumulative developments (see **Section 25.11**) and uncertainty over base ports which will be used, it is only possible to qualitatively consider future case vessel movements associated with OWF operations.

25.6 Scope of the Assessment

69. An EIA Scoping Report for the proposed Project was submitted to NRW Marine Licencing Team in April 2022. The Scoping Report was also shared with relevant consultees, inviting comment on the proposed approach adopted by the Applicant. A Scoping Opinion was provided to the Applicant by NRW Marine Licencing Team in July 2022. Based on the Scoping Opinion received, and further consultation undertaken, potential impacts on Shipping and Navigation scoped into the assessment are listed below in **Table 25-11**. Impacts scoped out of the assessment are listed in **Table 25-12**.

70. As set out in **Section 25.4.7**, this assessment considers the proposed Project design parameters which are predicted to result in the greatest environmental impact, known as the 'realistic worst case scenario'. The realistic worst case scenario represents, for any given receptor and potential impact on that receptor, various options in the Design Envelope[1] that would result in the greatest potential for change to the receptor in question. Given that the realistic worst case scenario is based on the design option (or combination of options) that represents the greatest potential for change, confidence can be held that the development of any alternative options within the design parameters will give rise to effects no greater or worse than those included in this impact assessment.

71. Accordingly, the design scenarios identified in **Table 25-11** have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group within the Shipping and Navigation study area. These scenarios have been selected from the details provided in **Chapter 04 Description of the Project**.

Table 25-11. Design scenario considered for the assessment

Potential impact	Design scenario	Justification
Construction		
Vessel displacement and increased third-party to third-party vessel collision risk.	Construction of up to two years. Full build out of the Array Area. Buoyed construction area encompassing the maximum extent of the Array Area. Presence of 500 m construction safety zones.	Largest possible extent of infrastructure, greatest number of simultaneous vessel activities and greatest duration resulting in the maximum spatial and temporal effect on vessel displacement and subsequent vessel to vessel collision risk.

[1] The Design Envelope approach is detailed in full in **Chapter 4: Project Description**.

Potential impact	Design scenario	Justification
	Two offshore export cables of combined 53 nm length. Up to 17 construction vessels on-site simultaneously.	
Third-party to project vessel collision risk.	Construction of up to two years. Full build out of the Array Area. Buoyed construction area encompassing the maximum extent of the Array Area. Presence of 500 m construction safety zones and 50 m pre commissioning safety zones. Two offshore export cables of combined 53 nm length. Up to 17 construction vessels on-site simultaneously.	Largest possible extent of infrastructure, greatest number of simultaneous vessel activities and greatest duration resulting in the maximum spatial and temporal effect on vessel to vessel collision risk involving a third-party vessel and a project vessel.
Reduced access to local port and harbours for third-party vessels.	Construction of up to two years. Full build out of the Array Area. Buoyed construction area encompassing the maximum extent of the Array Area. Presence of 500 m construction safety zones. Up to 17 construction vessels on-site simultaneously.	Largest possible extent, greatest number of vessel activities associated with the proposed Project and greatest duration resulting in the maximum spatial and temporal effect on access to local ports.
Operation and maintenance		
Vessel displacement and increased third-party to third-party vessel collision risk.	Maximum operational life of 30 years. Full build out of the Array Area. Presence of 500 m safety zones during major maintenance. Up to 12 operation and maintenance vessels on-site simultaneously and up to 120 annual round trips to port.	Largest possible extent of infrastructure, greatest number of simultaneous vessel activities and greatest duration resulting in the maximum spatial and temporal effect on vessel displacement and subsequent vessel to vessel collision risk.
Third-party to project vessel collision risk.	Maximum operational life of 30 years. Full build out of the Array Area.	Largest possible extent of infrastructure, greatest number of simultaneous vessel activities and greatest duration resulting in the maximum spatial and temporal effect on vessel to vessel collision risk

Potential impact	Design scenario	Justification
	Presence of 500 m safety zones during major maintenance. Up to 12 operation and maintenance vessels on-site simultaneously and up to 120 annual round trips to port.	involving a third-party vessel and a project vessel.
Reduced access to local port and harbours for third-party vessels.	Maximum operational life of 30 years. Full build out of the Array Area. Presence of 500 m safety zones during major maintenance. Up to 12 operation and maintenance vessels on-site simultaneously and up to 120 annual round trips to port.	Largest possible extent, greatest number of vessel activities associated with the proposed Project and greatest duration resulting in the maximum spatial and temporal effect on access to local ports.
Creation of vessel to structure allision risk for third-party vessels.	Maximum operational life of 30 years. Full build out of the Array Area. Presence of 500 m safety zones during major maintenance. Minimum spacing of 1,140 m between WTGs. Up to 10 WTGs on floating barge foundations with sea surface dimensions of 220 m diameter.	Largest possible extent of surface infrastructure, greatest number of surface structures and greatest duration resulting in the maximum spatial and temporal effect on vessel to structure allision risk.
Loss of station on third-party vessels.	Maximum operational life of 30 years. Full build out of the Array Area. Up to 10 WTGs on floating barge foundations with sea surface dimensions of 220 m diameter. 3 – 8 mooring lines per WTG.	Maximum number of WTGs with greatest surface dimensions.
Reduction in under keel clearance for third-party vessels due to mooring lines, buoyant inter-array cables, or cable protection.	Maximum operational life of 30 years. Up to 11 inter-array cables of combined 9.3 nm length Up to two offshore export cables of combined 53 nm length.	Largest possible extent of subsea infrastructure and greatest duration resulting in the maximum spatial and temporal effect on under keel clearance.

Potential impact	Design scenario	Justification
	Up to five crossings in total for each offshore export cable. Buoyant inter-array cables at depth of 25 - 55 m approximately 50 - 100 m from the WTGs. Tensioned, catenary spread, or catenary single point moorings. 3 – 8 mooring lines per WTG. Under keel clearance from above of 20 – 50 m. Touchdown at 150 m.	
Anchor interaction for third-party vessels with mooring lines or subsea cables.	Maximum operational life of 30 years. Up to 11 inter-array cables of combined 9.3 nm length. Up to two offshore export cables of combined 53 nm length. Indicative maximum proportion of inter-array cable protection requirement of 20% from the touchdown points. Indicative maximum proportion of export cable protection requirement of 27%. Up to five crossings in total for each offshore export cable. Tensioned, catenary spread, or catenary single point moorings. 3 – 8 mooring lines per WTG Touchdown at 150 m.	Largest possible extent of subsea infrastructure and greatest duration resulting in the maximum spatial and temporal effect on anchor interaction with subsea cables.
Reduction of emergency response capability including SAR.	Maximum operational life of 30 years. Full build out of the Array Area. Presence of 500 m safety zones during major maintenance. Up to 12 operation and maintenance vessels on-site	Largest possible extent, greatest number of surface structures, greatest number of simultaneous vessel activities and greatest duration resulting in the maximum spatial and temporal effect on emergency response capability.

Potential impact	Design scenario	Justification
	simultaneously and up to 120 annual round trips to port. Minimum spacing of 1,140 m between WTGs. Up to 10 WTGs on floating barge foundations with sea surface dimensions of 220 m diameter.	
Decommissioning		
Vessel displacement and increased third-party to third-party vessel collision risk.	Decommissioning of up to three years. Full build out of the Array Area. Buoyed decommissioning area encompassing the maximum extent of the Array Area. Two offshore export cables of combined 53 nm length Up to 17 decommissioning vessels on-site simultaneously.	Largest possible extent of infrastructure, greatest number of simultaneous vessel activities and greatest duration resulting in the maximum spatial and temporal effect on vessel displacement and subsequent vessel to vessel collision risk.
Third-party to project vessel collision risk.	Decommissioning of up to three years. Full build out of the Array Area. Buoyed decommissioning area encompassing the maximum extent of the Array Area. Two offshore export cables of combined 53 nm length Up to 17 decommissioning vessels on-site simultaneously.	Largest possible extent of infrastructure, greatest number of simultaneous vessel activities and greatest duration resulting in the maximum spatial and temporal effect on vessel to vessel collision risk involving a third-party vessel and a project vessel.
Reduced access to local port and harbours for third-party vessels.	Decommissioning of up to three years. Full build out of the Array Area. Buoyed decommissioning area encompassing the maximum extent of the Array Area. Up to 17 decommissioning vessels on-site simultaneously.	Largest possible extent, greatest number of vessel activities associated with the proposed Project and greatest duration resulting in the maximum spatial and temporal effect on access to local ports.

25.6.13. Impacts scoped out of assessment

72. A number of impacts have been scoped out of the assessment for Shipping and Navigation. These impacts are outlined, together with the justification for scoping them out, in **Table 25-12**. It is noted that fishing gear interaction with subsea infrastructure is assessed as part of **Chapter 26: Commercial Fisheries**.

Table 25-12. Potential impacts scoped out the assessment for Shipping and Navigation

Potential impact	Justification
Construction	
Creation of vessel to structure allision risk for third-party vessels.	Mitigation measures applicable during the construction phase (see **Section 25.7**), most notably the buoyed construction area, will ensure the likelihood of a third-party vessel alliding with a structure is negligible.
Reduction of emergency response capability including SAR.	Given the increased presence of project vessels on-site during the construction phase, a project vessel will be well placed to serve as the first responder should an emergency situation arise in line with SOLAS obligations (IMO, 1974).
Operation and maintenance	
Effects on navigation, communication, and position fixing equipment for third-party vessels.	A desktop review has been undertaken in Section 13 of **Appendix 25A: Navigational Risk Assessment** with consideration of very high frequency (VHF), VHF Direction Finding (VDF), AIS, navigational telex (NAVTEX), Global Positioning System (GPS), electromagnetic field (EMF), marine Radar, Sound Navigation and Ranging (SONAR), and noise, with all of elements considered Broadly Acceptable and therefore this impact is screened out of the assessment.
Decommissioning	
Creation of vessel to structure allision risk for third-party vessels.	Mitigation measures applicable during the decommissioning phase (see **Section 25.7**), most notably the buoyed decommissioning area, will ensure the likelihood of a third-party vessel alliding with a structure is negligible.
Reduction of emergency response capability including SAR.	Given the increased presence of project vessels on-site during the decommissioning phase, a project vessel will be well placed to serve as the first responder should an emergency situation arise in line with SOLAS obligations (IMO, 1974).

25.6.14. Assessment Assumptions and Limitations

AIS

73. The carriage of AIS is required on board all vessels of greater than 300 Gross Tonnage (GT) engaged on international voyages, cargo vessels of more than 500 GT not engaged on international voyages, passenger vessels irrespective of size built on or after 01 July 2002, and fishing vessels over 15 m in length.

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

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

Historical Incident Data

76. Although all UK commercial vessels are required to report accidents to the MAIB, non-UK vessels do not have to report unless they are in a UK port or within 12 nm 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.

77. 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. However, this does not affect the robustness of the assessment undertaken since such incidents would not affect emergency responder resources and by extension capability.

UKHO Admiralty Charts

78. 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. Additionally, not all navigational features may be charted, e.g., certain aids to navigation and wrecks.

79. However, during consultation, input has been sought from relevant stakeholders regarding the navigational features baseline. Navigational features are based upon the most recently available UKHO Admiralty Charts and Sailing Directions as of September 2023 and therefore any substantial changes since this time may not be reflected in the existing baseline.

25.7 Embedded Mitigation, Management Plans and Best Practice

80. As part of the project design process, several designed-in measures have been proposed to reduce the potential for impacts on Shipping and Navigation (see **Table 25-13**). The design of the proposed Project therefore includes embedded mitigation measures and reference to various management plans that will be produced as conditions of consent, and which will further mitigate potential impacts. This approach has been employed to demonstrate commitment to mitigation measures by including them in the design of the proposed Project and as such these measures have been considered within the assessment presented in **Section 25.8**. Assessment of sensitivity, magnitude and therefore significance includes the implementation of these measures.

Table 25-13. Mitigation measures, management plans and best practice adopted as part of the proposed Project

Embedded Mitigation Measures, Management Plans and Best Practice	Justification
Design Embedded Measures	
500 m safety zones will be applied for during construction, major maintenance, and decommissioning works. These will be centred on the Offshore Renewable Energy Installation (OREI) being worked on at the time. In addition, a 500 m safe passing distance will also be requested around the	The application of safety zones will assist in raising awareness of the proposed Project and protect project vessels undertaking construction, major maintenance, and decommissioning activities.

Embedded Mitigation Measures, Management Plans and Best Practice	Justification
Offshore Development vessels (e.g. during cable-laying).	
Cable burial risk assessment – Where possible, cable burial will be the preferred option for cable protection with the cable burial depth to be informed by a cable burial risk assessment and detailed within the Cable Specification Plan (target burial depth of 1.2m). Any damage, destruction or decay of cables must be notified to MCA, Trinity House, Kingfisher and UKHO no later than 24 hours after discovered.	Burial of cables to an agreed target depth will minimise the likelihood of a vessel experiencing an under keel interaction or anchor interaction with a cable.
Prior to construction, the final WTG positions and height will be provided to the United Kingdom Hydrographic Office (UKHO), Ministry of Defence (MoD), and Defence Geographic Centre (DGC) for aviation and nautical charting purposes. All structures of more than 91.4m in height will be charted on aeronautical charts and reported to the DGC for aviation and nautical charted on aeronautical charts and reported to the DGC, which maintains the UK's database of tall structures (Digital Vertical Obstruction File) at least 10 weeks prior to construction.	Appropriate marking and charting will assist in raising awareness of the proposed Project and aid mariners with passage planning in advance.
The Applicant will comply with MGN 654 and its annexes as per its consent conditions to ensure that impacts on navigational safety and emergency response are considered, assessed, and mitigated. This includes post-consent completion of an Emergency Response Cooperation Plan (ERCoP). The ERCoP will include a Search and Rescue (SAR) checklist based on requirements outlined within MGN654 Annex 5.	Compliance with MGN 654 will ensure impacts on navigational safety and emergency response are suitably assessed.
MGN 654 requires that the minimum air gap will be at least 22 m above mean high water springs noting that for floating foundations the value is calculated above Mean Sea Level (MSL) noting that consideration of motion is also required. This clearance is to ensure clearance for SAR activities and avoid allision with vessels - in particular yacht masts. The	Compliance with floating foundation guidance will ensure the final project design minimises floating device specific effects including loss of station.

Embedded Mitigation Measures, Management Plans and Best Practice	Justification
Project Design Envelope includes a minimum blade clearance of 22 m. An Emergency Response Cooperation Plan (ERCoP) will also be adhered to as outlined in the Outline CEMP, Volume 6, Appendix 4A, section 4.4.3.	
Decommissioning programme – A Decommissioning programme will be developed prior to decommissioning.	The development and agreement of a decommissioning programme will ensure that the process of decommissioning the proposed Project minimises shipping and navigation effects.
Fishing liaison – Ongoing liaison with fishing fleets will be maintained during construction, maintenance, and decommissioning operations via an appointed Fisheries Liaison Officer (FLO).	Appointment of a project FLO will assist in raising awareness of the proposed Project and associated operations with the fishing industry.
The appointment of guard vessels and Offshore Fisheries Liaison Officers (FLO) during construction, major maintenance works and decommissioning works, where required, ensures effective communication with the fishing community during the Offshore Development Area activities and reduces the potential for interactions with fishing activities. Where possible, guard vessels will be sourced locally.	The use of Guard Vessels will assist in raising awareness of the proposed Project and alerting a vessel on a closing point of approach to a project vessel.
Lighting and marking – Lights, marks, sounds, signals and other aids to navigation will be exhibited as required by Trinity House, MCA, and CAA including a buoyed construction area around the Array Area.	Appropriate lighting and marking of project infrastructure will assist in raising awareness of the proposed Project, including the buoyed construction area of which there will be no restrictions on entry.
Marine coordination for project vessels – Marine coordination will be implemented to manage project vessels throughout construction and maintenance periods.	Marine coordination of all project vessels minimise the likelihood of a project vessel instigating or being involved in an incident.
Minimum blade tip clearance – There will be a minimum blade tip clearance (air draft height) of at least 22 m above Mean Sea Level (MSL).	Commitment to a minimum blade tip clearance will reduce the likelihood of a blade allision incident for recreational vessels.
Pollution planning – A Marine Pollution Contingency Plan (MPCP) will be developed outlining procedures to protect personnel working and to safeguard the marine environment.	The development of a MPCP will minimise the likelihood of a significant consequences should a pollution incident occur.
Project vessel compliance with international marine regulations – Project vessels will ensure compliance with Flag State	Compliance with Flag State regulations by project vessels will minimise the likelihood of a project vessel instigating or being involved in an incident and

Embedded Mitigation Measures, Management Plans and Best Practice	Justification
regulations including the COLREGs and SOLAS.	through assistance reduce the likelihood of significant consequences should an incident occur.
Promulgation of information – The proposed Project will ensure that local Notifications to Mariners are updated and reissued at weekly intervals during construction activities and at least five days before any planned operation and maintenance works and supplemented with VHF radio broadcasts agreed with the MCA in accordance with the construction and monitoring programme approved under the relevant deemed Marine Licence (dML) condition.	Appropriate promulgation of information and notification to other sea users will assist in raising awareness of the proposed Project and associated operations.
Promulgation of information – Advance warning and accurate location details of construction, maintenance and decommissioning operations (including details of vessel routes, timings and locations), associated safety zones, and advisory passing distances will be given via Kingfisher Bulletins at least 14 days prior where possible.	Appropriate promulgation of information to other sea users will assist in raising awareness of the proposed Project and associated operations.
Traffic monitoring – Monitoring of vessel traffic will be undertaken for the duration of the construction phase and during the first three years of the operation and maintenance phase.	Monitoring of vessel traffic in and around the project Array Area and OfECC will allow the effectiveness of embedded mitigation measures to be suitably reviewed and any additional mitigation required to be identified.
Under keel clearance – Where scour protection is required, MGN 654 will be adhered to with respect to changes greater than 5% to the charted depths referenced to CD in consultation with the MCA and Trinity House.	Adherence to MGN 654 in relation to under keel clearance will minimise the likelihood of a vessel experiencing an under keel interaction with a cable.
Management Plans	
Outline Project (Array) Layout Plan – An Outline Project (Array) Layout Plan (including subsea cables) for the proposed Project will be agreed with the MMO following appropriate consultation with Trinity House and the MCA setting out proposed details of the offshore development areas.	The development of an agreed Outline Project (Array) Layout Plan will ensure the final array layout is compliant with MGN 654.
Pollution planning – A Marine Pollution Contingency Plan (MPCP) will be developed outlining procedures to protect personnel	The development of a MPCP will minimise the likelihood of a significant consequences should a pollution incident occur.

Embedded Mitigation Measures, Management Plans and Best Practice	Justification
working and to safeguard the marine environment.	

25.8 Assessment of Environmental Effects

81. The impacts and effects (both beneficial and adverse) associated with the construction, operation and maintenance and decommissioning of the proposed Project are outlined in the sections below. The assessments consider the embedded mitigation measures and management plans described in **Section 25.7**.

25.8.15. Construction Effects

Vessel Displacement

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

Commercial Vessels Routeing

83. The volume of vessel traffic passing within or in proximity to the Array Area has been established using vessel traffic data collected during dedicated surveys (28 days over winter 2022 and summer 2023) and from coastal receivers (12 months, 2022) as well as Anatec's ShipRoutes database. These datasets were interrogated to identify main routes using the principles set out in MGN 654 (MCA, 2021) (see **Section 25.5.11**).

84. Although there will be no restrictions on entry into the buoyed construction area, other than through active safety zones, based on experience at previously under construction OWFs and consultation, it is anticipated that the majority of commercial vessels will choose not to navigate internally within the buoyed construction area and therefore some main route deviations will be required.

85. The full methodology for main route deviations is provided in Section 15.4 of **Appendix 25A: Navigational Risk Assessment**, with deviations established in line with MGN 654 (MCA, 2021). A deviation will be required for four of the 14 main commercial routes identified. For tanker routeing to / from Milford Haven, the size of the deviations will depend on whether such routes pass east or west of the Array Area.

86. For the option of passing west of the Array Area, the largest deviation is anticipated to be 1.78 nm, associated with Route 6 (northbound to Milford Haven and used by an average of two to three vessels per week). This increase equates to a 1.48% increase in route length for the portion of the route from the TSS West of the Scilly Isles. An illustration of the anticipated worst-case shift in the mean positions of main commercial routes is presented in **Figure 25-7**.

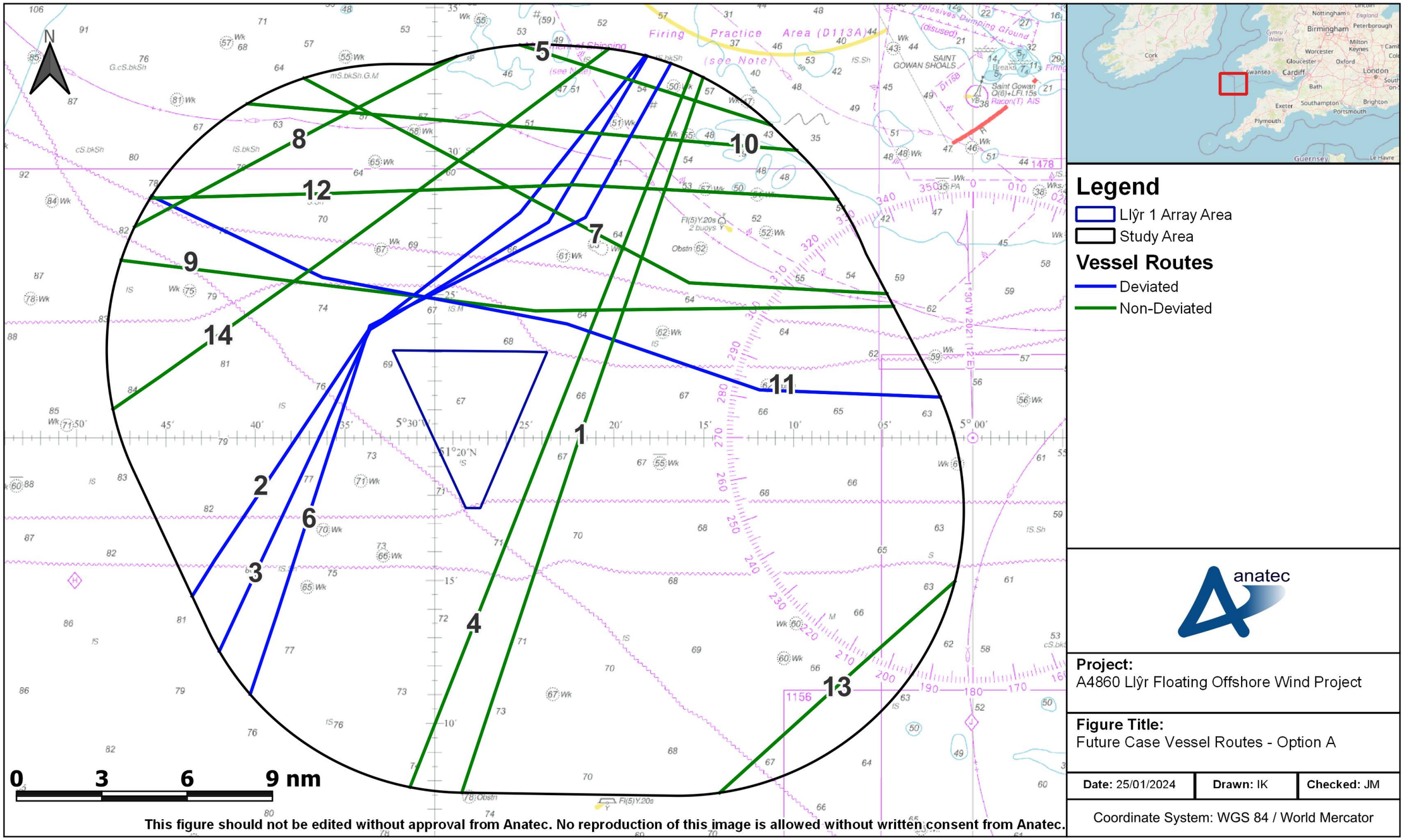


Figure 25-7. Future case vessel routes – option A

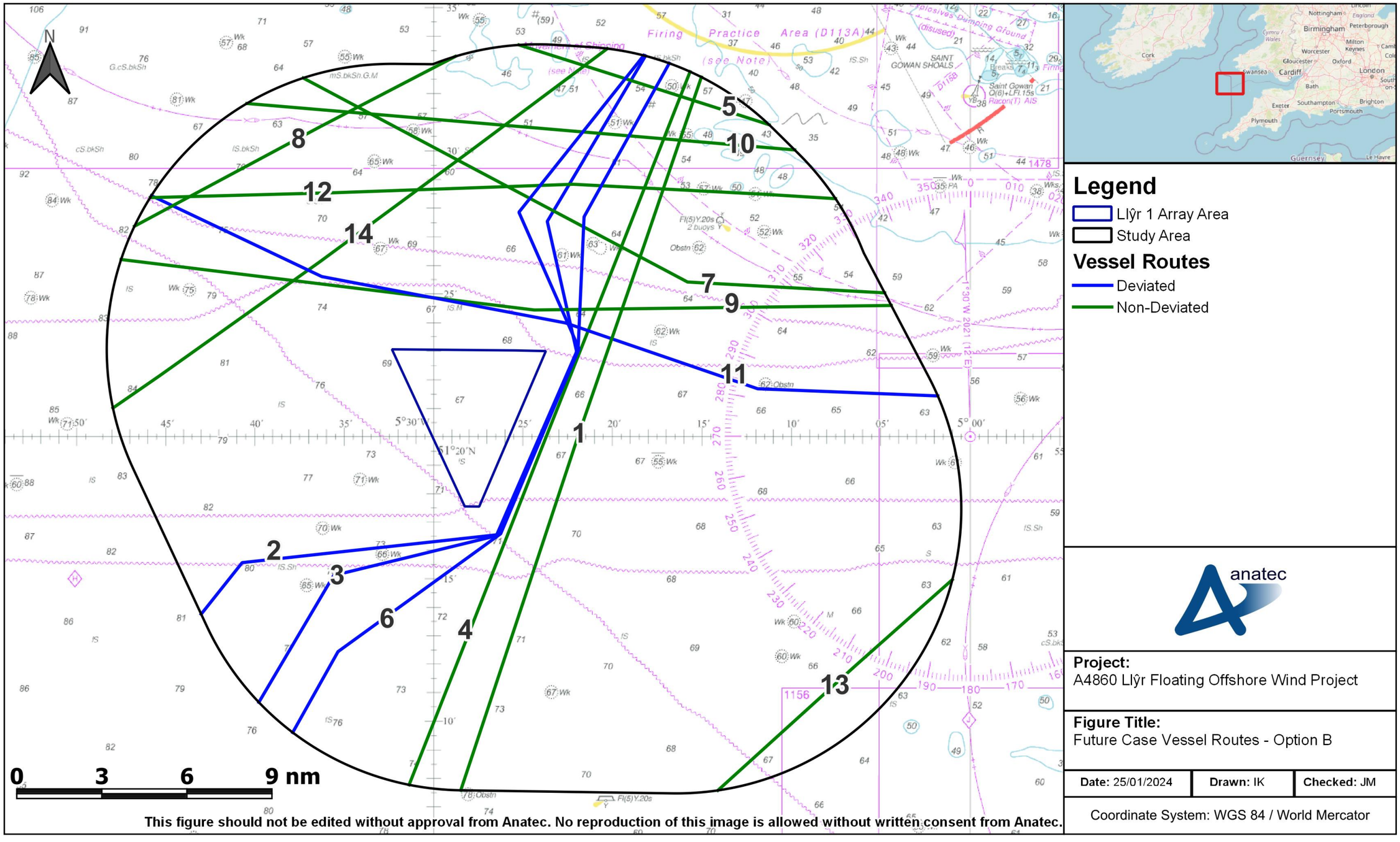


Figure 25-8. Future case vessel routes – option B

87. For the option of passing east of the Array Area, the largest deviation is anticipated to be 5.74 nm, associated with Route 2 (between Milford Haven and Mediterranean ports and used by an average of three vessels per week). This increase equates to a 0.46% increase in total route length. An illustration of the anticipated worst-case shift in the mean positions of main commercial routes is presented in **Figure 25-8**.

88. Vessel displacement was not raised as a key concern during the Hazard Workshop. However, as described by Trinity House, the nature of the Milford Haven Waterway results in tidal restrictions for large vessels, with disruptions to scheduled passage possible. Given the size of the anticipated deviations, particularly when considered relative to the length of routes, it is not expected that the presence of the proposed Project will prevent vessels from making current tidal windows. Furthermore, MHPA noted that the potential for two distinct tanker routeing options (east and west of the Array Area) may deconflict tidal constraints. It is also recognised that there is no regular routeing involving RoRo or RoPax vessels in the area, which would be particularly sensitive to any disruption to schedules, including in relation to tides.

89. Given the location of the OfECC, it is considered likely that cable installation will lead to displacement, and this was raised as a concern for Irish Ferries-operated routes to / from Pembroke. However, installation activities will be short-term (100 days) and temporary in nature and cover only a small extent. Therefore, deviations will be manageable. Moreover, MHPA have indicated that installation activities associated with the OfECC could be managed through the Milford Haven VTS, further limiting potential disruption.

Commercial Vessels Awaiting Orders

90. Commercial vessels, and in particular tankers, are noted as awaiting orders prior to entering Milford Haven. Most of this activity occurs between 5 and 10 nm north of the Array Area and is therefore not expected to be materially impacted by construction activities. Where there is currently interaction, there is suitable sea room[2] (and water depths) for this to be displaced, noting that the entrance to the Milford Haven Waterway is some 20 nm northeast of the Array Area.

Fishing Vessels and Recreational Vessels

91. Based on experience at previously under construction OWFs, it is anticipated that fishing vessels and recreational vessels will also choose not to routinely navigate internally within the buoyed construction area. There is limited transit activity featuring fishing vessels in proximity to the Array Area (noting that displacement of active commercial fishing is assessed separately in **Chapter 26: Commercial Fisheries**). For recreational vessels, the majority of transit activity occurs east of the Array Area between Milford Haven and Padstow or the ITZ off Land's End. Therefore, displacement will be limited and there is sufficient sea room east of the Array Area to accommodate any affected recreational vessels.

92. In the case of installation activities associated with the OfECC, fishing vessels transits in / out of Milford Haven in the majority occur clear of the OfECC, and so limited displacement is anticipated. For recreational vessels, there are frequent crossings of the OfECC in the summer, and therefore some potential for displacement around installation activities. However, there is sufficient sea room available for this (east and west) and so disruption will be limited.

[2] In the context of this assessment sufficient sea room refers to where there is adequate space available for navigation to safely continue, i.e., mariners can maintain a safe distance from any navigational hazards such as other offshore installations and shallow waters.

Consequences

93. The main consequence of vessel displacement associated with the Array Area and OfECC will be increased journey times and distances for affected third-party vessels. The extent of these consequences is expected to be limited, noting that the promulgation of information relating to the proposed Project and marking on relevant nautical charts will allow suitable passage planning and the presence of the buoyed construction area and guard vessels will assist with guiding vessels around the Array Area. No notable effects on navigational safety are anticipated.

Embedded Mitigation Measures and Management Plans

94. Embedded mitigation measures and management plans identified as relevant to reducing the significance of effect are as follows:

- Buoyed construction area;
- Charting of infrastructure;
- Guard vessel(s);
- Promulgation of information; and
- Traffic monitoring.

Frequency of Occurrence

95. The frequency of occurrence is therefore considered to be **frequent**.

Severity of Consequence

96. The severity of consequence is therefore considered to be **negligible**.

Significance of the effect

97. The frequency of occurrence of vessel displacement is **frequent** and the severity of consequence is assessed as **negligible**. Therefore, the effect will, be of **Tolerable with Mitigation** significance, which is not significant in EIA terms.

Increased Third-Party to Third-Party Vessel Collision Risk

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

Commercial Vessels

99. It is anticipated that four of the 14 main commercial routes identified will deviate because of the construction of the proposed Project. This may lead to increased vessel densities within the area, which could in turn lead to an increase in vessel to vessel encounters and therefore increased collision risk. This was a key discussion point in the Hazard Workshop.

100. Based on the pre OWF modelling, the baseline collision risk levels within the Study Area are low, with an estimated vessel to vessel collision frequency of one every 2,030 years. The low level of collision risk is due to the volume of traffic in the area relative to the available sea space.

101. For the option of passing west of the Array Area, the collision frequency was estimated at one in 1,392 years, representing a 46% increase on the pre OWF scenario. Although this is a high increase, the likelihood of a collision incident remains low, and this is also reflected when considering future case traffic levels.

102. For the option of passing east of the Array Area, the collision frequency was estimated at one in 1,101 years, representing an 84% increase on the pre OWF scenario. Again, this is a high increase but with the likelihood of a collision incident remaining low.

103. For both options, there is a potential for the creation of hotspots where traffic to / from Milford Haven crosses east-west traffic in / out of the Bristol Channel, as noted by the UK Chamber of Shipping. However, the collision risk modelling indicates such hotspots would be minimal due to the relatively low volumes of traffic present on the relevant routes. It is also noted that routeing in / out of the Bristol Channel is spread over a wide area; four east-west main commercial routes were identified in / out of the Bristol Channel spanning at least 10 nm). Again, with multiple options taken and no single clear option utilised. This further reduces collision densities which could form hotspots where crossing occurs.

104. For the option of passing east of the Array Area, the point at which the various tanker routes to / from Milford Haven meet may constitute a hotspot. At the Hazard Workshop it was felt that this point would likely be directly south of the Array Area rather than any closer to Milford Haven – this is relatively open sea area and accounting for traffic volumes the likelihood of an unacceptable level of effect is low.

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

Fishing Vessels and Recreational Vessels

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

Consequences

107. If a third-party to third-party vessel encounter does occur, it is likely to be localised and occur for only a short duration, with collision avoidance action implemented by the vessels involved, in line with the COLREGs, thus ensuring that the situation does not develop into a collision incident. This is supported by experience at previous under construction OWFs, where no collision incidents involving two third-party vessels have been reported. Mitigation measures will also minimise the likelihood of encounters including promulgation of information relating to the proposed Project, marking on relevant nautical charts to allow suitable passage planning and the presence of the buoyed construction area and guard vessels which will assist with guiding vessels around the Array Area.

108. 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 scenario, one or more of the vessels could be foundered resulting in a Potential Loss of Life (PLL) and pollution. In such circumstances, project vessels may attend the incident under SOLAS obligations and in liaison with the MCA and the MPCP would be implemented.

Embedded Mitigation Measures and Management Plans

109. Embedded mitigation measures and management plans identified as relevant to reducing the significance of effect are as follows:

- Buoyed construction area;
- Charting of infrastructure;
- Fisheries liaison;
- Guard vessel(s);
- Marine coordination for project vessels;
- Pollution planning;
- Project vessel compliance with international marine regulations;
- Promulgation of information; and
- Traffic monitoring.

Frequency of Occurrence

110. The frequency of occurrence is therefore considered to be **extremely unlikely**.

Severity of Consequence

111. The severity of consequence is therefore considered to be **serious**.

Significance of the effect

112. The frequency of occurrence of encounters and collision risk is considered to be **extremely unlikely** and the severity of consequence is assessed as **serious**. Therefore, the effect will, be of **Tolerable with Mitigation** significance, which is not significant in EIA terms.

Third-Party to Project Vessel Collision Risk

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

114. Up to 17 project vessels may be on site simultaneously during the construction phase. This will include Restricted in Ability to Manoeuvre (RAM) vessels. It is assumed that construction vessels will be on-site throughout the duration of the construction phase.

115. Based on historical incident data, there has been one instance of a third-party vessel colliding with a project vessel in the UK (see Section 9.6 of **Appendix 25A Navigational Risk Assessment**). In this incident, occurring in 2011, moderate vessel damage was reported with no harm to persons. Since then, awareness of offshore wind developments and the application of the mitigation measures outlined below has improved or been refined considerably in the interim, with no further collision incidents reported since.

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

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

construction activities. Minimum advisory passing distances, as defined by risk assessment, may also be applied where safety zones do not apply (e.g., around cable installation vessels).

118. The promulgation of information will ensure mariner awareness of construction activities is maximised, including charting of infrastructure, ongoing liaison with fisheries via an appointed FLO, and advanced warning of safety zones and any minimum advisory safe passing distances, with the latter particularly relevant for OfECC installation activities since safety zones are not permitted. Additionally, appropriate marine lighting and marking during construction including the buoyed construction area will be agreed with Trinity House. These navigational aids will further maximise mariner awareness when in proximity to ongoing construction works in the Array Area.

119. Third-party vessels may experience restrictions on visually identifying project vessels entering and exiting the Array Area during reduced visibility, increasing collision risk; however, this impact will be mitigated by the application of the COLREGs (reduced speeds) in adverse weather conditions and use of AIS by project vessels.

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

121. Should a collision occur, the consequences are expected to be similar to that outlined for the case of a collision between two third-party vessels, with a worst-case scenario of foundering, PLL, and pollution. In such circumstances, other project vessels may attend the incident under SOLAS obligations and in liaison with the MCA and the MPCP would be implemented.

Embedded Mitigation Measures and Management Plans

122. Embedded mitigation measures and management plans identified as relevant to reducing the significance of effect are as follows:

- Application for safety zones;
- Buoyed construction area;
- Charting of infrastructure;
- Fisheries liaison;
- Guard vessel(s);
- Lighting and marking;
- Marine coordination for project vessels;
- Pollution planning;
- Project vessel compliance with international marine regulations; and
- Promulgation of information.

Frequency of Occurrence

123. The frequency of occurrence is therefore considered to be **extremely unlikely**.

Severity of Consequence

124. The severity of consequence is therefore considered to be **serious**.

Significance of the effect

125. The frequency of occurrence of third-party to project vessel collision risk is **extremely unlikely** and the severity of consequence is assessed as **serious**. Therefore, the effect will, be of **Tolerable with Mitigation** significance, which is not significant in EIA terms.

Reduced Access to Local Ports and Harbours

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

127. Up to 38 construction vessels may be utilised across the construction phase and will include vessels which are RAM. Project vessels will be managed by marine coordination including with MHPA whose VTS area overlaps the OfECC.

128. The closest port or harbour to the proposed Project is Milford Haven, located approximately 21 nm to the northeast of the Array Area. There are also various ports and harbours located within the Bristol Channel. Given the relative distance to ports in the area and the anticipated deviations for the main commercial routes, it is not anticipated that there will be any substantial effect due to Array Area construction activities on vessel approaches to and from the local ports beyond the deviations already outlined for impacts on vessel displacement.

129. For OfECC construction activities, there is a greater risk given the proximity to the entrance to the Milford Haven Waterway. Where cable installation is ongoing vessel displacement is possible; however, the shift of the OfECC further east in response to consultation feedback ensures that vessels accessing Milford Haven will not be required to navigate in shallower water than normal and are unlikely to have difficulty berthing on their preferred tidal window.

130. However, installation activities will be short-term (export cable installation is anticipated to take up to 100 days) and temporary in nature and cover only a small extent. Moreover, MHPA have indicated that installation activities associated with the OfECC could be managed through the Milford Haven VTS, further limiting access constraints for the port. A key element of the coordination will be in relation to pilotage activities, but it is noted that the pilot boarding station for Milford Haven is located well clear of the OfECC. Nevertheless, information will be promulgated prior to any construction activities to allow mariners to passage plan accordingly.

131. The main consequence will be minor disruption to port access and related services; however, such disruption is not expected to prevent a third-party vessel from making port for any reason, including navigable water depths, tidal windows and pilot services.

Embedded Mitigation Measures and Management Plans

132. Embedded mitigation measures and management plans identified as relevant to reducing the significance of effect are as follows:

- Buoyed construction area;
- Charting of infrastructure;
- Marine coordination for project vessels;
- Project vessel compliance with international marine regulations;
- Promulgation of information; and
- Traffic monitoring.

Frequency of Occurrence

133. The frequency of occurrence is therefore considered to be **reasonably probable**.

Severity of Consequence

134. The severity of consequence is therefore considered to be **negligible**.

Significance of the effect

135. The frequency of occurrence of reduced access to local ports and harbours is considered to be **frequent** and the severity of consequence is assessed as **negligible**. Therefore, the effect will, be of **Broadly Acceptable** significance, which is not significant in EIA terms.

25.8.16. Operation and Maintenance (O&M) Effects

Vessel Displacement

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

137. Based on experience at existing operational OWFs, it is anticipated that commercial vessels will choose not to navigate internally within the Array Area and therefore the main route deviations established for the equivalent construction phase impact for vessel displacement in line with MGN 654 (MCA, 2021) are again applicable.

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

139. Additionally, the frequency of maintenance activities associated with the OfECC is expected to be limited, and so potential disruption associated with the OfECC will again be limited.

140. For fishing vessels and recreational vessels, internal navigation within the array is considered feasible during the operation and maintenance phase, noting that the minimum spacing of 1,140 m is sufficient to accommodate transits by smaller vessels. Additionally, there will be no restrictions on entry into the Array Area for any vessel other than through any active 500 m major maintenance safety zones. Nevertheless, the RYA have noted during consultation that internal passages by recreational vessels are not currently common at existing arrays – for small craft choosing to deviate around the Array Area the nature of this impact is again expected to be broadly similar to that considered for the equivalent construction phase impact for vessel displacement.

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

Embedded Mitigation Measures and Management Plans

142. Embedded mitigation measures and management plans identified as relevant to reducing the significance of effect are as follows:

- Charting of infrastructure;
- Guard vessel(s);
- Lighting and marking;
- Promulgation of information; and
- Traffic monitoring.

Frequency of Occurrence

143. The frequency of occurrence is therefore considered to be **frequent**.

Severity of Consequence

144. The severity of consequence is therefore considered to be **negligible**.

Significance of the effect

145. The frequency of occurrence of vessel displacement is considered to be **frequent** and the severity of consequence is assessed as **negligible**. Therefore, the effect will, be of **Tolerable with Mitigation** significance, which is not significant in EIA terms.

Increased Third-Party to Third-Party Vessel Collision Risk

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

147. Based on experience at existing operational OWFs, it is anticipated that commercial vessels will choose not to navigate internally within the Array Area and therefore the main route deviations established for the equivalent construction phase impact for vessel displacement in line with MGN 654 (MCA, 2021) are again applicable.

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

149. An additional factor during the operation and maintenance phase is the potential for the view of other vessels to be blocked or hindered due to the presence of structures, particularly for small craft which may choose to navigate internally within the array. However, the minimum spacing between WTGs (1,140 m) is sufficient to ensure that any notable effects – which would likely arise only along a row of WTGs – occur where the vessels involved are far apart, i.e., at opposite ends of the row of WTGs. As the distance between the vessels closes, any blocking effect would quickly reduce.

150. If an encounter or collision does occur, the consequences are expected to be broadly similar to the equivalent construction phase impact for increased third-party to third-party vessel collision.

Embedded Mitigation Measures and Management Plans

151. Embedded mitigation measures and management plans identified as relevant to reducing the significance of effect are as follows:

- Charting of infrastructure;
- Fisheries liaison;
- Guard vessel(s);
- Lighting and marking;
- Marine coordination for project vessels;
- Pollution planning;
- Project vessel compliance with international marine regulations;
- Promulgation of information; and
- Traffic monitoring.

Frequency of Occurrence

152. The frequency of occurrence is therefore considered to be **extremely unlikely**.

Severity of Consequence

153. The severity of consequence is therefore considered to be **serious**.

Significance of the effect

154. The frequency of occurrence of encounters and collision risk is considered to be **extremely unlikely** and the severity of consequence is assessed as **serious**. Therefore, the effect will, be of **Tolerable with Mitigation** significance, which is not significant in EIA terms.

Third-Party to Project Vessel Collision Risk

155. Project vessels associated with operation and maintenance activities may increase encounters and collision risk for other vessels already operating in the area.

156. Up to 120 return trips per year by operation and maintenance vessels may be made throughout the operation and maintenance phase of the proposed Project, including RAM vessels. It is estimated that project vessel movements will be more frequent during the summer months due to preference for project activities to be scheduled during the summer to avoid inclement weather. It is noted that the movement of project vessels during the operation and maintenance phase represents a decrease in movements in comparison to the construction phase.

157. Much of the mitigation measures outlined for the equivalent construction phase impact for third-party to project vessel collision risk are again relevant, although safety zones will be limited to surface structures where major maintenance is ongoing. Additionally, there will be no buoyed construction area to protect project vessels, and small craft may choose to navigate internally within the array, increasing the likelihood of an effect.

158. Should an encounter or collision occur between a third-party vessel and a project vessel, the consequences are expected to be broadly like the equivalent construction phase impact for third-party to project vessel collision risk, with a worst-case of foundering, PLL, and pollution. In such circumstances, other project vessels may attend the incident under SOLAS obligations and in liaison with the MCA and the MPCP would be implemented.

Embedded Mitigation Measures and Management Plans

159. Embedded mitigation measures and management plans identified as relevant to reducing the significance of effect are as follows:

- Application for safety zones (major maintenance only);
- Charting of infrastructure;
- Fisheries liaison;
- Guard vessel(s);
- Lighting and marking;
- Marine coordination for project vessels;
- Pollution planning;
- Project vessel compliance with international marine regulations; and
- Promulgation of information.

Frequency of Occurrence

160. The frequency of occurrence is therefore considered to be **remote**.

Severity of Consequence

161. The severity of consequence is therefore considered to be **serious**.

Significance of the effect

162. The frequency of occurrence of third-party to project vessel collision risk is **remote** and the severity of consequence is assessed as **serious**. Therefore, the effect will, be of **Tolerable with Mitigation** significance, which is not significant in EIA terms.

Creation of Vessel to Structure Allision Risk

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

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

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

Powered Allision Risk

165. Based on the quantitative assessment undertaken for the alternative array layout (see Section 16 of **Appendix 25A: Navigational Risk Assessment**), the base case annual powered vessel to structure allision frequency was estimated to be 2.34×10^{-4}, corresponding to a return period of approximately one in 4,277 years. This is a low return period compared to that estimated for other UK OWF developments and is reflective of both the scale of the proposed Project (maximum 14 surface structures for the alternative layout modelled and 10 for the indicative array layout) and the relatively low volume of vessel traffic intersecting or passing near the Array Area. The low return period is also reflected when considering future case traffic levels.

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

167. Vessels are expected to comply with national and international flag state regulations (including the COLREGs and SOLAS) and will be able to passage plan a route which minimises effects given the promulgation of information relating to the proposed Project, including the charting of infrastructure on relevant nautical charts. On approach, the operational marine lighting and marking on the structures (which will be agreed with the MCA and Trinity House) will also assist in maximising awareness. Furthermore, the final layout will be agreed post consent in consultation with MCA and Trinity House to ensure it is safe from a surface navigation perspective. It is expected that the final layout will be well aligned with existing routes, most notably tankers routeing to / from Milford Haven.

168. Should a powered allision occur, the consequences will depend on multiple factors including the energy of the contact, structural integrity of the vessel involved, and sea state at the time of the contact. Fishing vessels and recreational vessels are considered most vulnerable to the

impact given the potential for a non-steel construction. With consideration of lessons learned the most likely consequences are minor damage with the vessel able to resume passage and undertake a full inspection at the next port of call. As an unlikely worst case, the vessel could founder resulting in a PLL and pollution. If pollution were to occur, then the MPCP would be implemented.

Drifting Allision Risk

169. Based on the quantitative assessment undertaken for the alternative array layout (see Section 16 of **Appendix 25A: Navigational Risk Assessment**), the base case annual drifting vessel to structure allision frequency was estimated to be 3.20×10^{-5}, corresponding to a return period of approximately one in 20,875 years. This is a low return period compared to that estimated for other UK OWF developments and is again both the scale of the proposed Project (maximum 14 surface structures for the alternative array layout modelled and 10 for the indicative array layout) and the relatively low volume of vessel traffic intersecting or passing near the Array Area. The low return period is also reflected when considering future case traffic levels.

170. Based on historical incident data, there have been no instances of a third-party vessel alliding with an operational OWF structure whilst Not Under Command (NUC). However, there is potential for a vessel to be adrift in the area; this is reflected in the MAIB incident data reviewed in proximity to the proposed Project which indicates that machinery failure[3] is a frequent incident type.

171. A vessel adrift may only develop into an allision situation if in proximity to a surface structure. This is only the case where the adrift vessel is located internally within or near the Array Area and the direction of the wind and / or tide directs the vessel towards a structure.

172. In circumstances where a vessel drifts towards a structure in the Array Area, there are actions which the vessel may take to prevent the drift incident developing into an allision situation. For powered vessels, the ideal and likely solution would be to regain power prior to reaching the Array Area (i.e., by rectifying any fault). Failing this, the vessel's emergency response procedures would be implemented which may include an emergency anchoring event, following a check of the relevant nautical charts to ensure the deployment of the anchor will not lead to other effects (such as anchor snagging on a subsea cable), or the use of thrusters (depending on availability and power supply).

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

174. Should a drifting allision occur, the consequences will be like those noted for the case of a powered allision, including the unlikely worst-case of foundering, PLL, and pollution. However,

[3] An incident reported as a 'machinery failure' may not be so severe as to result in the vessel losing power and becoming NUC.

a drifting vessel is likely to be moving at a reduced speed compared to a powered vessel, thus reducing the energy of the impact, including in the case of a recreational vessel under sail.

Internal Allision Risk

175. As noted previously, based on experience at existing operational OWFs, it is anticipated that commercial vessels will be unlikely to navigate internally within the Array Area. Fishing and recreational vessels may be more likely to transit through although are less likely to do so at a floating site such as the proposed Project compared to fixed sites due to the presence of mooring infrastructure associated with floating WTGs.

176. The base case annual fishing vessel to structure allision frequency for the alternative array layout (see Section 16 of **Appendix 25A: Navigational Risk Assessment**) is estimated to be 5.96×10^{-2}, corresponding to a return period of approximately one in 16.8 years. This return period is reflective of the volume of fishing vessel traffic in the area, both in transit and engaged in fishing activities, and the conservative assumptions made within the modelling process. It has been assumed that the baseline fishing activity in terms of proximity to WTGs will not change. This is a very conservative assumption, particularly for a floating site, with consultation undertaken for commercial fisheries indicating that active fishing is not expected to resume following installation of the proposed Project.

177. The estimated return period also does not take account of the nature of any allision incident. The worst consequences reported for vessels involved in an allision incident involving a UK OWF development has been flooding, with no life-threatening injuries to persons reported (the model is calibrated against known reported incidents).

178. The minimum spacing between structures of 1,140 m is considered sufficient for safe internal navigation, i.e., for vessels to keep clear of the OWF structures within the Array Area. It is noted that this spacing is much greater than that associated with many other operational OWFs in the UK. Moreover, the final layout – agreed with MCA and Trinity House post consent – will be compliant with the requirements of MGN 654 (MCA, 2021).

179. As with any passage, any vessel navigating within the Array Area is expected to passage plan in accordance with SOLAS Chapter V (IMO, 1974) and promulgation of information by the proposed Project will ensure that such vessels have good awareness of the presence of surface structures. Operational marine lighting and marking will be in place as required by and agreed with Trinity House and MCA. Given the size of the Array Area, it is unlikely that a mariner would become disoriented when navigating internally; nevertheless, marking will include unique identification marking of each structure in an easily understandable pattern.

180. 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 receptors to date when operating in proximity to existing offshore wind developments.

181. For recreational vessels with a mast there is an additional allision risk when navigating internally within the Array Area associated with the WTG blades. However, the minimum blade tip clearance matches the minimum clearance the RYA recommend (22 m above Mean High Water Springs (MHWS)) for minimising allision risk (RYA, 2019 (b)) and which is also noted in MGN 654 (MCA, 2021).

Embedded Mitigation Measures and Management Plans

182. Embedded mitigation measures and management plans identified as relevant to reducing the significance of effect are as follows:

- Application for safety zones (major maintenance only);
- Charting of infrastructure;
- Compliance with MGN 654;
- Outline Project (Array) Layout Plan;
- Lighting and marking;
- Marine coordination for project vessels;
- Minimum blade tip clearance;
- Pollution planning;
- Project vessel compliance with international marine regulations; and
- Promulgation of information.

Frequency of Occurrence

183. The frequency of occurrence is therefore considered to be **extremely unlikely** for powered and drifting allision risk, and **remote** for internal allision risk.

Severity of Consequence

184. The severity of consequence is therefore considered to be **moderate** for all forms of allision risk.

Significance of the effect

185. The frequency of occurrence of vessel to structure allision risk is **remote** (worst-case) and the severity of consequence is assessed as **moderate**. Therefore, the effect will, be of **Tolerable with Mitigation** significance, which is not significant in EIA terms.

Reduced Access to Local Ports and Harbours

186. Operation and maintenance activities and the presence of the proposed Project may reduce access to local ports and harbours.

187. Up to 120 return trips per year by operation and maintenance vessels may be made throughout the operation and maintenance phase and will include vessels which are RAM. As per the construction phase, Project vessels will be managed by marine coordination including with MHPA whose VTS area overlaps the OfECC.

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

189. For the OfECC, the frequency of operation and maintenance activities is expected to be limited, and so potential disruption (particularly to Milford Haven access) will be more limited with information promulgated in advance to allow mariners to passage plan accordingly.

190. The main consequences will be broadly similar to the equivalent construction phase impact for reduced access to local ports and harbours, with any access constraints not expected to prevent a third-party vessel from making port.

Embedded Mitigation Measures and Management Plans

191. Embedded mitigation measures and management plans identified as relevant to reducing the significance of effect are as follows:

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

Frequency of Occurrence

192. The frequency of occurrence is therefore considered to be **reasonably probable**.

Severity of Consequence

193. The severity of consequence is therefore considered to be **negligible**.

Significance of the effect

194. The frequency of occurrence of reduced access to local ports and harbours is **reasonably probable** and the severity of consequence is assessed as **negligible**. Therefore, the effect will, be of **Broadly Acceptable** significance, which is not significant in EIA terms.

Loss of Station

195. If the mooring system holding a floating substructure fails, the floating substructure may suffer loss of station and become a floating hazard to passing vessels.

196. The MCA require under their Regulatory Expectations on Moorings for Floating Wind and Marine Devices (MCA & HSE, 2017) that developers arrange Third Party Verification (TPV) of the mooring systems by an independent and competent person / body. The Regulatory Expectations state that TPV is a "continuous activity" and that should there be any modifications to a system or if new information becomes available about its reliability, additional TPV would be required.

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

198. The Regulatory Expectations also require the provision of continuous monitoring either by GPS or other suitable means. Given Floating Offshore Wind used by the proposed Project is an emerging technology the regulatory requirement for continuous monitoring has not been previously recognised by present regulations. Despite this the proposed Project aims to upload previously legislated requirements and expectations. Each WTG should also have an alarm system in place, whereby an alert will be provided to the Marine Coordination Centre if 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, which will depend upon the design of the substructure and any predefined Emergency Response Protocols. These protocols will also include recovery of deliberate sinking of floating foundations should this be deemed a necessary option in the event of a floating substructure going off station.

Embedded Mitigation Measures and Management Plans

199. Embedded mitigation measures and management plans identified as relevant to reducing the significance of effect are as follows:

- Charting of infrastructure;
- Compliance with MGN 654;
- Compliance with floating foundation guidance;
- Lighting and marking; and
- Promulgation of information.

Frequency of Occurrence

200. The frequency of occurrence is therefore considered to be **negligible**.

Severity of Consequence

201. The severity of consequence is therefore considered to be **serious**.

Significance of the effect

202. The frequency of occurrence of loss of station is **negligible** and the severity of consequence is assessed as **serious**. Therefore, the effect will, be of **Broadly Acceptable** significance, which is not significant in EIA terms.

Further mitigation and residual risk

203. Whilst the significance of effect is assessed as Broadly Acceptable and not significant in EIA terms, to mitigate the effect of loss of station (ensuring the significance of effect is ALARP), AIS tracking on the floating structures has been specifically identified as an additional mitigation measure.

204. Taking the above mitigation into consideration, the residual effect will be of **Broadly Acceptable** significance.

Reduction in Under Keel Clearance due to Mooring Lines, Buoyant Inter-Array Cables, or Cable Protection

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

Subsea Cables

206. For all subsea cables relating to the proposed Project, the target burial depth is 1.2 m, noting actual burial depths will be determined via the cable burial risk assessment process undertaken post consent once geotechnical survey data is available. Given existing water depths (between 67 and 71 m below CD), it is not anticipated that there will be any notable changes in navigable depths.

207. Where cable burial is not possible, alternative cable protection methods may be deployed which will be determined within the cable burial risk assessment. Overall, it is estimated that a maximum of 27% of the overall offshore export cables will require protection under a worst-case scenario. Further details regarding offshore cable protection measures and design are detailed in **Chapter 4: Description of the Proposed Project, Section 4.5.3**. The requirements of MGN 654 in relation to cable protection will apply, namely cable protection will not change the charted water depth by more than 5% unless appropriate mitigation is agreed with the MCA. This aligns with the RYA's recommendation that the "minimum safe under keel clearance

over submerged structures and associated infrastructure should be determined in accordance with the methodology set out in MGN 543 [since superseded by MGN 654]" (RYA, 2019 (b)).

208. Given existing water depths within the Array Area, it is not anticipated that the presence of cable protection associated with inter-array cables will reduce charted water depths by more than 5%. For the export cables, the water depth is shallow in the nearshore area, and therefore the likelihood of a reduction in charted water depth by more than 5% is much greater, should cable protection be required. However, from the vessel traffic data limited activity occurs in the nearshore area of the OfECC (off Freshwater West). Nevertheless, as noted above, in such circumstances the MCA will be consulted on appropriate mitigation (if required) to ensure the unde keel risk is ALARP.

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

Mooring Lines and Buoyant Inter-Array Cables

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

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

212. It is likely that commercial vessels will not enter the Array Area; moreover, experience indicates that commercial vessels frequently pass 1 nm or more off established developments. On this basis, taking into consideration the baseline and anticipated post wind farm vessel routeing, it is considered highly unlikely that a commercial vessel would pass in sufficient proximity to the WTGs (86 m based on the draught assessment undertaken in Section 16.6.2 of **Appendix 25A: Navigational Risk Assessment**) and hence be at risk of subsea interaction. This is compounded by the extent of the above surface structure including the WTG blades which may deter a commercial vessel from navigating in proximity to the structure such that an interaction risk arises.

213. Therefore, it is likely that any vessels near the substructures will be smaller. From the vessel traffic data, recreational vessels do not regularly navigate within the Array Area (generally passing to the east) and so the key receptor for interaction risk is fishing vessels, which typically have relatively shallow draughts compared to commercial vessels.

214. An assessment of fishing vessel draughts relative to the predicted mooring line descents showed that a typical fishing vessel in the area should avoid an under keel interaction beyond approximately 53 m from a floating structure (see Section 16 of **Appendix 25A: Navigational Risk Assessment**). The likelihood of a fishing vessel navigating closer than this distance from a floating structure is low and in such a circumstance it is likely that it would do with caution, noting that the surface section of the mooring lines will be visible above the waterline. The infrastructure will also be marked on appropriate nautical charts.

215. It will be necessary to confirm available under keel clearance from the mooring lines post installation, in particular if catenary mooring lines are used. The confirmed available clearance

should be discussed with the MCA and Trinity House post installation to determine if any additional mitigation is required.

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

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

Embedded Mitigation Measures and Management Plans

218. Embedded mitigation measures and management plans identified as relevant to reducing the significance of effect are as follows:

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

Frequency of Occurrence

219. The frequency of occurrence is therefore considered to be **negligible**.

Severity of Consequence

220. The severity of consequence is therefore considered to be **moderate**.

Significance of the effect

221. The frequency of occurrence of reduction in under keel clearance is **negligible** and the severity of consequence is assessed as **moderate**. Therefore, the effect will, be of **Broadly Acceptable** significance, which is not significant in EIA terms.

Anchor Interaction with Mooring Lines or Subsea Cables

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

223. The spatial extent of the impact is small given that a vessel must be near an export cable or IAC for an interaction to occur and there will be limited numbers of inter-array cables given the small-scale nature of the proposed Project.

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

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

225. Although the second of these scenarios may involve limited decision-making time if drifting towards a hazard, in all three scenarios it is anticipated that the charting of infrastructure including the subsea cables and mooring lines (where scale of chart is appropriate) will inform the decision of a vessel to anchor, as per Regulation 34 of SOLAS (IMO, 1974).

226. An average of one anchored vessel per day was observed within the Study Area during the survey periods, with these all being tankers. Risk of interaction with an inter-array cable or mooring line on a planned anchoring or dragged anchoring basis is therefore anticipated to be very low. In terms of emergency anchoring, any areas of high traffic volume are likely to represent the areas of highest effect, particularly where there are hazards nearby (e.g., structures, rocks, shallows). Given the open sea room in proximity to the inter-array cables the likelihood of this scenario arising is very low.

227. An average of one anchored vessel per day was observed within the OfECC Study Area, with the majority of these being tankers. None of these anchoring instances occurred within the OfECC itself, although some instances did occur in close proximity. For such instances, the burial of the export cables and use of external cable protection – as informed by the cable burial risk assessment with a target burial depth of 1.2m – will minimise the likelihood of an interaction occurring. The cable burial risk assessment will also account for traffic volume and sizes.

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

229. Nevertheless, should a vessel anchor over a subsea cable the most likely consequence (based on historical anchor interaction incidents) is that no interaction occurs given the burial / protection of the cable. As an unlikely worst case, a snagging incident could occur and / or the vessel's anchor and the cable could be damaged, with potential for loss of stability for a small vessel. For an interaction with a buoyant inter-array cable, a further consequence could be the breaking of the cable, which may have implications for the stability of the floating substructure, depending upon the design. This scenario is highly unlikely given that this section of the cable will be near the WTG (50 to 100 m), with vessels unlikely to navigate at such a distance from a surface structure.

Embedded Mitigation Measures and Management Plans

230. Embedded mitigation measures and management plans identified as relevant to reducing the significance of effect are as follows:

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

Frequency of Occurrence

231. The frequency of occurrence is therefore considered to be **extremely unlikely**.

Severity of Consequence

232. The severity of consequence is therefore considered to be **minor**.

Significance of the effect

233. The frequency of occurrence of anchor interaction is **extremely unlikely** and the severity of consequence is assessed as **minor**. Therefore, the effect will, be of **Broadly Acceptable** significance, which is not significant in EIA terms.

Reduction of Emergency Response Capability Including SAR

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

235. Given the distances that may be covered by air-based SAR support (the SAR helicopter base at St Athan is located approximately 67 nm from the Array Area), the spatial extent of this impact is considered reasonably large. The Array Area covers approximately 16 square nautical mile (nm^2) which represents a relatively small area to search compared to other OWFs.

236. Up to 120 return trips per year by operation and maintenance vessels may be made throughout the operation and maintenance phase. It is estimated that project vessel movements will be more frequent during the summer months. The presence of such vessels will increase the likelihood of an incident and subsequently increase the likelihood of multiple incidents occurring simultaneously in the region, diminishing emergency response capability. As an unlikely worst case, the consequences of such a situation could include a failure of emergency response to an incident, resulting in PLL and pollution.

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

238. From recent SAR helicopter taskings data, the frequency of SAR operations in proximity to the proposed Project is low, with no SAR helicopter incidents occurring within the Array Area. The frequency of SAR operations in proximity to the Array Area is not anticipated to change markedly from the current level, given the measures noted above which will be in place. However, if a SAR operation is required internally within the Array Area, its small-scale and the minimum spacing of 1,140 m between WTGs should ensure that access effects are minimal.

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

Embedded Mitigation Measures and Management Plans

240. Embedded mitigation measures and management plans identified as relevant to reducing the significance of effect are as follows:

- Compliance with MGN 654;
- Guard vessel(s);
- Outline Project (Array) Layout Plan;
- Lighting and marking;
- Marine coordination;

- Pollution planning; and
- Project vessel compliance with international marine regulations.

Frequency of Occurrence

241. The frequency of occurrence is therefore considered to be **extremely unlikely**.

Severity of Consequence

242. The severity of consequence is therefore considered to be **serious**.

Significance of the effect

243. The frequency of occurrence of reduction of emergency response capability including SAR is considered to be **extremely unlikely** and the severity of consequence is assessed as **serious**. Therefore, the effect will, be of **Tolerable with Mitigation** significance, which is not significant in EIA terms.

25.8.17. Decommissioning Effects

Vessel Displacement

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

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

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

Embedded Mitigation Measures and Management Plans

247. Embedded mitigation measures and management plans identified as relevant to reducing the significance of effect are as follows:

- Buoyed decommissioning area;
- Charting of infrastructure;
- Decommissioning Environmental Management Plan;
- Guard vessel(s); and
- Promulgation of information.

Frequency of Occurrence

248. The frequency of occurrence is therefore considered to be **frequent**.

Severity of Consequence

249. The severity of consequence is therefore considered to be **negligible**.

Significance of the effect

250. The frequency of occurrence of vessel displacement is **frequent** and the severity of consequence is assessed as **negligible**. Therefore, the effect will, be of **Tolerable with Mitigation** significance, which is not significant in EIA terms.

Increased Third-Party to Third-Party Vessel Collision Risk

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

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

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

Embedded Mitigation Measures and Management Plans

254. Embedded mitigation measures and management plans identified as relevant to reducing the significance of effect are as follows:

- Buoyed decommissioning area;
- Charting of infrastructure;
- Decommissioning Environmental Management Plan;
- Fisheries liaison;
- Guard vessel(s);
- Marine coordination for project vessels;
- Pollution planning;
- Project vessel compliance with international marine regulations; and
- Promulgation of information.

Frequency of Occurrence

255. The frequency of occurrence is therefore considered to be **extremely unlikely**.

Severity of Consequence

256. The severity of consequence is therefore considered to be **serious**.

Significance of the effect

257. The frequency of occurrence of encounters and collision risk is considered to be **extremely unlikely** and the severity of consequence is assessed as **serious**. Therefore, the effect will, be of **Tolerable with Mitigation** significance, which is not significant in EIA terms.

Third-Party to Project Vessel Collision Risk

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

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

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

Embedded Mitigation Measures and Management Plans

261. Embedded mitigation measures and management plans identified as relevant to reducing the significance of effect are as follows:

- Application for safety zones;
- Buoyed decommissioning area;
- Charting of infrastructure;
- Decommissioning Environmental Management Plan;
- Fisheries liaison;
- Guard vessel(s);
- Lighting and marking;
- Marine coordination for project vessels;
- Pollution planning;
- Project vessel compliance with international marine regulations; and
- Promulgation of information.

Frequency of Occurrence

262. The frequency of occurrence is therefore considered to be **extremely unlikely**.

Severity of Consequence

263. The severity of consequence is therefore considered to be **serious**.

Significance of the effect

264. The frequency of occurrence of third-party to project vessel collision risk is **extremely unlikely** and the severity of consequence is assessed as **serious**. Therefore, the effect will, be of **Tolerable with Mitigation** significance, which is not significant in EIA terms.

Reduced Access to Local Ports and Harbours

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

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

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

Embedded Mitigation Measures and Management Plans

268. Embedded mitigation measures and management plans identified as relevant to reducing the significance of effect are as follows:

- Buoyed decommissioning area;
- Charting of infrastructure;
- Decommissioning Environmental Management Plan;
- Marine coordination for project vessels;
- Project vessel compliance with international marine regulations; and
- Promulgation of information.

Frequency of Occurrence

269. The frequency of occurrence is therefore considered to be **reasonably probable**.

Severity of Consequence

270. The severity of consequence is therefore considered to be **negligible**.

Significance of the effect

271. The frequency of occurrence of reduced access to local ports and harbours is **frequent** and the severity of consequence is assessed as **negligible**. Therefore, the effect will, be of **Broadly Acceptable** significance, which is not significant in EIA terms.

25.8.18. Summary of Residual Environmental Effects

272. This chapter of the ES has assessed the potential environmental effects on Shipping and Navigation from the construction, operation and maintenance and decommissioning phases of the proposed Project. Where significant effects have been identified, additional mitigation has been considered and incorporated into the assessment.

273. **Table 25-14** summarises the impact assessment undertaken and confirms the significance of any residual effects, following the application of additional mitigation.

25.9 Summary of Additional Mitigation Measures

274. An additional mitigation measure has been identified relating to the deployment of AIS tracking on the floating structures to allow monitoring in the event of a loss of station incident.

25.9.19. Monitoring

275. Monitoring of vessel traffic via AIS will be undertaken for the duration of the construction phase and during the first three years of the operation and maintenance phase. This will allow the effectiveness of embedded mitigation measures to be suitably reviewed and any additional mitigation required to be identified.

25.10 Summary of Effects and Conclusions

276. This section summarises the residual significant effects of the proposed Project on Shipping and Navigation following the implementation of mitigation.

Table 25-14. Assessment summary

Potential Impact	Receptor	Frequency of Occurrence	Severity of Consequence	Significance of Effect	Additional Mitigation	Residual Significance of Effect
Construction						
Vessel displacement	All third-party vessels	Frequent	Negligible	Tolerable with Mitigation	None required	Tolerable with Mitigation
Increased third-party vessel collision risk	All third-party vessels	Extremely unlikely	Serious	Tolerable with Mitigation	None required	Tolerable with Mitigation
Third-party with project vessel collision risk	All third-party vessels	Extremely unlikely	Serious	Tolerable with Mitigation	None required	Tolerable with Mitigation
Reduced access to local ports and harbours	All third-party vessels	Reasonably probable	Negligible	Broadly Acceptable	None required	Broadly Acceptable
Operation and Maintenance						
Vessel displacement	All third-party vessels	Frequent	Negligible	Tolerable with Mitigation	None required	Tolerable with Mitigation
Increased third-party vessel collision risk	All third-party vessels	Extremely unlikely	Serious	Tolerable with Mitigation	None required	Tolerable with Mitigation
Third-party with project vessel collision risk	All third-party vessels	Remote	Serious	Tolerable with Mitigation	None required	Tolerable with Mitigation
Creation of vessel to structure allision risk	All third-party vessels	Remote	Moderate	Tolerable with Mitigation	None required	Tolerable with Mitigation
Reduced access to local ports and harbours	All third-party vessels	Reasonably probable	Negligible	Broadly Acceptable	None required	Broadly Acceptable

Potential Impact	Receptor	Frequency of Occurrence	Severity of Consequence	Significance of Effect	Additional Mitigation	Residual Significance of Effect
Loss of station	All third-party vessels	Negligible	Serious	Broadly Acceptable	AIS tracking on the floating structures	Broadly Acceptable
Reduction in under keel clearance due to mooring lines, buoyant inter-array cables, or cable protection	All third-party vessels	Negligible	Moderate	Broadly Acceptable	None required	Broadly Acceptable
Anchor interaction with mooring lines or subsea cables	All third-party vessels	Extremely unlikely	Minor	Broadly Acceptable	None required	Broadly Acceptable
Reduction of emergency response capability including SAR	All third-party vessels and emergency responders	Extremely unlikely	Serious	Tolerable with Mitigation	None required	Tolerable with Mitigation
Decommissioning						
Vessel displacement	All third-party vessels	Frequent	Negligible	Tolerable with Mitigation	None required	Tolerable with Mitigation
Increased third-party vessel collision risk	All third-party vessels	Extremely unlikely	Serious	Tolerable with Mitigation	None required	Tolerable with Mitigation
Third-party with project vessel collision risk	All third-party vessels	Extremely unlikely	Serious	Tolerable with Mitigation	None required	Tolerable with Mitigation
Reduced access to local ports and harbours	All third-party vessels	Reasonably probable	Negligible	Broadly Acceptable	None required	Broadly Acceptable

25.11 Cumulative Effects of the Project

25.11.20. Introduction

277. Cumulative effects are those effects upon receptors arising from the proposed Project alongside all existing, and/ or reasonably foreseeable projects, plans and activities that result in cumulative effects with any element of the proposed Project. Existing projects are generally considered as part of the baseline and as such are considered within the impact assessment presented in **Section 25.8** above.

278. This section assesses potential cumulative effects on Shipping and Navigation from identified projects, plans and activities that have the potential to act cumulatively with the proposed Project.

279. Planning Inspectorate (PINS) Advice 17: Cumulative Effects Assessment (PINS, 2019) suggests that CEA follows a four-stage process. The aim of this approach is to accurately determine relevant projects and associated relationships with scoped in receptors identified in the ES, to be included within the interproject CEA.

280. The approach to the assessment of cumulative effects is detailed in Appendix 5B: Approach to Cumulative Effects Assessment, and is also summarised in **Table 25-15**.

Table 25-15. PINS Advice 17 Stages of the CEA process

CEA Stage	Activity
Stage 1	Determine a zone of influence (ZoI) via desk study for each topic receptor scoped into the ES. This will establish a *long list* of projects within each ZoI that will be shortlisted in Stage 2. This list of plans and projects/activities is drawn up through a desk study of planning applications, development plan documents, relevant development frameworks and any other available sources to identify 'other development' within the ZoI. Information on each project (location, development type, status, etc.) is documented, along with the certainty or tier assigned to the 'other development' (i.e. confidence it will take place in the current form and when it will take place in relation to the project). PINS notes that the project should then consult with the relevant planning authority/ authorities and statutory consultees regarding the long list.
Stage 2	Screening of the long list identified in Stage 1, to establish a short list for the CEA. Screening is based on the criteria presented in the scoping report and subsequent comments by the regulator and statutory consultees. PINS has provided inclusions/ exclusion threshold criteria, against which the potential for 'other development to give rise to significant cumulative effects by virtue of overlaps in temporal scope, the scale and nature of the 'other developments' and /or receiving environment, or any other relevant factors, is assessed. From this assessment, a shortlist of 'other developments' to be included in the CEA is produced. It is noted that documented information on each of the 'other developments' is likely to be high level at this stage, outlining the key issues to take forward.
Stage 3	Gathering of all information available on short listed projects generated in Stage 2. At this stage all available data and information about the shortlisted projects that will be included in the CEA is collected to inform the assessment. This should utilise the most current information for each project in the public domain, and assess the assumptions and limitations of the information collected on each shortlisted project.
Stage 4	Each of the shortlisted projects are reviewed in turn by the different topics to assess whether cumulative effects may arise and the nature of those effects (i.e. beneficial or adverse). The significance of the effects on environmental receptors is established within each ES technical chapters. Where significant adverse cumulative

CEA Stage	Activity
	effects are identified, mitigation measures are also considered within the CEA alongside the mechanism to secure that mitigation, e.g. consent condition requirements.

25.11.21. Scope of Cumulative Effects Assessment for Shipping and Navigation

281. The following impacts have been scoped into the CEA for Shipping and Navigation.

Construction

- Vessel displacement;
- Increased third-party vessel to vessel collision risk;
- Increased third-party to project vessel collision risk; and
- Reduced access to local ports and harbours.

Operation and maintenance

- Vessel displacement
- Increased third-party vessel to vessel collision risk;
- Increased third-party to project vessel collision risk;
- Creation of vessel to structure allision risk;
- Reduced access to local ports and harbours;
- Reduction in under keel clearance;
- Anchor interaction with mooring lines or subsea cables; and
- Reduction of emergency response capability.

Decommissioning

- Vessel displacement;
- Increased third-party vessel to vessel collision risk;
- Increased third-party to project vessel collision risk; and
- Reduced access to local ports and harbours.

282. **Table 25-16** presents the short list of projects identified and included within the CEA for Shipping and Navigation, based on a ZoI of 50 nm from the Array Area. Section 3.3 and Section 14 of **Appendix 25A: Navigational Risk Assessment** provide full details of the methodology and screening exercise, respectively.

Table 25-16 List of projects considered for the Shipping and Navigation cumulative effects assessment

Project Name/Developer	Project Type	Tier and Status	Approx. distance from the proposed Project (nm)
Erebus	Offshore wind farm	1 Consented	2.5
White Cross	Offshore wind farm	2 Consent submitted	9.3

Project Name/Developer	Project Type	Tier and Status	Approx. distance from the proposed Project (nm)
Pembrokeshire Demonstration Zone	Offshore wind farm	3 Scoped	Unknown
The Crown Estate (TCE) Project Development Areas (PDA)	Offshore wind farm	3 Planned	0.0

283. The screened in cumulative projects are presented in **Figure 25-9**, where geographical information is available.

284. Due to the preliminary status, low data confidence, and / or overlap with the TCE PDAs, Llywelyn, Petroc, and Valorous offshore wind farms have been screened out. No other types of cumulative projects relevant to Shipping and Navigation were identified.

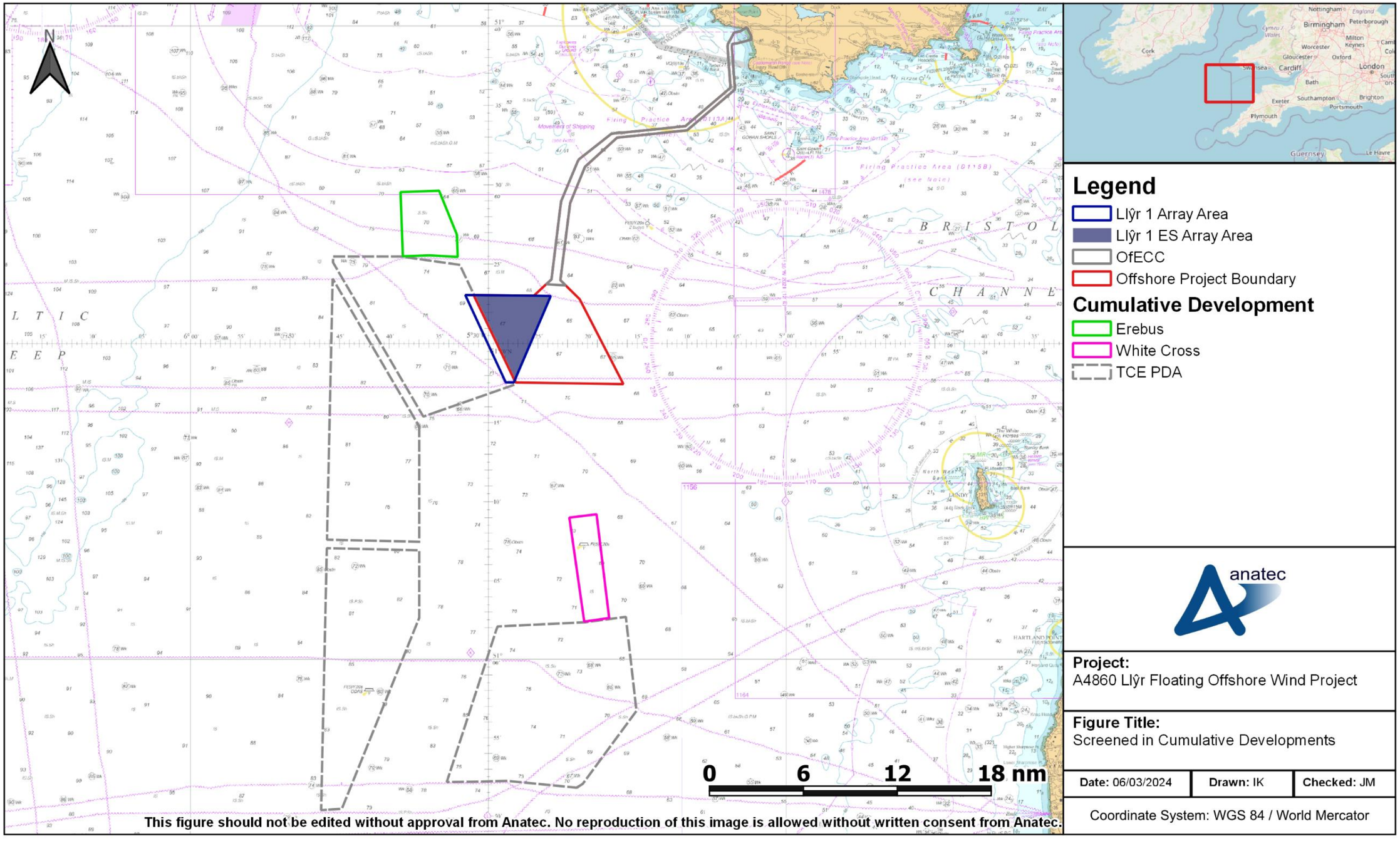


Figure 25-9. Overview of screened in cumulative projects

25.11.22. Cumulative Effect Assessment

Vessel Displacement

285. Construction/decommissioning activities associated with the installation of structures and cables and the presence of structures may displace existing routes/activity on a cumulative level.

Tier 1

286. Based on the cumulative assessment of vessel routeing a deviation will be required for nine of the 14 main commercial routes identified. It is anticipated that eight of these routes will deviate around Erebus, with the other avoiding White Cross. The largest deviation is anticipated to be 11.14 nm, associated with Route 6 (northbound to Milford Haven and used by an average of two to three vessels per week). This increase equates to a 9.4% increase in route length and relates to the option of passing west of Erebus.

287. Although the increase in route length is substantial for tanker routeing to/from Milford Haven (Routes 2, 3 and 6), these deviations are a conservative worst-case, with vessels on these routes likely to take a more direct approach between the TSS Off the Scilly Isles and the west of Erebus, particularly given that there is sea room available to do so. There is also potential that a more direct route between the west of Erebus and Milford Haven may be taken, further reducing the level of deviation.

288. Additionally, there is an option to pass east of the Array Area which has been considered. This option would also reduce the level of deviation for the tanker routeing to/from Milford Haven (maximum of 5.7 nm associated with Route 2) and may be considered feasible given the favourable angle of the eastern boundary of the Array Area.

289. The size of deviations for commercial vessels would also be reduced if navigation between the Array Area and Erebus was considered. However, such a routeing option is not considered realistic given the sea room available for alternative options. For small craft, use of the sea room between the Array Area and Erebus is considered more feasible, and this has been acknowledged by the RYA during the Hazard Workshop in August 2023, with the ability to avoid tanker routeing an additional incentive for this option.

290. It is noted that the route deviation associated with White Cross is not affected by the presence of the proposed Project, either directly or indirectly (by sharing sea room with routes which are directly affected). Therefore, no cumulative risk is considered with respect to this route.

291. For tankers awaiting orders, the additional presence of Erebus may further restrict available sea room. However, most of this activity occurs east of Erebus and so is not expected to be materially impacted by the cumulative presence of multiple developments.

292. The same main consequences (increased journey times and distances) and mitigation measures relevant for each phase of the equivalent hazard for the proposed Project in isolation are again applicable, including promulgation of information and marking on relevant nautical charts. Given the greater length of deviations compared with the in isolation scenario, the severity of consequence is greater, although remains relatively low given the increased distances relative to the length of routes.

Tier 3

293. The TCE PDAs will significantly influence commercial routeing in the area if built out in full. The Array Area has been refined in response to stakeholder feedback so as to align with the

gap between PDA 3 and 4 (see Figure **25-9**), thus minimising any further disruption to the tanker routeing to/from Milford Haven. For other routes on a similar heading, the presence of the PDAs may serve to 'shelter' the Array Area – their location means that vessels will not transit in proximity to the Array Area from the southwest. For east-west routes anticipated to pass south of the Array Area and Erebus in the Tier 1/2 scenario, it may be necessary to pass north of both developments, although there is sea room available to do so.

294. The Pembrokeshire Demonstration Zone may also cumulatively affect deviations, although as with the TCE PDAs there is alignment to allow tanker routeing to/from Milford Haven to continue. There is also adequate sea room available south of the Pembrokeshire Demonstration Zone to allow east-west routes to continue as described above.

Frequency of Occurrence

295. For all project phases the frequency of occurrence is therefore considered to be **frequent**.

Severity of Consequence

296. For all project phases the severity of consequence is therefore considered to be **minor**.

Significance of the effect

297. For all project phases, the frequency of occurrence of cumulative vessel displacement is considered to be **frequent** and the severity of consequence is assessed as **minor**. Therefore, for all project phases, the effect will, be of **Tolerable with Mitigation** significance, which is not significant in EIA terms.

Increased Third-Party Vessel to Vessel Collision Risk

298. Construction / decommissioning activities associated with the installation / removal of structures and cables and the presence of structures any increase encounters and collision risk with other third-party vessels on a cumulative level.

Tier 1/2

299. The same cumulative vessel routeing considered for the vessel displacement hazard is again applicable.

300. The deviation of multiple routes around the west of Erebus may further increase collision risk given that a greater number of routes will be passing west of Erebus than was the case passing west of the Array Area for the in isolation assessment. However, given the volumes of traffic associated with these routes, the increase is anticipated to be limited and there is sea room available to ensure vessels are able to pass each other safely should an encounter arise.

301. For the option of passing east of the Array Area, quantitative modelling has been undertaken (noting that this option provided the greater collision frequency for the in isolation scenario). The collision frequency was estimated at one in 895 years, representing an 88% increase on the pre OWF scenario. Although this is a high increase, the likelihood of a collision incident remains moderate and this is also reflected when considering future case traffic levels.

302. For small craft, the option to pass between the Array Area and Erebus is feasible, as acknowledged by the RYA during the Hazard Workshop in August 2023. This may allow small craft to avoid tanker routeing and thus minimise collision risk, noting that the consequences should a small craft collide with a larger vessel would likely be exacerbated.

Tier 3

303. The TCE PDAs may exacerbate collision risk further to the west of Erebus due to the resulting less sea room. This is particularly relevant should PDA 1 and 2 be built out in full given the

sharp corner at the northwestern extent. Additionally, the presence of the Pembrokeshire Demonstration Zone may reduce available sea room for passing vessels.

304. However, in both cases, the volumes of traffic in the area are again noted. The cumulative collision risk would likely remain at a manageable level, noting that the embedded mitigation measures for the proposed Project are expected to also apply to the cumulative developments.

Frequency of Occurrence

305. For all project phases the frequency of occurrence is therefore considered to be **remote**.

Severity of Consequence

306. For all project phases the severity of consequence is therefore considered to be **serious**.

Significance of the effect

307. For all project phases the frequency of occurrence of cumulative encounters and collision risk is considered to be **remote** and the severity of consequence is assessed as **serious**. Therefore, for all project phases, the effect will, be of **Tolerable with Mitigation** significance, which is not significant in EIA terms.

Increased Third-Party to Project Vessel Collision Risk

308. Project vessels associated with construction, operation and maintenance, and decommissioning activities may increase encounters and collision risk for other vessels already operating in the area on a cumulative level.

Tier 1/2/3

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

310. However, all developers are expected to establish appropriate marine coordination and vessel management systems with project vessels complying with Flag State regulations including the COLREGs and SOLAS. Coordination with MHPA will likely also be important on a cumulative basis.

Frequency of Occurrence

311. For the construction and decommissioning phases, the frequency of occurrence is therefore considered to be **extremely unlikely**.

312. For the operation and maintenance phase, the frequency of occurrence is therefore considered to be **remote**.

Severity of Consequence

313. For all project phases, the severity of consequence is therefore considered to be **serious**.

Significance of the effect

314. For the construction and decommissioning phases, the frequency of occurrence of cumulative third-party to project vessel collision risk is **extremely unlikely** and the severity of consequence is assessed as **remote**. For the operation and maintenance phase, the frequency

of occurrence of cumulative third-party to project vessel collision risk is **remote** and the severity of consequence is assessed as **serious**.

315. Therefore, the effect will, be of **Tolerable with Mitigation** significance for all project phases, which is not significant in EIA terms.

Creation of Vessel to Structure Allision Risk

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

Tier 1

317. Given the localised nature of vessel to structure allision risk, cumulative risk is limited. However, given that small craft may choose to navigate between the Array Area and Erebus (located approximately 3 nm to the northwest of the Array Area), there is some potential cumulative allision risk. This sea room is considered adequate to allow safe navigation by small craft, noting that Trinity House will give due consideration to cumulative lighting and marking requirements across both the proposed Project and Erebus.

Tier 2/3

318. The distance between the Array Area and White Cross and the Pembrokeshire Demonstration Zone is sufficient that no potential cumulative allision risk is considered.

319. Although the TCE PDAs are in close proximity to the Array Area, there is limited information currently available in relation to the nature of any layout which may be taken forward. However, as with Erebus, it is expected that Trinity House will give due consideration to cumulative lighting and marking requirements across the proposed Project and any developments within the TCE PDAs when they are taken forward.

320. The nearest screened in cumulative development is the Erebus OWF, located 3 nm northwest of the Array Area. White Cross is located 9 nm south of the Array Area. Given this available sea space between the Array Area and the screened in developments, it is unlikely that vessels will experience increased allision risk beyond the localised risk when passing any given development.

321. All developments will be required to implement marine lighting and marking in agreement with Trinity House and in compliance with IALA G1162 (IALA, 2021), meaning the localised risk is managed.

Frequency of Occurrence

322. The frequency of occurrence is therefore considered to be **remote** for powered and internal allision risk, and **extremely unlikely** for drifting allision risk.

Severity of Consequence

323. The severity of consequence is therefore considered to be **moderate** for all forms of allision risk.

Significance of the effect

324. The frequency of occurrence of vessel to structure allision risk is **remote** (worst-case) and the severity of consequence is assessed as **moderate**. Therefore, the effect will, be of **Tolerable with Mitigation** significance for all project phases, which is not significant in EIA terms.

Reduced Access to Local Ports and Harbours

325. Construction, operation and maintenance, and decommissioning activities and the presence of the proposed Project alongside other cumulative developments may reduce access to local ports and harbours.

Tier 1/2

326. Given the relative distance to ports in the area and the anticipated cumulative deviations for the main commercial routes, it is not anticipated that there will be any substantial effect due to activities associated with Tier 1 and Tier 2 cumulative developments beyond the deviations already outlined for hazards relating to vessel displacement. This assumes that the duration and nature of such activities are analogous to that considered for the proposed Project.

327. Based on current known programmes of construction, cable installation activities associated with Erebus will not overlap temporally with the proposed Project. However, in the event this did occur, it is anticipated that the two developments would coordinate activities in liaison with MHPA to ensure that access constraints to Milford Haven are minimised. As is the case for the assessment of the proposed Project in isolation, promulgation of information to allow mariners to passage plan accordingly is key.

Tier 3

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

Frequency of Occurrence

329. For all project phases, the frequency of occurrence is therefore considered to be **reasonably probable**.

Severity of Consequence

330. For all project phases, the severity of consequence is therefore considered to be **negligible**.

Significance of the effect

331. For all project phases, the frequency of occurrence of cumulative reduced access to local ports and harbours is **reasonably probable** and the severity of consequence is assessed as **negligible**.

332. Therefore, for all project phases, the effect will, be of **Tolerable with Mitigation** significance, which is not significant in EIA terms.

Reduction in Under Keel Clearance

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

Tier 1

334. Given the localised nature of under keel clearance risk, cumulative risk is limited. However, given the potential for the export cable route corridors for the proposed Project and Erebus to be in relatively proximity, there is some potential cumulative under keel clearance risk associated with the presence of cable protection.

335. Portions of the OfECC which may be shared with the Erebus export cable corridor are outside of the nearshore area such that the likelihood of a reduction in charted water depth greater

than 5% is low. Nevertheless, as per the assessment of the proposed Project in isolation, in such circumstances the MCA will be consulted on appropriate mitigation (if required) to ensure the under keel risk is ALARP.

Tier 2/3

336. Given the distance between the proposed Project and White Cross, and the low data confidence associated with Tier 3 cumulative developments (particularly in relation to export cable routes), no cumulative risk associated with under keel clearance is identified.

Frequency of Occurrence

337. The frequency of occurrence is therefore considered to be **extremely unlikely**.

Severity of Consequence

338. The severity of consequence is therefore considered to be **moderate**.

Significance of the effect

339. The frequency of occurrence of cumulative reduction in under keel clearance is **extremely unlikely** and the severity of consequence is assessed as **moderate**. Therefore, the effect will, be of **Broadly Acceptable** significance, which is not significant in EIA terms.

Anchor Interaction with Mooring Lines or Subsea Cables

340. The presence of mooring lines and subsea cables may increase the risk of anchor interaction on a cumulative level.

Tier 1

341. Given the localised nature of anchor interaction risk, cumulative risk is limited. However, given the potential for the export cable route corridors for the proposed Project and Erebus to be in relatively proximity, there is some potential cumulative anchor interaction risk.

342. The overall footprint of export cables across the proposed Project and Erebus will be small, such that vessels are expected to be able to avoid anchoring over the cables. It is noted that cables associated with Erebus will be marked on nautical charts similarly to the proposed Project.

343. Additionally, a cable burial risk assessment will also be undertaken for Erebus, as well as for the proposed Project and inform the burial / protection of cables. Therefore, should an anchor interaction occur, the consequences are expected to be broadly similar for the cumulative scenario to that determined for the assessment of the Project in isolation.

Tier 2/3

344. Given the distance between the proposed Project and White Cross, and the low data confidence associated with Tier 3 cumulative developments (particularly in relation to export cable routes), no cumulative risk associated with anchor interaction is identified.

Frequency of Occurrence

345. The frequency of occurrence is therefore considered to be **extremely unlikely**.

Severity of Consequence

346. The severity of consequence is therefore considered to be **minor**.

Significance of the effect

347. The frequency of occurrence of cumulative anchor interaction is **extremely unlikely** and the severity of consequence is assessed as **minor**. Therefore, the effect will, be of **Broadly Acceptable** significance, which is not significant in EIA terms.

Reduction of Emergency Response Capability Including SAR

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

Tier 1/2/3

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

350. Given that the Array Area is not immediately adjacent to Erebus or any other cumulative development, there is not considered to be any cumulative risk associated with SAR access, noting that a 1 nm separation is required by MGN 654.

Frequency of Occurrence

351. The frequency of occurrence is therefore considered to be **remote**.

Severity of Consequence

352. The severity of consequence is therefore considered to be **serious**.

Significance of the effect

353. The frequency of occurrence of cumulative reduction of emergency response capability is **remote** and the severity of consequence is assessed as **serious**. Therefore, the effect will, be of **Tolerable with Mitigation** significance, which is not significant in EIA terms.

25.12 Inter-related Effects of the proposed Project

354. The term 'Inter-related' considers the environmental interactions ('inter-relationships') with other receptors within the proposed Project. These are referred to in the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 and further described in **Chapter 31 – Inter-related Effect Assessment**.

355. As set out in PINS Advice Note 17 (PINS, 2019), inter-related -project effects, or 'interrelationships between topics', derive from combinations of different project specific impacts which, when acting together on the same receptor, could result in a new or different effect, or an effect of greater significance than the project effects, when considered in isolation.

356. Inter-related effects comprise the following:

357. *Project lifetime effects:* effects that have the potential to occur during more than one phase of the proposed Project (i.e. construction, operation and maintenance and decommissioning) and also to interact in a way that could potentially create a more significant effect than if it was assessed in isolation.

358. *Receptor-led effects:* effects that have the potential to interact, spatially and temporally, to create inter-related effects on a receptor.

359. **Chapter 31 - Inter-related Effects Assessment** details the approach to the inter-related effects assessment and includes a description of the likely inter-related effects that may occur because of the proposed Project on Shipping and Navigation.

25.12.23. *Inter-related Project lifetime effects*

360. Inter-related effects that may occur throughout the project lifetime on Shipping and Navigation are limited. The overlap between commercial fishing vessel displacement in transit and engaged in fishing activity has been addressed in **Chapter 26: Commercial Fisheries**.

25.12.24. *Inter-related receptor-led effects*

361. No inter-related receptor-led effects are identified for Shipping and Navigation.

25.13 Transboundary Effects

362. A transboundary effect refers to the impacts or effects of a project that extend beyond the boundaries of the UK and have the potential to affect the environment of other countries within the European Economic Area (EEA). These effects can occur either from the proposed Project on its own or when combined with the effects of other projects or activities in the wider geographical area.

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

364. Since the use of AIS transceivers (the primary data source for characterisation of commercial vessel movements) is international, the characterisation of the existing environment in **Section 25.5** is suitable for identifying relevant other EEAs. Other EEAs with port(s) which feature explicitly in the main commercial routes include Ireland, the Netherlands, Spain, and Gibraltar (with the latter two captured as Mediterranean ports).

365. Since such international commercial routeing is captured in the existing environment, the environmental assessment for the proposed Project in isolation suitably considers this effect in transboundary terms, with no likely significant transboundary effects. This also extends to the assessment of cumulative effects, noting that all screened projects are located within the UK rather than other EEAs.

25.14 References

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