Preliminary Environmental Information Report Volume 2

Appendix 23.1 Navigational Risk Assessment

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LIONLINK

LionLink
Navigational Risk Assessment

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Abbreviations Table

Abbreviation	Definition
AIS	Automatic Identification System
ALARP	As Low As Reasonably Practicable
ALB	All-weather Lifeboat
AtoN	Aid to Navigation
CBRA	Cable Burial Risk Assessment
CEMP	Construction Environmental Management Plan
CFE	Controlled Flow Excavator
CLB	Cable Lay Barge
CLV	Cable Lay Vessel
COLREGS	International Regulations for Preventing Collisions at Sea
CSV	Construction Support Vessel
CTV	Crew Transfer Vessel
DfT	Department for Transport
DCO	Development Consent Order
DIO	Defence Infrastructure Organisation
DML	Deemed Marine Licence
DMR	Dedicated Metallic Return
DWT	Dead Weight Tonnage
EAOW	East Anglia Offshore Wind Ltd
EEZ	Exclusive Economic Zone
EMF	Electromagnetic Field
ERRV	Emergency Response and Rescue Vessel
ES	Environmental Statement
EU	European Union
FLO	Fisheries Liaison Officer
FOC	Fibre Optic Cable
FSA	Formal Safety Assessment
GT	Gross Tonnage

Abbreviation	Definition
GW	Gigawatt
HDD	Horizontal Directional Drilling
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
ILB	Inshore Lifeboat
IMO	International Maritime Organization
JRCC	Joint Rescue Coordination Centre
JUB	Jack-up Barge
km	Kilometre
KP	Kilometre Point
kV	Kilovolt
LOA	Length Overall
m	Metre
MAIB	Marine Accident Investigation Branch
MCA	Maritime and Coastguard Agency
MDS	Maximum Design Scenario
MGN	Marine Guidance Note
MHWS	Mean High Water Springs
MMO	Marine Management Organisation
MOD	Ministry of Defence
MPCP	Marine Pollution Contingency Plan
MRCC	Maritime Rescue Coordination Centre
NAVAREA	Navigational Areas
NAVTEX	Navigational Telex
NGLLL	National Grid Lion Link Limited
NSIPs	Nationally Significant Infrastructure Projects
NtM	Notice to Mariners
NM	Nautical Mile
NRA	Navigational Risk Assessment
OOS	Out-of-service

Abbreviation	Definition
OREI	Offshore Renewable Energy Installation
PEIR	Preliminary Environmental Information Report
PLGR	Pre-lay Grapnel Run
PLL	Potential Loss of Life
RAM	Restricted in their Ability to Manoeuvre
RNLI	Royal National Lifeboat Institution
RYA	Royal Yachting Association
SAR	Search and Rescue
SOLAS	International Convention for the Safety of Life at Sea
SOPEP	Shipboard Oil Pollution Emergency Plan
SOSA	Site Outside Safeguarding Areas
SPR	ScottishPower Renewables
µT	MicroTesla
TCE	The Crown Estate
TSHD	Trailing Suction Hopper Dredger
TSS	Traffic Separation Scheme
UK	United Kingdom
UKC	Under-keel Clearance
UKHO	United Kingdom Hydrographic Office
UNCLOS	United Nations Convention on the Law of the Sea
UXO	Unexploded Ordnance
VHF	Very High Frequency
VMS	Vessel Monitoring System
ZoI	Zone of Influence

1 Introduction

1.1 Project Summary

Anatec Ltd were commissioned by CEA to undertake a Navigational Risk Assessment (NRA) for the LionLink Project (hereafter 'the Project') between the United Kingdom (UK) and the Netherlands for National Grid Lion Link Limited (NGLLL) (hereafter 'the Applicant'). The assessment covers the Proposed Offshore Scheme (the offshore UK elements of the Project) between Mean High Water Springs (MHWS) to the boundary between the UK and Netherlands Exclusive Economic Zone (EEZ).

This NRA presents information on the Proposed Offshore Scheme relevant to existing and estimated future navigational activity and forms the technical appendix to **Chapter 23 Shipping and Navigation** of this Preliminary Environmental Information Report (PEIR).

1.2 Objectives

The NRA methodology follows the Maritime and Coastguard Agency (MCA) Marine Guidance Note (MGN) 654 (Ref. i), but takes into consideration that the Proposed Offshore Scheme consists of subsea cables and associated protection only, and there is no permanent surface infrastructure. This NRA includes:

- Overview of NRA methodology;
- Summary of consultation undertaken with shipping and navigation stakeholders to date;
- Lessons learnt from previous subsea cable projects;
- Summary of the project description relevant to shipping and navigation;
- Baseline characterisation of the existing environment;
- Discussion of potential impacts on navigation;
- Future case marine traffic characterisation;
- Assessment of navigational risk (following the Formal Safety Assessment (FSA) process); and
- Outline of embedded mitigation measures.

Potential hazards are considered for each phase of the Proposed Offshore Scheme as follows:

- Construction/Installation;
- Operation/Maintenance; and
- Decommissioning.

The assessment of the Proposed Offshore Scheme is based on a parameter-based Project Design Envelope (PDE) approach, in accordance with industry best practice. This approach allows for a project to be assessed on the basis of maximum project design parameters (i.e., the worst-case scenario) and includes conservative assumptions to form a Maximum Design Scenario (MDS) which is considered and assessed for all impacts. Further details on the design envelope are provided in **Chapter 2 Description of the Proposed Scheme** of this PEIR

The shipping and navigation baseline and risk assessment has been undertaken based upon the information available and consultation responses received at the time of preparation.

2 Project Overview

2.1 Project Location

The Project is a proposed electricity interconnector between the UK and the Netherlands that will supply up to 2 gigawatts (GW) of electricity and will connect to Dutch offshore wind via an offshore converter platform in Dutch waters.

The Proposed Scheme (defined as the part of the Project within the UK jurisdiction) would involve the construction of a converter station and the installation of offshore and onshore underground high voltage direct current (HVDC) cables to the onshore converter station and underground high voltage alternating current (HVAC) cables between the converter station and the proposed Friston substation.

This NRA assesses the Proposed Offshore Scheme (the component of the Proposed Scheme seaward of MHWS) within the UK EEZ. The Proposed Offshore Scheme is approximately 97NM in length, and approximately 65NM from the coast at its furthest point offshore.

Analysis is primarily undertaken within a 5NM buffer of the Draft Order Limits of the Proposed Offshore Scheme, hereafter the 'study area'. The Draft Order Limits of the Proposed Offshore Scheme and the study area are presented in Figure 2.1.

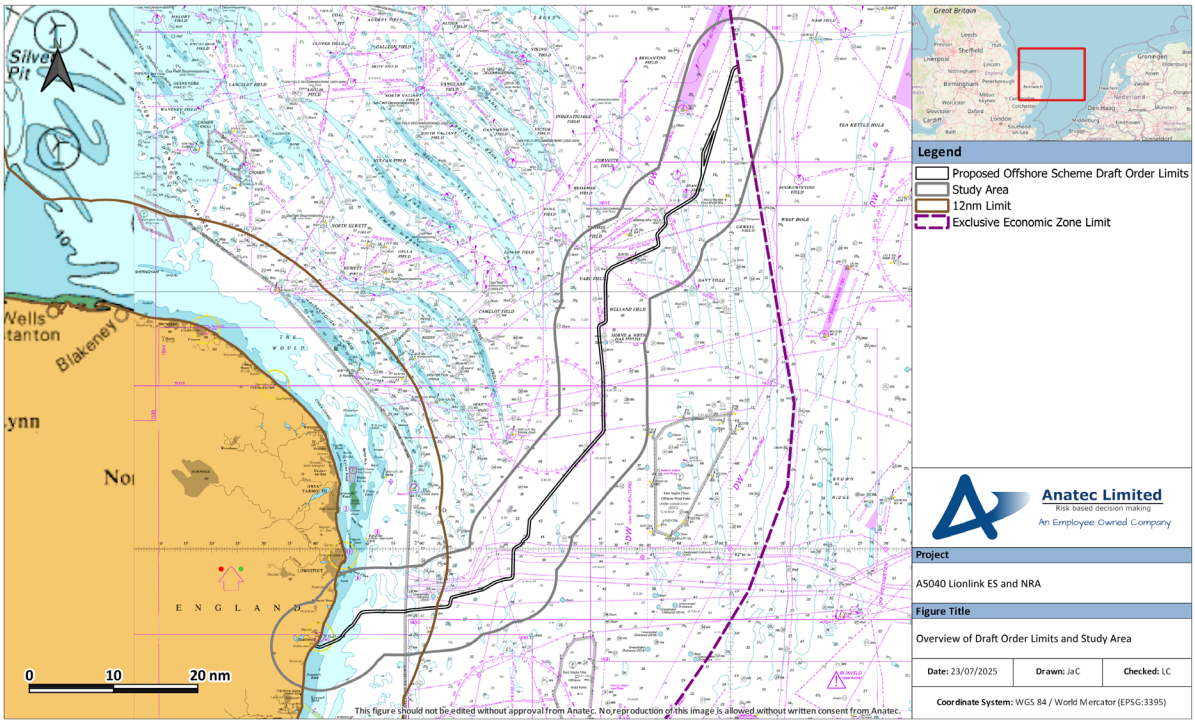

Figure 2.1 Overview of Draft Order Limits and Study Area

The use of a 5NM buffer is standard practice and sufficient to characterise the shipping activity and navigational features close to the Proposed Offshore Scheme and to encompass any vessel traffic that may be impacted by the cables and associated operations, while also

remaining project-specific in terms of the vessel activity and navigational features that it captures. Navigational features outside of the study area have been considered and discussed if relevant, for context and wider discussion purposes. The study area has been presented to stakeholders during consultation meetings and no objections were made regarding the approach.

2.2 Details of Works

This section presents a summary of the details of the Proposed Offshore Scheme relevant to shipping and navigation. Full details of the Proposed Offshore Scheme are presented in **Chapter 2 Description of the Proposed Scheme** of this PEIR.

2.2.1 Project Design

Key parameters of the Proposed Offshore Scheme taken from **Chapter 2 Description of the Proposed Scheme** are presented in Table 2.1.

Table 2.1 Proposed Offshore Scheme Project Parameters

Parameter	Project Design
Length of Offshore HVDC Submarine Cable Corridor in UK waters	98NM (182km)
Number of trenches	1
Width of trench	5m
Burial depth	Minimum of 1.0m, with specific depths to be informed by Cable Burial Risk Assessment (CBRA)
Cable protection measures	To be applied where burial is not feasible, and at infrastructure crossings. Height to be determined by CBRA and crossing agreements with the maximum height of protection at infrastructure crossings being 2.2m.
Number of HVDC power cables	2
Operating voltage of HVDC cables	525 kilovolts (kV)
Number of Fibre Optic Cables (FOC)s	1
Number of Dedicated Metallic Return (DMR) cables	1
Number of infrastructure crossings requiring crossing construction	Up to 19
Maximum height of infrastructure crossings	2.2m

2.2.2 Cable Construction Works

Construction works will include the following key activities:

- Pre-installation activities;
- Landfall works;
- Cable lay; and
- Burial and protection works.

2.2.2.1 Pre-Installation Activities

Works will be required to survey and prepare the route for the Proposed Offshore Scheme construction. Surveys of the Draft Order Limits have already been undertaken, with further surveys to take place ahead of construction. It is anticipated that two survey vessels will be required for these.

In addition to surveys, Unexploded Ordnance (UXO) identification and, if necessary, clearance will also take place in advance of the Proposed Offshore Scheme construction. It is anticipated that identification would involve two construction support vessels (CSV), while clearance would involve one CSV and one guard vessel. It is noted that UXO clearance will be subject to a separate Marine Licence application; the assessment provided is for information only to give a holistic overview of the Proposed Offshore Scheme.

Route preparation works may also include boulder clearance, pre-lay grapnel run (PLGR), trial trenching, sand wave clearance and the preparation of crossings with other subsea infrastructure. The requirement and extent of boulder clearance works will be informed by the geophysical surveys, with up to 17% of the route expected to require boulder clearance. If boulder clearance is required, this would be carried out by a CSV, and would either involve grabbing and moving individual boulders, or using a SCAR plough or similar method for larger volumes of boulders.

A PLGR will be undertaken in advance of cable lay to ensure debris on the seabed is removed and will be undertaken by a CSV. Noting that the cable lay and burial will be undertaken over several campaigns, the PLGR may be undertaken either along the whole route in advance of the first campaign, or along each section of the route prior to individual campaigns.

Sand wave clearance is expected to be required for up to 9% of the cable route, or 14.2km. This will be undertaken by a single trailing suction hopper dredger (TSHD) or Controlled Flow Excavator (CFE).

The Proposed Offshore Scheme is expected to cross a number of subsea cables and pipelines. Out of service cables are proposed to be cut, subject to agreement with the cable owners, with a section removed to allow the Proposed Offshore Scheme to be laid. At up to 24 crossings with pipelines and in-service cables, crossings will be constructed with external protection installed, up to a maximum height of 2.2m. Crossing preparation would involve

one CSV and one rock placement vessel. A list of the cables and pipelines crossed is presented in **Chapter 2 Description of the Proposed Scheme** of this PEIR.

2.2.2.2 Landfall Works

The proposed Landfall will be installed using horizontal directional drilling (HDD), with three ducts taking the cables from the Proposed Onshore Scheme to exit points ("punch-out" locations) indicatively located between 5m and 9m water depth. Based on charted water depths, this corresponds to exit points between 440m and 890m offshore from MHWS. Vessels are expected to be required at the proposed Landfall Site for approximately 2-3 weeks for offshore landfall works. Vessels will be involved in the construction of the Proposed Landfall, including the following:

- 1 x Jack-up Barge (JUB)/Multicat;
- 1 x tug;
- 1 x crew transfer vessel (CTV); and
- 4 x small workboats.

2.2.2.3 Cable Lay

The cables will be laid using a cable lay vessel (CLV) and a cable lay barge (CLB). The CLV will lay the majority of the cable, while the CLB will be used to lay the cables in areas of shallow waters.

Cable pull-in is the process of pulling the cables through the pre-prepared HDD ducts. The cables will be pulled into the ducts using an onshore winch. During the operation, the cable end would be transferred from the CLV to a multi-cat or CSV at approximately 10m water depth, with floats installed to keep the cable end afloat. Workboats will also be positioned along the floating cable section to ensure the cable is steady as it enters the HDD duct. Further details on the pull-in process are included in **Chapter 2 Description of the Proposed Scheme** of this PEIR. The highest numbers of vessels will be present during cable pull-in, with vessels associated with landfall enabling works and cable present simultaneously.

Three configurations are possible for the cable lay operation:

- Lay of the cable into a pre-cut trench;
- Simultaneous lay and burial of the cable; and
- Cable lay to the seabed for post-lay burial.

Dependent on the technique used, cable lay is expected to proceed at speeds between 100m and 500m per hour. Cable laying will be taking place 24 hours a day in order to minimise disruption and the overall installation time.

During cable lay, either the CLV or CLB may be Restricted in their Ability to Manoeuvre (RAM) due to the nature of their work, and guard vessels may be deployed where required to warn other vessels of the ongoing works. Guard vessels may also be deployed in locations where the cables are unburied or unprotected following cable lay.

2.2.2.4 Burial and Protection Works

Where possible, it is proposed to protect the cables via burial. Where this is not feasible, external protection measures may be required, including at crossings of the Proposed Offshore Scheme with other subsea infrastructure such as existing pipelines and cables. The target burial depth and protection required will be confirmed based on the results of the Cable Burial Risk Assessment (CBRA), however it is anticipated that burial depths will be a minimum of 1.0m.

The choice of burial tool will be based on a number of factors, with options including a cable plough, jet trenching, vertical injector, cutting or CFE. Depending on the technique selected, there may be a period following cable lay where the cables are exposed on the seabed. Alternatively, the cables may be simultaneously laid and buried, either using equipment towed by the cable lay vessel, or an additional vessel following behind. As with cable lay, burial works are anticipated to take place 24 hours a day. The cables will be buried in a trench up to 5m wide.

Where burial to the target depth is not feasible, external protection in the form of rock placement, mattresses, rock bags or protective coverings may be required, to protect the Proposed Offshore Scheme from threats such as fishing gear or anchors. The height of external protection required will also be determined via the CBRA. External protection will also be required at infrastructure crossings, as noted in Section 2.2.2.1.

2.2.2.5 Construction Programme

The construction of the Proposed Offshore Scheme is planned to take place over multiple campaigns taking place between 2028 and 2032. The first campaign is proposed to consist of route preparation works, with further campaigns for the cable lay following this. Vessels associated with the offshore landfall works are expected to be required for a period of 2-3 weeks.

2.2.2.6 Vessels Required for Cable Installation

Table 2.2 presents the indicative vessel numbers anticipated to be required for each stage of construction.

Table 2.2 Indicative Vessel Numbers per Construction Activity

Construction activity	Indicative vessel requirements
Pre-construction survey	2 x survey vessel
UXO Identification	2 x CSV
UXO clearance	1 x CSV 1 x guard vessel
Boulder clearance	1 x CSV
Sand wave clearance	1 x TSHD

Construction activity	Indicative vessel requirements
Crossing preparation	1 x CSV 1 x rock placement vessel
PLGR	1 x CSV
Landfall enabling works	1 x JUB / multicat 1 x tug 1 x crew transfer vessel 4 x small workboats
Cable lay and burial	1 x CLV 1 x CLB 1 x CSV 2 x tug / anchor handler 10 x guard vessel

2.2.3 Operation

The design of the Proposed Offshore Scheme is intended to minimise the need for maintenance. During the operation phase, routine maintenance is not anticipated, however periodic geophysical surveys will be carried out to monitor the cable burial and protection measures. Should the cables become exposed, remedial works may be undertaken.

A cable monitoring system will also be in place to detect cable faults. Should a fault be detected, a cable repair will be carried out. Depending on the extent of the damage and the type of repair required, the repair would be expected to involve an operation of two to six weeks and would be carried out by a single vessel. In the case of a repair in shallow waters (less than 10m), an anchored barge will carry out the repair. In deeper waters, a cable vessel would be used.

2.2.4 Decommissioning Works

Methodology for decommissioning will be assessed at the time of decommissioning in line with the legislation at the time. It is anticipated that removal of the cables would be a similar process to the installation of the cables but in reverse and that all sections of the cables would be removed except for any section or sections which are preferable to leave in situ to minimise impacts associated with removal.

2.3 Maximum Design Scenario

Table 2.3 presents the maximum design scenario for the Proposed Offshore Scheme to be considered in the impact assessment presented in Section 10.

Table 2.3 Maximum Design Scenario

Impact	Maximum Design Scenario
Collision of a passing (third-party) vessel with a vessel associated with cable installation or maintenance	**Construction Phase** ▪ Three year construction period taking place over multiple campaigns between 2028 and 2032. ▪ Construction vessels to include: 2 x survey vessels, 7 x CSV, 11 x guard vessels, 1 x TSHD, 1 x rock placement vessel, 1 x JUB/multicat, 1 x crew transfer vessel, 4 x small workboats, 1 x CLV, 1 x CLB and 3 x tug/anchor handlers. ▪ 500m advisory safe passing distance in place around construction vessels while cable installation is taking place. ▪ Cable lay and burial taking place at 100-500m per hour, and carried out 24 hours a day. **Operational Phase** ▪ No routine maintenance, but surveys, repairs and remedial works possible. ▪ Anticipated 40 year design life.
Cable installation causing disruption to passing vessel routeing/timetables	**Construction Phase** ▪ Three year construction period taking place over multiple campaigns between 2028 and 2032. ▪ Construction vessels to include: 2 x survey vessel, 7 x CSV, 11 x guard vessel, 1 x TSHD, 1 x rock placement vessel, 1 x JUB/multicat, 1 x crew transfer vessel, 4 x small workboats, 1 x CLV, 1 x CLB and 3 x tug/anchor handlers. ▪ 500m advisory safe passing distance in place around construction vessels while cable installation is taking place. ▪ Cable lay and burial taking place at 100-500m per hour, and carried out 24 hours a day.
Increase in the risk of a vessel-to-vessel collision due to construction vessel activity	
Cable installation causing disruption to fishing and recreational activities	
Cable installation causing disruption to third party marine activities (e.g., dredging)	
Reduced access to local ports and harbours	

Impact	Maximum Design Scenario
Anchor interaction with the cable	**Construction Phase** ▪ Four cables in a single bundle, consisting of two HVDC power cables, one DMR cable and one fibre optic cable laid in a single trench. ▪ Offshore HVDC Submarine Cable Corridor of 98NM (182km) in length. ▪ Separate cable lay and burial campaigns leading to a period where the cables are exposed on the seabed. **Operational Phase** ▪ Four cables in a single bundle, consisting of two HVDC power cables, one DMR cable and one fibre optic cable laid in a single trench. ▪ Offshore HVDC Submarine Cable Corridor of 98NM (182km) in length. ▪ Target burial depth of a minimum of 1.0m as informed by the findings of a CBRA. Cable protection to be in place where burial is not feasible, and at cable crossings. ▪ Anticipated 40 year design life.
A vessel engaged in fishing snags its gear on the cable	
Reduction in under-keel clearance resulting from laid cable and associated protection	**Operational Phase** ▪ Four cables in a single bundle, consisting of two HVDC power cables, one DMR cable and one fibre optic cable laid in a single trench. ▪ Offshore HVDC Submarine Cable Corridor of 98NM (182km) in length. ▪ Target burial depth of a minimum of 1.0m as informed by the findings of a CBRA. ▪ Cable protection to be in place where burial is not feasible, and at cable crossings, with design height to be determined by the findings of a CBRA. ▪ Locations and height of crossings where burial is not feasible due to unfavourable ground conditions are still to be determined. ▪ Up to 24 crossings with existing cables and pipelines requiring the construction of a cable crossing with a maximum height of 2.2m. ▪ Anticipated 40 year design life.
Interference with Marine Navigational Equipment	**Operational Phase** ▪ Four cables in a single bundle, consisting of two 525kV HVDC power cables, one DMR cable and one fibre optic cable laid in a single trench. ▪ Maximum magnetic field of 51.9µT (99.3µT including the Earth's magnetic field) at seabed level during normal operation, decreasing with vertical distance from the Proposed Offshore

Impact	Maximum Design Scenario
	Scheme (see Appendix 2.5: Electromagnetic Field Assessment to the PEIR). ▪ MCA thresholds of no more than three degree electromagnetic compass deviation for 95% of the cable route and five degree deviation for the remaining 5% of the cable route will be exceeded in a limited area during normal operations, based on a HDD punchout at approximately 300m offshore. ▪ Offshore HVDC Submarine Cable Corridor of 98NM (182km) in length. ▪ Anticipated 40 year design life.

3 Guidance and Legislation

3.1 Legislation

The following legislation has been considered in this assessment:

- United Nations Convention on the Law of the Sea (UNCLOS) (Ref. ii);
- Submarine Telegraph Act (1885) (Ref. iii);
- International Regulations for Preventing Collisions at Sea (COLREGS) (Ref. iv);
- Chapter V, Safety of Navigation, of the Annex to the International Convention for the Safety of Life at Sea (SOLAS) (Ref. v); and
- Merchant Shipping (Vessel Traffic Monitoring and Reporting Requirements) Regulations 2004 (as amended in 2011) (Ref. vi).

3.2 Primary Guidance

Impacts on shipping and navigation receptors are assessed using an FSA compliant with International Maritime Organization (IMO) guidelines. The primary guidance document used during the assessment is therefore given below:

- *Revised Guidelines for FSA for use in the IMO Rule-Making Process* (Ref. vii).

3.3 Secondary Guidance

The secondary guidance documents used during the assessment are listed below:

- *Marine Guidance Note (MGN) 654 (Merchant and Fishing) Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response* and its annexes[1] (Ref. i); and
- *MGN 661 (Merchant and Fishing) Navigation – Safe and Responsible Anchoring and Fishing Practices* (Ref. viii).

[1] Although this guidance is focused on offshore renewables, it highlights issues to be taken into consideration when assessing the effects of offshore developments on navigational safety and includes guidance on cable protection and burial within UK waters.

4 Navigational Risk Assessment Methodology

4.1 Formal Safety Assessment Methodology

A shipping and navigation user can only be exposed to a risk caused by a hazard if there is a pathway through which a risk can be transmitted between the source activity and the user. In cases where a user is exposed to a risk, the overall significance of risk to the user is determined. This process incorporates a degree of subjectivity. The assessments presented for shipping and navigation users have considered the following criteria:

- Baseline data and assessment;
- Expert opinion;
- Level of stakeholder concern; and
- Number of transits of specific vessels and/or vessel types.

4.2 Formal Safety Assessment Process

The IMO FSA process approved under the IMO circular MSC-MEPC.2/Circ.12/Rev.2 (Ref. vii) has been applied within this assessment. This is a structured and systematic methodology based on risk analysis and cost benefit analysis (if applicable) to reduce impacts to As Low as Reasonably Practicable (ALARP). There are five basic steps within this process (this assessment focuses on Steps 1-3):

- Step 1: Identification of hazards (a list of all relevant accident scenarios with potential causes and outcomes);
- Step 2: Assessment of risks (evaluation of risk factors);
- Step 3: Risk control options (devising regulatory measures to control and reduce the identified risks);
- Step 4: Cost benefit analysis (determining cost effectiveness of risk control measures); and
- Step 5: Recommendations for decision-making (information about the hazards, their associated risks and the cost effectiveness of alternative risk control measures).

A flow diagram of the FSA methodology applied is presented in Figure 4.1.

Figure 4.1 Formal Safety Assessment Process

The FSA assigns each hazard a "severity of consequence" and "frequency of occurrence" to evaluate the significance during the Construction, Operational and Decommissioning phases of the Proposed Offshore Scheme. Table 4.1 and Table 4.2 identify how the severity of consequence and the frequency of occurrence has been defined, respectively.

Table 4.1 Severity of Consequence Ranking Definitions

Rank	Description	Definition			
		People	Property	Environment	Business
1	Negligible	No perceptible risk	No perceptible risk	No perceptible risk	No perceptible risk
2	Minor	Slight injury(ies)	Minor damage to property, i.e., superficial damage	Tier 1[2] local assistance required	Minor reputational risks – limited to users
3	Moderate	Multiple minor or single serious injury	Damage not critical to operations	Tier 2[3] limited external assistance required	Local reputational risks

[2] Tier 1 – Local (within the capability of one local authority, offshore installation operator or harbour authority)
[3] Tier 2 – Regional (beyond the capability of one local authority or requires additional contracted response from offshore operator or from ports or harbours)

Rank	Description	Definition			
		People	Property	Environment	Business
4	Serious	Multiple serious injuries or single fatality	Damage resulting in critical risk to operations	Tier 2 regional assistance required	National reputational risks
5	Major	More than one fatality	Total loss of property	Tier 3[4] national assistance required	International reputational risks

Table 4.2 Frequency of Occurrence Ranking Definitions

Rank	Description	Definition
1	Negligible	Less than 1 occurrence per 10,000 years
2	Extremely unlikely	1 per 100 to 10,000 years
3	Remote	1 per 10 to 100 years
4	Reasonably probable	1 per 1 to 10 years
5	Frequent	Yearly

The severity of consequence and frequency of occurrence are then used to define the significance of risk via a tolerability matrix approach as shown in Table 4.3. The significance of risk is defined as Broadly Acceptable (low risk), Tolerable (intermediate risk) or Unacceptable (high risk).

[4] Tier 3 – National (requires national resources coordinated by the MCA for a shipping incident and the operator for an offshore installation incident)

Table 4.3 Tolerability Matrix and Risk Rankings

Severity of Consequence						
	5					
	4					
	3					
	2					
	1					
		1	2	3	4	5
		Frequency of occurrence				

	Unacceptable (high risk)
	Tolerable (intermediate risk)
	Broadly Acceptable (low risk)

Once identified, the significance of risk will be assessed to ensure it is ALARP. Further risk control measures may be required to further mitigate a hazard in accordance with the ALARP principles. Unacceptable risks are not considered to be ALARP.

5 Consultation

Shipping and navigation stakeholders have been consulted as part of the NRA process. The following sections present the key points from consultation, including the Scoping Opinion, and feedback gathered during consultation meetings and through email correspondence.

5.1 Scoping Opinion

The Scoping Report for the Proposed Scheme was submitted to the Planning Inspectorate in March 2024(Ref ix). Following consultation with the appropriate statutory bodies, the Scoping Opinion was then provided by the Planning Inspectorate on 16th April 2024. Key issues raised during the scoping process specific to the NRA are listed in Table 5.1, together with details of how these issues have been addressed within this NRA. The Applicant received a separate EIA Scoping Opinion from the Marine Management Organisation (MMO) (Reference DCO/2024/00005, dated 04 September 2024) as the MMO were unable to provide opinion to the Planning Inspectorate in time for the April 2024 deadline. In relation to navigation / other users of the sea, the MMO deferred to the MCA and Trinity House comments received by the Planning Inspectorate and had no further comments.

Table 5.1 Summary of Scoping Responses Relevant to Shipping and Navigation

Consultee	Issue Raised	How and Where Considered in the NRA
Planning Inspectorate Scoping Response	Scoping Opinion ID - 3.18.2: "*The Scoping Report states that the 5 nautical mile (nm) buffer around the offshore scoping boundary is sufficient to characterise the relevant baseline conditions for the assessment but does not explain why. The ES should clearly justify why the final extent of the study area reflects the ZoI of the Proposed Development and, where possible, it should be agreed with the relevant consultation bodies.*"	The 5NM buffer around the Draft Order Limits has been chosen as a sufficient area to cover all vessel traffic that can have a potential impact associated with the Proposed Offshore Scheme. Extending the study area beyond this would be inappropriate as it would introduce vessel traffic further away from the Proposed Offshore Scheme, which is assumed to have no direct consequences. Subsequently, this would lead to an exaggerated increase in the frequency of occurrence of all hazards associated with third-party vessels. Consultation was held with various stakeholders i.e., the MCA, Trinity House, UK Chamber of Shipping etc. There were no concerns raised regarding the study area chosen for the NRA. The study area for shipping and navigation, and the justification for the

Consultee	Issue Raised	How and Where Considered in the NRA
		study area defined, is presented in Section 2.1.
	Scoping Opinion ID - 3.18.3: "*The Scoping Report proposes to determine significance as either broadly acceptable, tolerable, or unacceptable in line with the International Maritime Organisation's (IMO) Formal Safety Assessment (FSA) methodology. The ES should clearly set out how the risk assessment approach leads to an assessment of significance of effect that is consistent/ compatible with the terminology used in the ES, for which the intended approach is set out in Chapter 5 (Section 5.5) of the Scoping Report*"	The NRA uses the IMO FSA methodology which is standard practice for assessing shipping and navigation hazards. The impact assessment presented in **Chapter 23 Shipping and Navigation** of this PEIR discusses how the significance of each impact corresponds to the ES terminology defined in the EIA regulations.
MCA – response to Planning Inspectorate	"*The development area carries a significant amount of through traffic, with a significant number of important international shipping routes in close proximity, including the Traffic Separation Schemes (TSS); Off Botney Ground TSS to the North of route B and the TSS Off Brown Ridge to the North East of route C. Although the exact route has not yet been finalised, the proposed offshore cable routes B and C pass through and nearby significant amount of through traffic to offshore wind farms, as well as cargo traffic and fishing activity. Attention needs to be paid to changes in vessel routing, particularly in heavy weather ensuring shipping can continue to make safe passage without large-scale deviations, and any reduction in navigable depth referenced to chart datum.*"	It is noted that route C is no longer being considered for the Proposed Offshore Scheme. The NRA includes details on the vessel traffic using the Off Botney Ground TSS, the deep-water routes, the cargo and ferry routes, as well as the traffic transiting between Lowestoft and offshore wind farms; presented in Sections 7 and 9. The potential impacts associated with displacement of commercial traffic from established routes, disruption to fishing activity, as well as reduction in navigable depth are assessed in Section 10.
	"*The Environmental Statement (ES) will consider the potential impacts of the construction, operation, maintenance and decommissioning phases of the proposed development and will follow the IMO Formal Safety Assessment methodology, which we welcome. The information from the Navigation Risk Assessment (NRA) will feed into the shipping and navigation chapter of the ES. The ES should supply detail on the possible impact on navigational issues for both commercial, fishing and recreational craft, specifically:* ▪ *Collision Risk* ▪ *Navigational Safety* ▪ *Visual intrusion and noise* ▪ *Risk Management and Emergency response* ▪ *Marking and lighting of site and information to mariners* ▪ *Effect on small craft navigational and communication equipment*	The potential impacts associated with shipping and navigation are discussed in Section 10.

Consultee	Issue Raised	How and Where Considered in the NRA
	▪ *The risk to drifting recreational craft in adverse weather or tidal conditions* ▪ *The likely squeeze of small craft into the routes of larger commercial vessels."*	
	"*The MCA welcomes the commitment in section 23-14 to undertake an NRA as an appendix to the ES shipping and navigation chapter including a baseline study which will summarise the navigational features, historical incident data, vessel activity including anchoring and fishing activity in the vicinity of the selected Submarine Cable Corridor, and a constraints map which will include consideration of marine users and potential Unexploded Ordinance (UXO) to inform the choice of cable route.* *The NRA should establish how the phases of the project are managed to a point where risk is reduced and considered to be 'as low as reasonably practicable' (ALARP). The MCA would also welcome a hazard identification workshop to bring together relevant navigational stakeholders for the area to discuss the potential impacts on navigational safety associated with the proposed development. We note that 2 months of up-to-date AIS data, with complete coverage of the study area, for January and July 2023 have been selected to allow for consideration of seasonal variations in vessel traffic.* *We also note the intention to follow the IMO Formal Safety Assessment (FSA) process which we welcome*."	The NRA includes descriptions of the navigational features, historical incident data, vessel activity including anchoring and fishing activity in Sections 7, 8 and 9. The route selection is considered in **Chapter 3 Alternatives and Design Evolution** of this PEIR. The impacts associated with each phase of the Proposed Offshore Scheme are considered in Section 10. The Applicant has carried out extensive consultation with all relevant navigational stakeholders, with key findings presented in Section 5.2. The NRA uses 12 months of AIS data from November 2023 to October 2024 to inform the baseline traffic analysis.
	"*There are other works to facilitate the development including temporary construction compounds, drainage and access, and HDD under the so called "main rivers" if culverts are not used. It should be confirmed by the applicant whether there are any proposed works / activities undertaken below the Mean High-Water Spring within the Hundred River, River Minsmere, River Blyth and River Wang as a result of these aspects, which would impact on any other marine users for the selected locations*."	River Wang and River Blyth were associated with Southwold option and no longer being crossed, for the others the Project is using HDD so there are no proposed works within watercourses.
	"*Attention should be paid to cabling routes and where appropriate burial depth for which a Burial Protection Index study should be completed and subject to the traffic volumes, an anchor penetration study may be necessary. Where cable protection measures are required e.g., rock bags or concrete mattresses, the MCA would be willing to accept a 5%*	Reduction in under keel clearance due to the implementation of external cable protection is considered within the impact assessment presented in Section 10. Compliance with the MCA guidance on the reduction in water depths is included within the

Consultee	Issue Raised	How and Where Considered in the NRA
	reduction in surrounding depths referenced to Chart Datum. This will be particularly relevant where depths are decreasing towards shore and at cable crossings where potential impacts on navigable water increase. Where this is not achievable, the applicant must discuss further with the MCA. *We note the intention for the cables to be buried along the total length of the route with the exception of crossings, with an intended burial depth of between 1 and 2m with a maximum depth of 3m. The Offshore Scheme would cross numerous existing in-service cables and pipelines. The cables would cross over existing infrastructure on a 'bridge' comprised of either aggregate or concrete mattresses or by making use of a separator system put around the cable at installation. This section would subsequently be covered over with a protective layer of either aggregate (rock) or concrete mattresses.* *Where ground conditions prevent the full cable burial i.e., only partial or no burial is achieved, then there may be the need to install external cable protection. This can take the form of concrete mattresses, rock berms or rock bags.* *As the design progresses, further assessments may be required in order to assess the subsea cables protection against shipping and fishing activities (anchoring and trawling). The MCA welcomes the development and review of the Cable Burial Risk Assessment (CBRA) mentioned in section 18.5.3 which will inform detailed understanding of the burial details along the Offshore Cable Corridor in the ES. The CBRA should take into consideration location specific factors such as ground conditions (i.e., ability to bury), intensity of shipping and fishing activity. The MCA welcomes the marine survey campaign that would be undertaken prior to cable lay and burial."*	mitigation measures adopted as part of the Proposed Offshore Scheme in Section 10.2. A CBRA will be undertaken to inform the target burial depth and protection required for the Proposed Offshore Scheme.
	"*We note the potential for a reduction of under keel clearance, which will be scoped into the assessment. It is expected a significant number of cable crossings will be required. Where the cable crosses in-service cables, whether buried or surface laid, a layer of separation in the form of rock berm or concrete mattresses may be installed over the crossed asset. The cable would then also require protection in the form of a post-lay rock berm. The height of the concrete mattress and rock berm above the seabed is currently not specified.*	The reduction in under-keel clearance resulting from cable laying and associated protection is assessed in the impact assessment in Section 10.

Consultee	Issue Raised	How and Where Considered in the NRA
	Safe realistic under keel clearance (UKC) assessment should be undertaken for the maximum drafts of vessel both observed and anticipated."	
	"A study should be undertaken to establish the electromagnetic deviation, affecting ship compasses and other navigating systems, of the high voltage cable route to the satisfaction of the MCA. On receipt of the study, the MCA reserves the right to request a deviation survey of the cable route post installation. There must be no more than a 3-degree electromagnetic compass deviation for 95% of the cable route and for the remaining 5% of the cable route there must be no more than a 5 degree electromagnetic compass deviation. If the MCA requirement cannot be met, a post installation actual electromagnetic compass deviation survey should be conducted for the cable in areas where compliance has not been achieved. We note this has been scoped in (section 23.7.0) of the project which we welcome."	The impacts associated with electromagnetic interference are assessed in the impact assessment in Section 10 based on a specialist EMF study carried out in **Appendix 2.5 LionLink EMF Assessment** of this PEIR.
Ministry of Defence (MOD)/ Defence Infrastructure Organisation (DIO) – response to Planning Inspectorate	*"At this stage the MOD has no concerns regarding the offshore element of this activity, there do not appear to be any Military Practice or Training Areas within the study area, however, please note, there are other defence interests in the locality relating to navigational interests that are not defined in the public domain. The MOD will be able to provide specific advice, as may be necessary, on the proposed cable installation when more detailed information becomes available. Regarding the onshore section, a proposed Landfall at either Southwold or Walberswick and cable route towards Friston Substation has been assessed as a SOSA (Site Outside Safeguarding Areas) as far as MOD interests are concerned, however, the MOD requests to be included in any consultation when more detailed information becomes available."*	Details regarding the project and the coordinates of the Proposed Offshore Scheme have been shared with the DIO. The response is included in Section 5.2.2, with no issues noted. Military activity has also been taken into consideration in **Chapter 25 Other Marine Users** of this PEIR.
RYA– response to Planning Inspectorate	It was noted that there might be some disruption to vessels during the construction phase of the project.	Disruption to recreational vessels is discussed in the Impact Assessment in Section 10.
East Suffolk Council– response to Planning Inspectorate	It was noted that the LionLink project is among the several Nationally Significant Infrastructure Projects (NSIPs) currently proposed or consented within the region. Therefore, it is essential that the full cumulative effects of LionLink with other projects are assessed and mitigated.	Cumulative impacts of the Proposed Offshore Scheme will be considered in Section 11 of the NRA as part of the Environmental Statement (ES) and **Chapter 28 Assessment of Cumulative and Combined Effects of the Project** of this PEIR

5.2 Further Consultation

5.2.1 Stakeholders

The following shipping and navigation stakeholders have been consulted as part of the NRA process:

- MCA;
- Trinity House;
- Royal Yachting Association (RYA);
- Cruising Association;
- UK Chamber of Shipping;
- East Suffolk Council – Statutory Harbour Authority for Southwold Harbour;
- RNLI;
- DIO;
- Wind farm developers:
  - RWE; and
  - ScottishPower Renewables (SPR).
- Ferry operators:
  - P&O Ferries;
  - DFDS Seaways; and
  - Stena Line.

5.2.2 Consultation Responses

Responses were received from stakeholders during consultation undertaken in the NRA process, either during virtual meetings, or via emails. The key points and where they have been addressed in the NRA are presented in Table 5.2.

Table 5.2 Summary of Key Points Raised during Consultation

Date	Consultee / Type of Consultation	Issue Raised	Response to Issue Raised and/or where Considered in the NRA
13/01/2025	Cruising Association – stakeholder consultation	The Cruising Association noted that recreational activity is fairly low in the study area. However, some vessels carrying AIS may be receiving only as opposed to transmitting.	The recreational activity is presented in Section 9.3.4. The RYA Coastal Atlas data has also been used in addition to the AIS, as recreational vessels are likely to be under-represented on AIS. Consultation with the Cruising Association, RYA and Southwold Harbour Authority has been undertaken to understand small vessel activity within the study area.

Date	Consultee / Type of Consultation	Issue Raised	Response to Issue Raised and/or where Considered in the NRA
		Query was raised regarding whether the concern was safety during installation, or after the cable is installed, as the cable is unlikely to impact recreational vessels post installation, as burial of the cable would limit interaction with recreational vessel anchors.	It was noted that both would be considered, however impact on recreational vessels would be more likely associated with disruption while the cable lay vessel is working. This is assessed in Section 10.
		Query was raised regarding the location of the Southwold Anchorage, and the vessels that are frequently anchored there.	The charted anchorages in proximity to the Draft Order Limits are presented in Figure 7.1 and Figure 7.2, and the vessels identified to be anchored within the study area are presented in Section 9.4. Impacts associated with anchoring activity are assessed in Section 10.
16/01/2025	MCA – consultation meeting	It was noted that there are several consented wind farms near the Proposed Offshore Scheme, and hence, their developers should be consulted.	Consultation was held with RWE as developers of the Norfolk projects and SPR as developers of the East Anglia projects. Their comments have been included in this table. Planned offshore wind farms are presented in Section 9.9.1 with further discussion on their impact on the Proposed Offshore Scheme to be assessed in the cumulative effects as part of the ES (Section 11 of the NRA and **Chapter 28 Assessment of Cumulative and Combined Effects of the Project** of this PEIR).
		The MCA enquired about whether details on anchoring activity will be included in the NRA.	The anchoring activity within the study area has been presented in Section 9.4.
		The MCA raised no concerns with the NRA methodology, impacts or mitigation measures presented.	Noted that the MCA accept the methodology, impacts and mitigation measures presented.
16/01/2025	UK Chamber of Shipping – stakeholder consultation	The Chamber queried about the kind of drilling technology that will be used for the project.	Information on the trenchless technique to be used at the proposed Landfall is provided in **Chapter 2 Description of the Proposed Scheme** of this PEIR.

Date	Consultee / Type of Consultation	Issue Raised	Response to Issue Raised and/or where Considered in the NRA
		Query was raised about whether the sand waves will be mitigated by deep burial or active monitoring of the burial.	**Chapter 2 Description of the Proposed Scheme** of this PEIR**.** describes how the Proposed Offshore Scheme will be buried in areas of sand waves and where pre-sweeping may be used to ensure cables are buried to below the non-mobile reference level. Regular surveys would be carried out during operation to monitor burial depths. This is discussed in Section 2.2.
		It was noted that the Draft Order Limits of the Proposed Offshore Scheme intersects an aggregate dredging area, and their operator should be consulted.	The Applicant has consulted the aggregate operator and has provided an option within the Draft Order Limits to avoid the aggregate site should agreement not be reached.
		The Chamber raised no concerns with the NRA methodology, impacts or mitigation measures presented.	Noted that the Chamber accept the methodology, impacts and mitigation measures presented.
16/01/2025	Trinity House – stakeholder consultation	Trinity House noted that Sizewell C Harbour Authority should also be considered in the NRA.	Sizewell C Harbour Limits are approximately 4.2NM south of the Draft Order Limits and presented in the baseline in Section 7.3. Sizewell C will be considered as part of the cumulative effects assessment for the ES (Section 11 of the NRA and **Chapter 28 Assessment of Cumulative and Combined Effects of the Project** of this PEIR).
		It was noted that there are temporary buoys associated with the construction of East Anglia 3 wind farm. Question was raised on how it would impact the vessel traffic once the construction is completed.	This has been taken into consideration as part of the future baseline in Section 9.9.1, and will be considered as part of the cumulative effects assessment for the ES (Section 11 of the NRA and **Chapter 28 Assessment of Cumulative and Combined Effects of the Project** of this PEIR). There were no concerns raised by SPR during consultation, regarding the presence of temporary construction buoys in proximity to the Proposed Offshore Scheme.

Date	Consultee / Type of Consultation	Issue Raised	Response to Issue Raised and/or where Considered in the NRA
		Trinity House raised no concerns with the NRA methodology, impacts or mitigation measures presented.	Noted that Trinity House accept the methodology, impacts and mitigation measures presented.
28/01/2025	RYA – stakeholder consultation	The RYA noted that the main concern would be during construction, for anchored vessels waiting on the tide should the cable not be installed at the proposed Landfall Site using Horizontal Directional Drilling (HDD).	The proposed Landfall is planned to be constructed using a trenchless technique such as HDD as mentioned in Section 2.2 with further details provided in **Chapter 2 Description of the Proposed Offshore Scheme** of this PEIR. Impacts relating to the landfall works are considered in Section 10.
		It was also noted that the disruption to recreational vessels would be greater if the construction happens in the summer months.	The cable installation plan has not been finalised and construction could take place at any time of the year. However, the cable installation is planned to take place over 24 hours per day to minimise the time required for cable installation. The disruption to recreational vessels is assessed in Section 10.
		It was noted that the RYA Coastal Atlas should be used as it provides a heat map showing where the recreational activity is the highest.	The RYA Coastal Atlas has been included in the baseline, see Section 9.3.4.2.
05/03/2025	DFDS Seaways – email correspondence	No issues noted.	Noted.
13/03/2025	Stena Line – email correspondence	It was noted that there may be some temporary disruption to traffic during construction/ decommissioning phases.	The disruption to ferries and other commercial traffic is assessed in Section 10.
02/04/2025	RWE – stakeholder consultation	RWE noted that there will be a spatial overlap i.e., the Proposed Offshore Scheme would cross the export cable corridor (ECR) of Vanguard East. There will also likely be a temporal overlap in construction works.	This will be considered as part of the cumulative effects assessment for the ES (Section 11 of the NRA and **Chapter 28 Assessment of Cumulative and Combined Effects of the Project** of this PEIR). Coordination with RWE has been added to the list of mitigations in Section 10.

Date	Consultee / Type of Consultation	Issue Raised	Response to Issue Raised and/or where Considered in the NRA
		It was noted that if the Vanguard East and West turbines are erected prior to the construction of the Proposed Offshore Scheme, then the main concern would be the cable laying vessel coming in contact with the turbines. This can be avoided with the right coordination and planning, and taking into account SIMOPS and other hazards.	This will be considered as part of the cumulative effects assessment for the ES (Section 11 of the NRA and **Chapter 28 Assessment of Cumulative and Combined Effects of the Project** of this PEIR). Standard mitigations are outlined in Section 10.2, and coordination with wind farm developers has been included as a proposed mitigation in Section 10.4.
03/04/2025	East Suffolk Council – stakeholder consultation	It was noted that if vessels entering/leaving Southwold Harbour are required to make a detour during landfall works, this might make it unsafe for vessels to manoeuvre in that area, as it is a challenging approach that needs to be carried out on a specific bearing (300°). Careful coordination would be required in this scenario as the harbour mouth is very narrow.	Disruption to passing vessels and reduced access to local ports and harbours is assessed in Section 10.
		It was noted that any reduction in water depth would have a significant impact on the harbour mouth, not just on under keel clearance but also in terms of sedimentation and water deflection.	There are no crossings with other subsea infrastructure in the harbour mouth noting that the harbour mouth is located approximately 400m north of the Draft Order Limits. If water depths are expected to be reduced by more than 5% then additional assessment on the impacts to shipping and consultation with key stakeholders will be carried out. Sedimentation and water deflection are assessed in **Chapter 18 Marine Physical Environment** of this PEIR**.**

Date	Consultee / Type of Consultation	Issue Raised	Response to Issue Raised and/or where Considered in the NRA
04/04/2025	SPR - stakeholder consultation	There are three ongoing East Anglia projects (one under construction and two consented) in close proximity to the Proposed Offshore Scheme. It was noted that there is no spatial overlap between the Proposed Offshore Scheme and the three East Anglia projects; however, there might be a temporal overlap between them during construction.	The potential impact between the Proposed Offshore Scheme and East Anglia projects will be considered as part of the cumulative effects assessment for the ES (Section 11 of the NRA and **Chapter 28 Assessment of Cumulative and Combined Effects of the Project** of this PEIR). Standard mitigations will be in place during the installation of the Proposed Offshore Scheme.
		It was noted that there may be slight disruption to wind farm support vessels transiting between Lowestoft and East Anglia ONE (operational), during the cable laying process.	Disruption to third-party vessels has been assessed in Section 10.
04/04/2025	P&O Ferries – email correspondence	It was noted that sufficient navigational warnings during the construction/ decommissioning phases should minimise the impact on P&O Ferries operations.	This has been included in the standard mitigations in Section 10.
07/04/2025	RNLI – email correspondence	No issues noted.	Noted.
25/04/2025	DIO	No issues noted.	Noted

6 Data Sources

The main data sources used in this assessment are listed below, and described in detail in the following sections:

- Automatic Identification System (AIS) data;
- MMO satellite fishing data;
- RYA Coastal Atlas;
- Royal National Lifeboat Institution (RNLI) incident data;
- Marine Accident Investigation Branch (MAIB) incident data;
- Department for Transport (DfT) Search and Rescue (SAR) helicopter taskings data;
- Department for Transport (DfT) port arrival statistics;
- United Kingdom Hydrographic Office (UKHO) Admiralty Charts;
- Admiralty Sailing Directions, North Sea (West) Pilot NP54 12th Edition (Ref. x);
- Marine aggregate dredging areas (The Crown Estate (TCE)); and
- Offshore wind farm lease boundaries and export cable corridors (TCE).

Data sources used have been presented and agreed during consultation with relevant stakeholders.

6.1 AIS Data

The baseline shipping analysis (see Section 9) is primarily based on twelve months of AIS data, spanning the period of 1st November 2023 to 31st October 2024 and recorded from a combination of onshore and satellite receivers to maximise coverage.

AIS equipment is required to be fitted on all vessels of 300 Gross Tonnage (GT) and upwards engaged on international voyages, cargo vessels of 500GT and upwards not engaged on international voyages, and passenger vessels irrespective of size, built on or after 1st July 2002. Under the Merchant Shipping (Vessel Traffic Monitoring and Reporting Requirements) Regulations 2004 (as amended in 2011), fishing vessels of 15m or more in length overall (LOA), UK registered or operating in UK waters, must be fitted with an approved (Class A) AIS (regulation 8A). In addition, all European Union (EU) registered fishing vessels of length 15m and above are required to carry AIS equipment by EU Directive. Smaller fishing vessels (below 15m) as well as recreational craft are not required to carry AIS, but a proportion does so voluntarily. It is also noted that military vessels are not obligated to broadcast on AIS at all times. Therefore, these vessels (e.g., fishing vessels below 15m, recreational vessels and military vessels) will be under-represented within the AIS data.

The reporting interval between position reports for a given vessel typically ranges between a few seconds and up to three minutes, depending on its speed and navigational status (less frequent for anchored and moored vessels).

6.2 VMS Data

The MMO provides Vessel Monitoring System (VMS) satellite data, covering all fishing vessels of 15m or greater, in a density-based grid for the UK. Fishing data from 2020, which was latest available dataset, was reviewed in Section 9.3.5.3.

6.3 RYA Coastal Atlas

The RYA Coastal Atlas may be used to "*help identify and protect areas of importance to recreational boaters, to advise on new development proposals and in discussions over navigational safety*" (Ref. xi). The RYA Coastal Atlas includes a heat map indicating the density of recreational activity around the UK coast and was reviewed in Section 9.3.4.2.

6.4 Royal National Lifeboat Institution Incident Data

The RNLI logs details of incidents it responds to, including the cause of the incident. Data from 2014 to 2023 was reviewed in Section 8.1.

6.5 Marine Accident Investigation Branch Incident Data

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 are inside the UK 12NM territorial waters and carrying passengers to a UK port. There are no requirements for non-commercial recreational craft to report accidents to the MAIB. The MAIB will record details of significant accidents of which they are notified by bodies such His Majesty's Coastguard (HMCG), or by monitoring news and other information sources for relevant accidents. Data from 2014 to 2023 was reviewed in Section 8.2.

6.6 Department for Transport Helicopter Taskings

The Department for Transport (DfT) UK civilian Search and Rescue (SAR) helicopter taskings data from April 2015 to March 2024 was reviewed in Section 8.3.

6.7 UKHO Admiralty Charts

Admiralty charts are nautical charts issued by the UKHO. Charts have been used to identify navigational features in the area. The main charts used in this study were charts number 1504-0, 1503-0, 1543-0 and 1535-0, last updated in January 2025. These will be reviewed again at the ES stage to ensure that any (potential) changes to the existing navigational features are captured within the Shipping and Navigation baseline.

6.8 UKHO Admiralty Sailing Directions

Admiralty Sailing Directions, also known as Pilot Books, are used by mariners to identify established routes when steaming on passage, as well as coastline features, anchorages, ports, etc. Admiralty Sailing Directions, North Sea (West) Pilot NP54 12th Edition, published in 2021 (Ref. x) has been used in this assessment to identify the significant navigational features

in the vicinity of the Draft Order Limits of the Proposed Offshore Scheme. Admiralty Sailing Directions will be reviewed again at the ES stage if a new edition is published.

6.9 Aggregate Dredging Areas

Marine aggregate dredging areas were obtained from TCE. TCE are responsible for licensing capital and maintenance dredging projects which enable navigational channels to be created and maintained on the UK seabed. This report uses the latest available data at the time of writing i.e., April 2025 (TCE, 2025). This data has been combined with boundaries displayed on the latest UKHO Admiralty Charts to ensure the aggregate dredging areas are comprehensively captured.

6.10 Offshore Wind Farms

The offshore wind farm boundaries, export cable corridors and potential areas of extension which are in proximity to the Draft Order Limits were obtained from TCE. This report uses the latest available data at the time of writing (April 2025). Where relevant, the current status of offshore wind farms has been based on the offshore component only, i.e., an offshore wind farm is only considered to be under construction where the associated buoyed construction area is in-situ.

6.11 Data Limitations

6.11.1 AIS Data

It is assumed that vessels under an obligation to broadcast information via AIS have done so. It has also been assumed that the details broadcast via AIS (such as vessel type and dimensions) are accurate unless clear evidence to the contrary was identified. There may be occasional range limitations in tracking certain vessels, especially smaller (Class B AIS) vessels in winter. However, it is not considered that the comprehensiveness of the AIS data affects the accuracy of the assessment undertaken.

Since the vessel traffic data for the study area consists of AIS only, the data has limitations associated with non-AIS targets. Therefore, additional data sources, such as VMS data and consultation feedback, have been considered when assessing the baseline environment.

Military vessels are not required to broadcast on AIS and may therefore be under-represented. The MOD will be consulted as part of the consenting programme.

6.11.2 Incident Data

Although all UK commercial vessels are required to report incidents to the MAIB, this is not mandatory for non-UK vessels unless they are in a UK port, within territorial waters or carrying passengers to a UK port. There are also no requirements for non-commercial recreational craft to report incidents to the MAIB. Nevertheless, the MAIB incident database is considered to be a suitable source for the characterisation of historical incidents and adequate for the assessment.

The RNLI incident data cannot be considered comprehensive of all incidents in the study area. Although hoax and false alarms are excluded, any incident to which a RNLI resource was not mobilised has not been accounted for in this dataset. Nevertheless, the RNLI incident data is still considered to be an appropriate resource for the characterisation of historical incidents and adequate for the assessment.

6.11.3 Admiralty Charts and Sailing Directions

The Admiralty Charts and Sailing Directions published by the UKHO are updated periodically, and therefore the information shown may not reflect the real-time features within the area with complete accuracy. Admiralty Charts are considered to be a suitably comprehensive and adequate resource for the assessment of navigational features within the area and the Sailing Directions are a useful resource to supplement the charts. The most up-to-date available editions of the Admiralty Charts and Sailing Directions have been used to inform the review of navigational features.

For aids to navigation, only those charted and considered key to establishing the Shipping and Navigation baseline are shown. For wrecks, only those of navigational significance are charted (non-charted wrecks are considered in **Chapter 26 Marine Archaeology** of this PEIR).

7 Navigational Features

A plot of the navigational features in proximity to the Draft Order Limits is presented in Figure 7.1. Following this, Figure 7.2 presents a detailed overview of navigational features in proximity to the proposed Landfall Site.

Each of the features shown are discussed in the following subsections and have been identified using the most detailed UKHO Admiralty Charts available at the time of writing (June 2025).

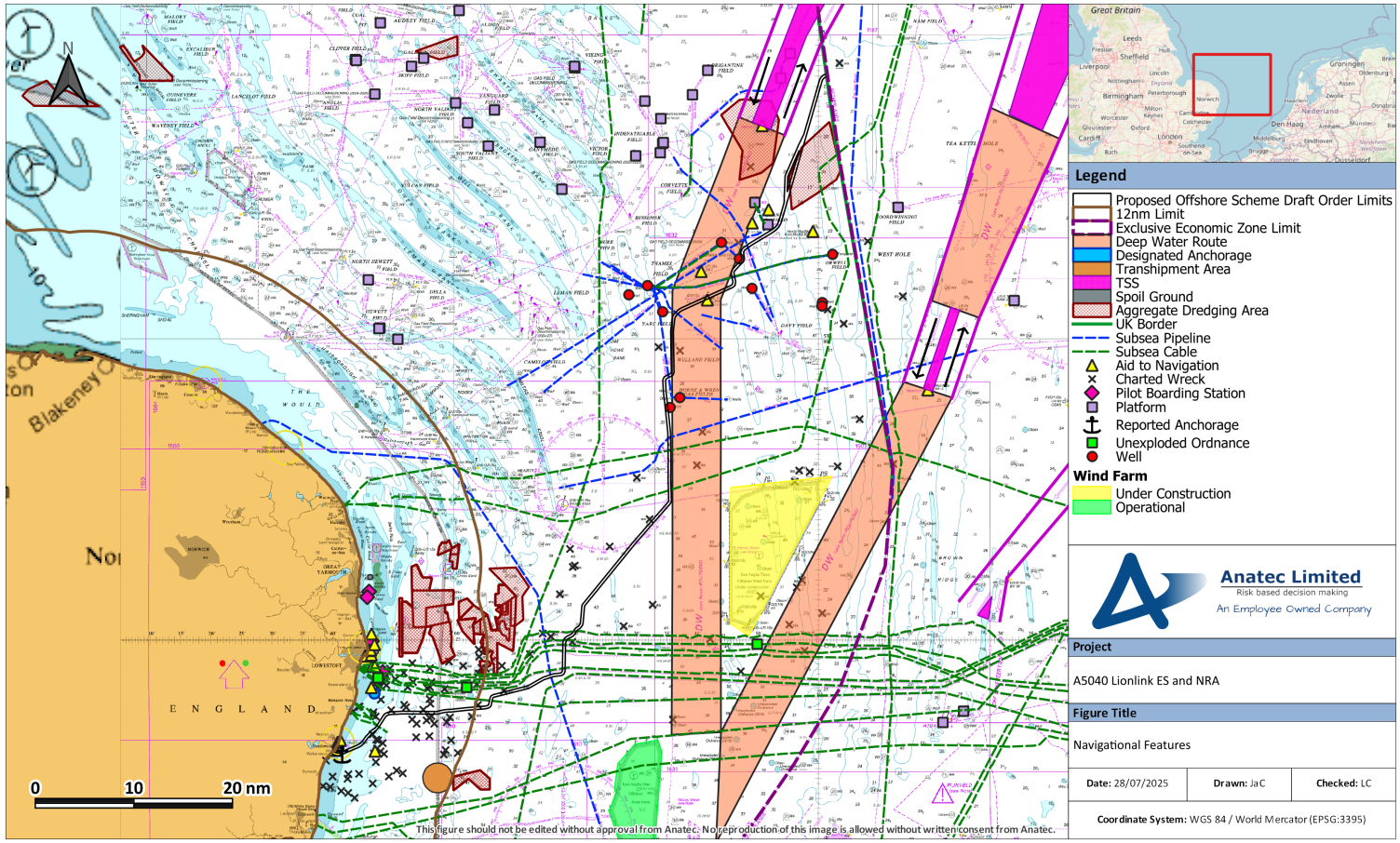

Figure 7.1 Navigational Features

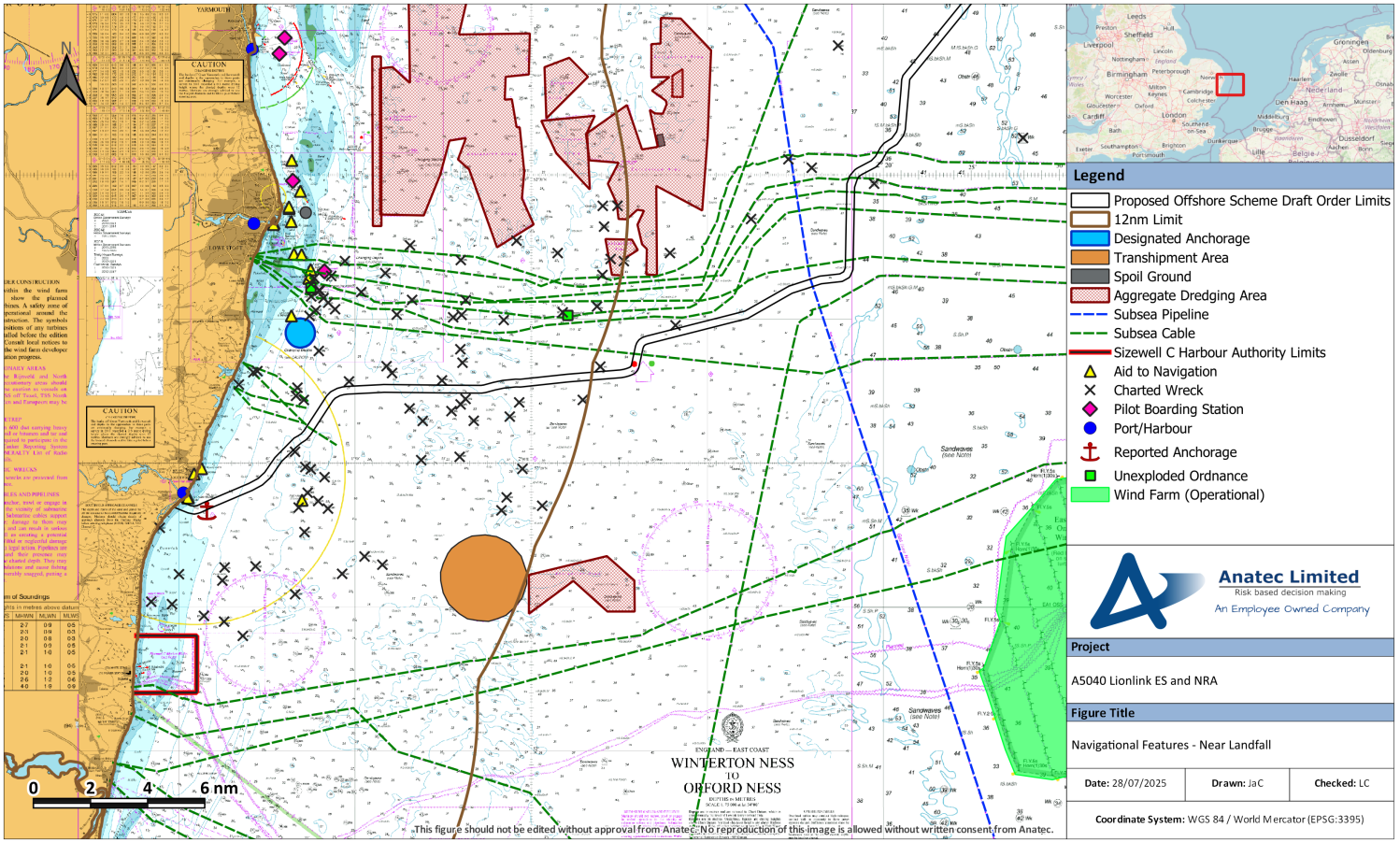

Figure 7.2 Navigational Features (proposed Landfall Site)

7.1 IMO Routeing Measures

The Off Botney Ground Traffic Separation Scheme (TSS) is located approximately 1.2NM to the west of the northern extent of the Draft Order Limits. Also in proximity is TSS Off Brown Ridge, located approximately 19NM south east of the Draft Order Limits. At the entry/exit of both TSSs are mandatory deep-water routes that extend to the south.

The deep-water route that routes traffic to and from Off Botney Ground TSS overlaps with the Draft Order Limits. A note on the chart states of this deep-water route that it "has been designated by IMO as a two-way route for tankers from North Hinder to Indefatigable Bank via DR1 light-buoy".

7.2 Offshore Wind Farms

The nearest operational offshore wind farm to the Draft Order Limits is East Anglia One (operational since 2020), located approximately 10.1NM to the south east. The closest 'under construction' offshore wind farm is East Anglia Three, located approximately 5.9NM to the east of the Draft Order Limits. The offshore construction of East Anglia Three commenced in November 2024 (Ref. xii). Vessel traffic associated with East Anglia Three (once operational) is taken into account in the future baseline in Section 9.9.

There are also additional offshore wind farms that are in proximity to the Draft Order Limits which have been consented or are in early planning stages, including in Dutch waters, and will therefore be considered in the cumulative effects assessment.

7.3 Ports, Harbours and Related Facilities

The closest port/harbour is Southwold Harbour, the entrance to which is located approximately 370m north of the Draft Order Limits. Based on stakeholder consultation, the Draft Order Limits intersect the Southwold Harbour limits (not currently show on Admiralty Charts). There is no pilotage at Southwold Harbour. Vessel movements at the Southwold Harbour are mostly associated with small vessels, including commercial, fishing, leisure, and visiting vessels. In 2023, Very High Frequency (VHF) recorded an average of nine vessels per day visiting the harbour, followed by a daily average of ten vessels in 2024. Recreational and fishing activity in Southwold Harbour is further discusses in Sections 9.3.4.3 and 9.3.5.4.

The next closest port/harbour is the Port of Lowestoft, located approximately 6.1NM north west of the Draft Order Limits at the nearest point. There are two pilot boarding stations located at the approaches to Lowestoft.

The Sizewell C Harbour Authority Limits lie approximately 4.2NM south of the Draft Order Limits, intersecting the study area at the southwestern edge. These limits have been put in place to manage vessel movements during construction of the Sizewell C nuclear power station.

7.4 Subsea Pipelines

Subsea pipelines are located in proximity to the Draft Order Limits, mainly associated with oil and gas infrastructure at its northern portion (see Section 7.9). There is also a gas pipeline connecting the UK with Belgium that crosses the Draft Order Limits at its southern portion. In total, seven charted subsea pipelines (operational and out-of-service (OOS)) intersect the Draft Order Limits. It is noted that the number of subsea pipelines presented in **Chapter 2 Description of the Proposed Scheme** of this PEIR.

7.5 Subsea Cables

Subsea cables can be seen crossing the Draft Order Limits, mainly at its southern portion. A minor proportion of these may be OOS, but still of navigational interest if remaining on the seabed. Six of these cables make landfall at Lowestoft, approximately 5.4NM to the north west of the Draft Order Limits. Overall, ten charted subsea cables (operational and OOS) intersect the Draft Order Limits. It is noted that the number of subsea cables presented in **Chapter 2 Description of the Proposed Scheme** of this was 19, indicating that nine of these cables are not charted potentially due to either being out of service, or not yet constructed.

7.6 Charted Wrecks and Obstructions

Wrecks and obstructions in proximity to the Draft Order Limits are mainly located within 15NM of the coast. None are charted within the Draft Order Limits. Non-charted wrecks (which are not considered a danger to safe navigation) are considered in **Chapter 26 Marine Archaeology** of this PEIR.

7.7 Designated and Reported Anchorages

A reported anchorage is charted approximately 60m south of the Draft Order Limits, at the approaches to Southwold Harbour. A designated anchorage area is also located between Southwold Harbour and the Port of Lowestoft, approximately 1.8NM north west of the Draft Order Limits. See Section 9.4 for details on vessels seen to anchor in these locations.

7.8 Aggregate Dredging Areas

Two aggregate dredging areas are within the northern portion of the study area, with one (i.e., Area 2109) that overlaps with the Draft Order Limits and the other to the west of the Draft Order Limits (at a distance of approximately 2.1NM). The Draft Order Limits have been revised to include an option for avoiding the Aggregate Area 2109 at the PEIR stage. The revised version includes both the original route, and the alternative route. The alternative route avoids the aggregate area by 500m; industry standard exclusion zone applied to most constraints when undertaking marine spatial planning. Please refer to **Chapter 2 Description of the Proposed Scheme** of this PEIR.

Aggregate dredging areas are in proximity to the southern portion of the Draft Order Limits, with one to its south (at a distance of approximately 6.1NM) and the others to its north (with the closest at a distance of approximately 2.0NM).

Section 9.3.8 provides details on dredger traffic in the vicinity of the Draft Order Limits.

7.9 Oil and Gas Infrastructure

Subsea wells and platforms, with 500m safety zones surrounding many of them, are located in proximity to the northern portion of the Draft Order Limits. Pipelines connecting to these platforms and wells are also charted.

The closest well is approximately 390m from the Draft Order Limits, between KP105 and KP106 (with its 500m safety zone overlapping with the Draft Order Limits). This well is one of three wells part of the Gawain gas field, which has recently been decommissioned, with the plugging and abandonment of all three completed in March 2024 (Ref. xiii). Other nearby wells include those associated with the Davy, Thames and Horne Gas fields, noting that these are abandoned and awaiting decommissioning.

The closest platform is approximately 0.6NM from the Draft Order Limits. This is associated with the Sean gas field, which is expected to be fully decommissioned by 2029. This platform comprises a wellhead and compression platform and a production and accommodation platform that are bridge-linked (Ref. xiv).

See Section 9.3.7 for details on oil and gas vessel traffic in the vicinity of the Draft Order Limits.

7.10 Aids to Navigation

Aids to navigation in the vicinity of the Draft Order Limits can be seen at its northern portion and close to the coast.

Aids to navigation at its northern portion include a met mast owned and operated by EAOW (East Anglia Offshore Wind Ltd) (Ref. xv) and a west cardinal buoy equipped with Racon approximately 150m south of the Draft Order Limits. There are also two safe-water buoys within the deep-water route associated with Off Botney Ground TSS; one approximately 2.5NM to the northwest of the Draft Order Limits (named DR1) and one equipped with Racon at the entry/exit of the TSS (named DR2).

Aids to navigation close to the coast include buoys marking the entrance/exit of Southwold Harbour and a lighthouse equipped with AIS.

7.11 Unexploded Ordnance

Unexploded ordnance is charted in two locations at the southern portion of the Draft Order Limits, with the closest being approximately 2NM to its north and the other being approximately 3.6NM to its north. **Chapter 2 Description of the Proposed Scheme** provides further information on the types of ordnance which are expected to be found in the vicinity

of the Proposed Offshore Scheme, along with the likelihood of their presence and the maximum quantity of explosive associated with the UXO.

7.12 Transhipment Area

An oil cargo transhipment area is located 4.9NM to the south of the Draft Order Limits. The chart notes that “vessels in this area may be conducting oil transhipment operations and have reduced manoeuvrability”.

8 Emergency Response Overview

This section summarises the existing emergency response resources (including SAR) and reviews historical maritime incident data to establish baseline incident rates in proximity to the Draft Order Limits.

8.1 Royal National Lifeboat Institution

The RNLI is organised into six divisions, with the relevant region for the Draft Order Limits being the North and East division. Based out of more than 230 stations, there are over 400 lifeboats across the RNLI fleet, including both all-weather lifeboats (ALBs) and inshore lifeboats (ILBs).

Figure 8.1 presents the RNLI incidents recorded within the study area during the 10-year period between 2014 and 2023, colour-coded by incident type. Also shown are the RNLI stations in proximity to the Draft Order Limits. It is noted that incidents which were deemed hoaxes or false alarms have been excluded from the analysis.

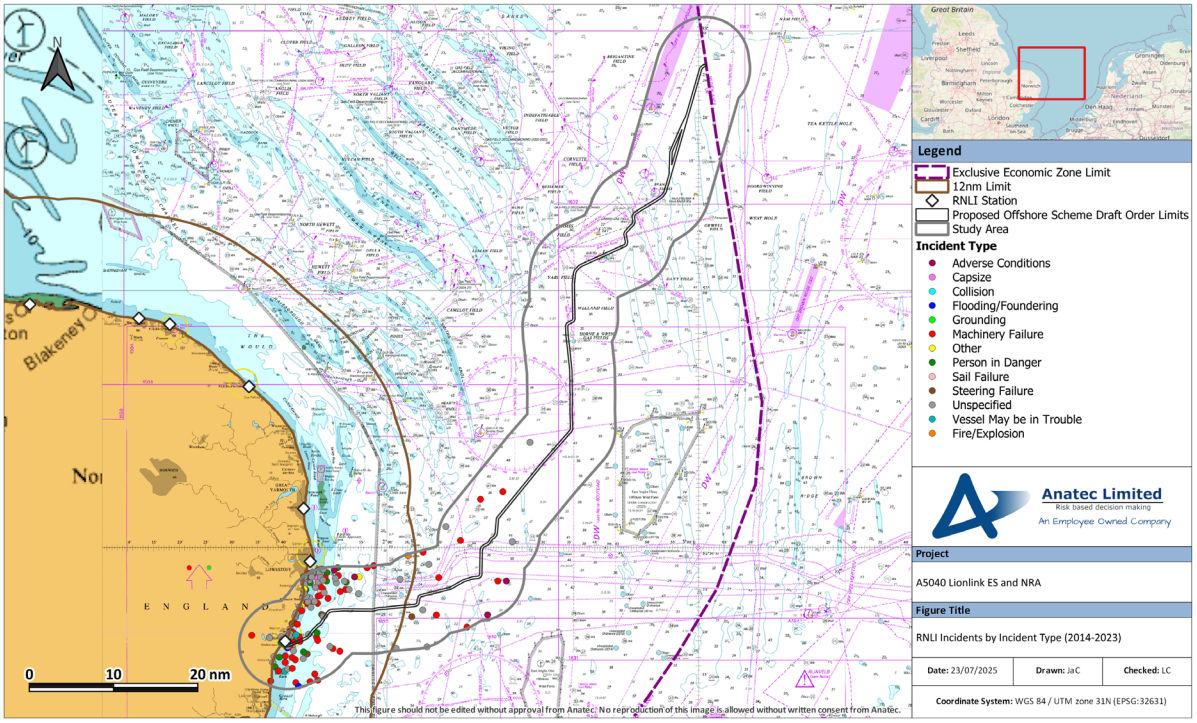

Figure 8.1 RNLI Incidents by Incident Type (2014-2023)

The RNLI stations closest to the nearshore portion of the Draft Order Limits are Southwold station (located approximately 560m from the proposed Landfall Site) and Lowestoft station (located approximately 6.2NM from the Draft Order Limits). The station closest to the greatest offshore extent of the Draft Order Limits is Happisburgh, at a distance of approximately 65NM; given that the RNLI have an operational limit of 100NM, it is anticipated that an incident occurring in proximity to the Draft Order Limits could result in a response from an RNLI asset, particularly closer to shore.

A total of 231 incidents were responded to by the RNLI within the study area between 2014 and 2023, corresponding to an average of 23 incidents per year, noting that the significant majority (92%) of incidents occurred within 10NM of the coast. During the 10-year period, a total of five occurred within the Draft Order Limits.

Excluding unspecified incident types (which accounted for 42% of the data), the most common incident types were "*machinery failure*" (45%) and "*person in danger*" (29%). Excluding unspecified casualty types, "*person in danger*" and non-vessel based incidents, the most common vessel type involved was "*recreational (powered)*" (51%), followed by "*personal craft*" (15%).

8.2 Marine Accident Investigation Branch

All UK flagged vessels and non-UK flagged vessels in UK territorial waters (12NM), a UK port or carrying passengers to a UK port are required to report incidents to the MAIB. Data arising from these reports are assessed within this section, covering the 10-year period between 2014 and 2023.

Figure 8.2 presents the MAIB incidents recorded within the study area during between 2014 and 2023, colour-coded by incident type.

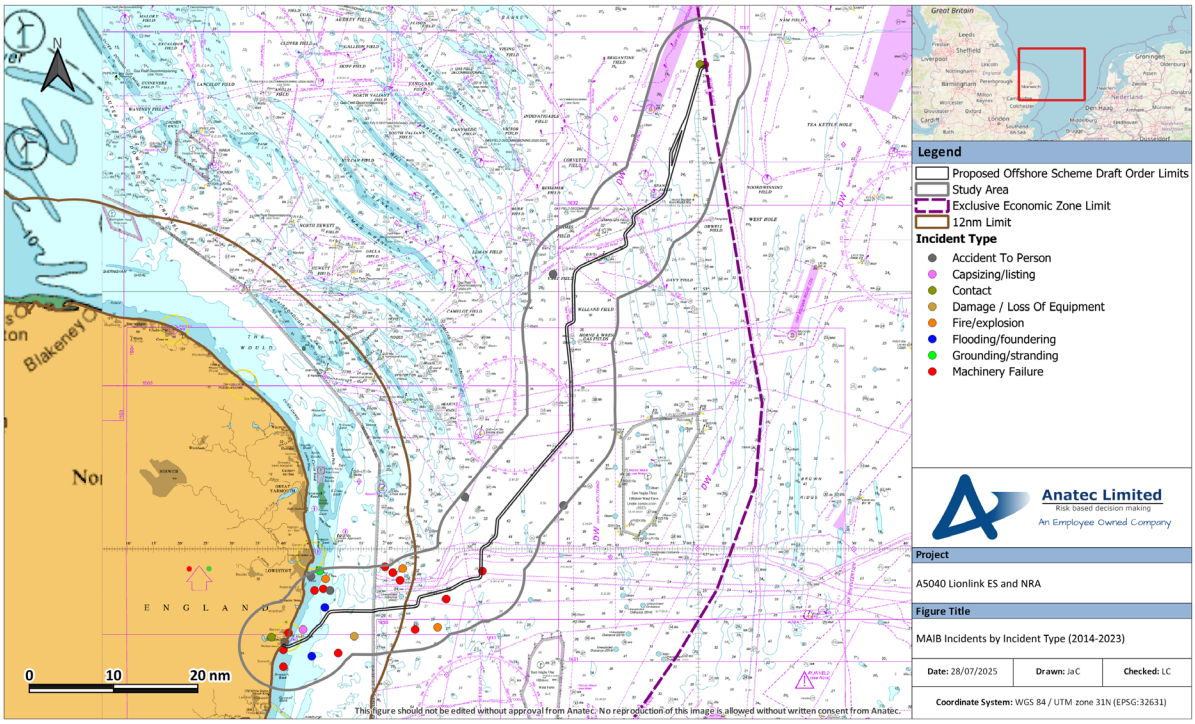

Figure 8.2 MAIB Incidents by Incident Type (2014-2023)

A total of 29 incidents involving 31 vessels occurred within the study area during the 10-year period, corresponding to an average of three incidents per year. A single incident has its documented location within the Draft Order Limits, at the northernmost extent; however,

supplementary information provided by the MAIB dataset indicates that its coordinates are inaccurate and that it actually occurred at the coast.

The most common incident type was "*machinery failure*", accounting for 45%. The most common casualty type was "*other*" which includes dredgers, tugs and offshore supply vessels, accounting for 45%. This was followed by fishing vessels, which accounted for 19%.

8.3 Search and Rescue Helicopters

In July 2022, the Bristow Group were awarded a new 10-year contract by the MCA (as an executive agency of the DfT) commencing in September 2024 to provide helicopter SAR operations in the UK. Bristow have been operating the service since April 2015 (Ref. xvi).

The SAR helicopter service is currently operated out of 10 base locations around the UK, with the closest bases to the Draft Order Limits being located at Humberside (approximately 107NM north west of the proposed Landfall Site) and Lydd (approximately 86NM south west of the proposed Landfall Site). The former operates two Sikorsky S92 helicopters and the latter operates two Agusta Westland AW189 helicopters.

The DfT has produced data on civilian SAR helicopter activity in the UK by the Bristow Group on behalf of the MCA between April 2015 and March 2024. This data is presented in Figure 8.3, colour-coded by tasking type.

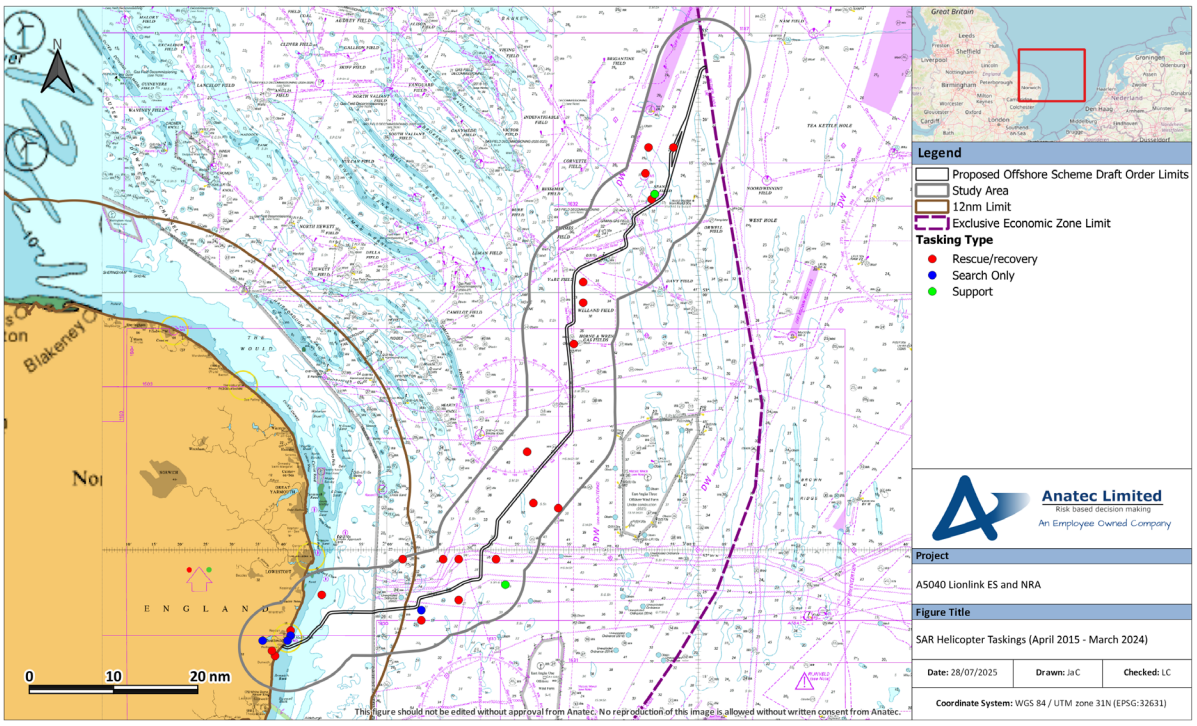

Figure 8.3 Search and Rescue Helicopter Taskings (April 2015 – March 2024)

There were 38 helicopter taskings within the study area during the nine-year period, corresponding to an average of four per year. The majority (82%) were of type "*rescue/recovery*", followed by "*search only*" (13%) and "*support*" (5%).

8.4 Marine Rescue Coordination Centres and Joint Rescue Coordination Centres

HMCG, a division of the MCA, is responsible for requesting and tasking SAR resources made available to other authorities and for coordinating the subsequent SAR operations (unless they fall within military jurisdiction).

The HMCG coordinates SAR operations through a network of 11 Maritime Rescue Coordination Centres (MRCC), including a Joint Rescue Coordination Centre (JRCC) based in Hampshire.

All of the MCA's operations, including SAR, are divided into 18 geographical regions. The Draft Order Limits are within Area 7: "East Anglia". The closest MRCCs to the Draft Order Limits are at Dover (located at a minimum distance of approximately 71NM to the south west of the Draft Order Limits) and Humber (located at a minimum distance of approximately 118NM to the north west of the Draft Order Limits). These MRCCs are illustrated in Figure 8.4. It is noted that incident response is not necessarily coordinated by the nearest MRCC, as operators may be unavailable, and calls re-routed to another MRCC.

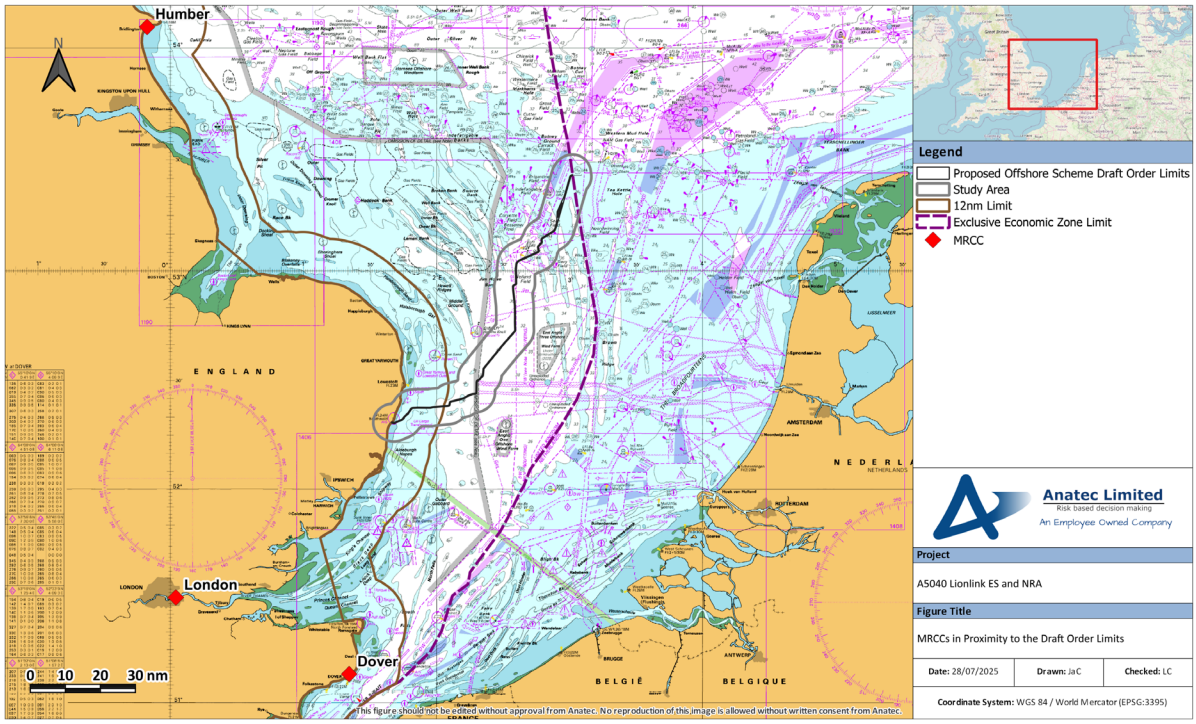

Figure 8.4 MRCCs in Proximity to the Draft Order Limits

9 Baseline Shipping Analysis

This section presents analysis of the AIS shipping data within the study area, including assessments of the vessel numbers, types, sizes and densities. An AIS dataset covering 12 months from November 2023 to October 2024 was used to provide up-to-date coverage of the study area and cover seasonal variations in vessel traffic. See Section 6.1 for further details on this dataset.

It is noted that a number of tracks have been classified as temporary or non-routine, and have been removed. This consisted of vessels undertaking surveys, including unmanned survey vessels, and vessels undertaking guard duty. Vessels which remained moored in port have also been removed from the analysis to ensure that a fair representation is given to typical vessel traffic movements in the area.

9.1 Vessel Numbers

Figure 9.1 presents the average daily vessel count per month, based on the number of unique vessels per day[5] over the month, recorded within the study area and intersecting the Draft Order Limits.

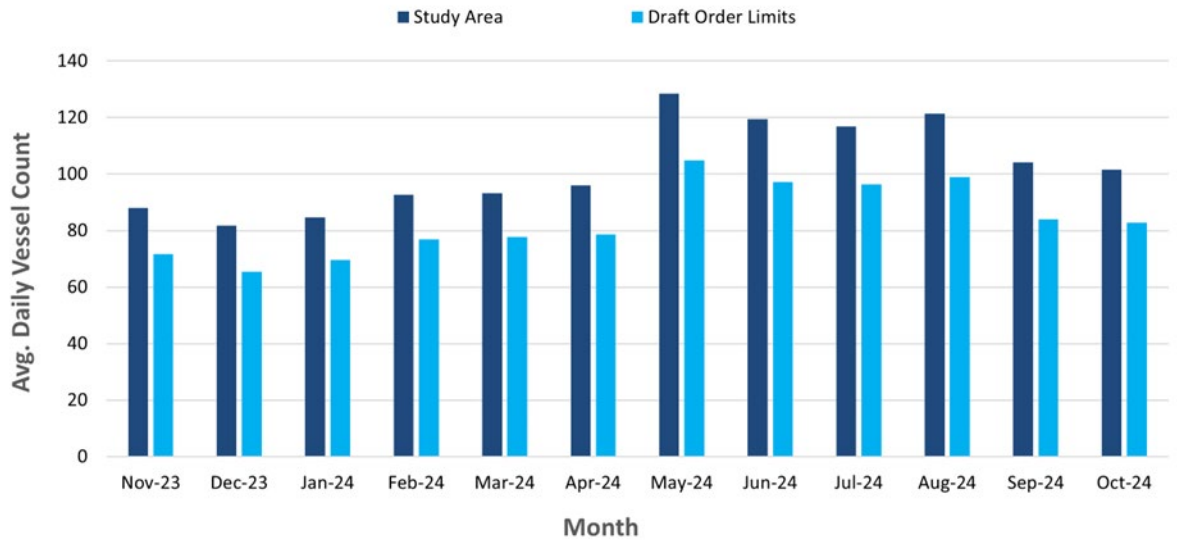

Figure 9.1 Average Daily Vessel Count per Month

During the 12-month period, there was an average of 102 vessels recorded per day within the study area and 83 recorded per day intersecting the Draft Order Limits. May was the busiest month with an average of 126 vessels recorded per day in the study area. December was the quietest month with an average of 81 vessels recorded per day.

[5] i.e., each vessel is counted only once per day within the study area to avoid over-counting if the vessel leaves and re-enters.

Overall, higher vessel counts were recorded in the summer months between May and October. This is due to higher levels of recreational activity, fishing activity and wind farm support vessels recorded during these months.

9.2 Vessel Density

Figure 9.2 presents a density map of vessels within the study area, based on the number of tracks in the 12 months AIS data intersecting the cells of a 500m × 500m grid.

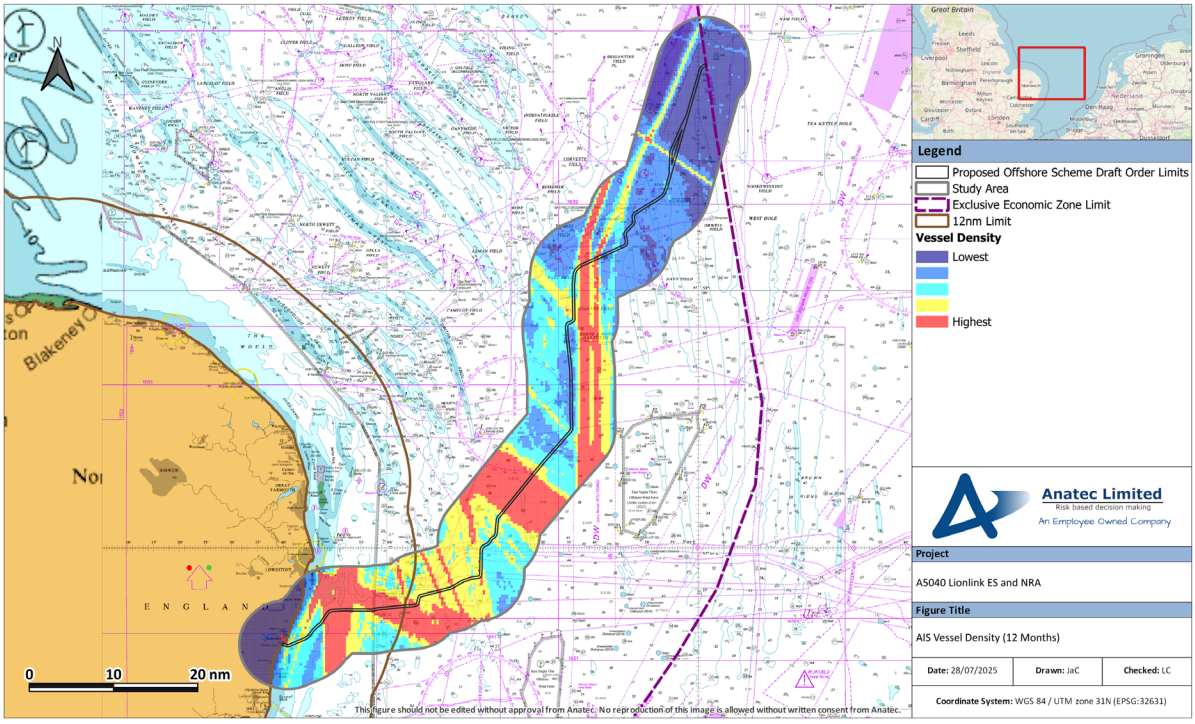

Figure 9.2 Vessel Density (AIS, 12 Months)

The density map highlights the following routes of relatively high-density traffic:

- A north/south route to the east of the Draft Order Limits, following the deep-water route that connects to the Off Botney Ground TSS (see Section 7) and consisting of commercial vessel traffic.
- A north west/south east route through the central portion of the Draft Order Limits, consisting of commercial vessel traffic including Roll-on/Roll-off Passenger (RoPax) generally transiting between the UK (Hull, Immingham and Rotterdam) and Netherlands (Rotterdam and Hoek van Holland).
- A north west/south east route through the southern portion of the Draft Order Limits, consisting of wind farm support vessels transiting between Lowestoft and East Anglia One.
- Nearshore north/south routeing through the Draft Order Limits, mainly consisting of cargo vessels and dredgers, and nearshore southeast/northwest routeing from wind farm support vessels transiting between Lowestoft and the Greater Gabbard and Galloper offshore wind farms.

9.3 Vessel Type

9.3.1 Overview

An overview of vessel tracks recorded within the study area, colour-coded by vessel type, is presented in Figure 9.3; for clarity, only the busiest[6] month (May 2024) is shown. Following this, Figure 9.4 presents the distribution of vessel types across the 12-month period.

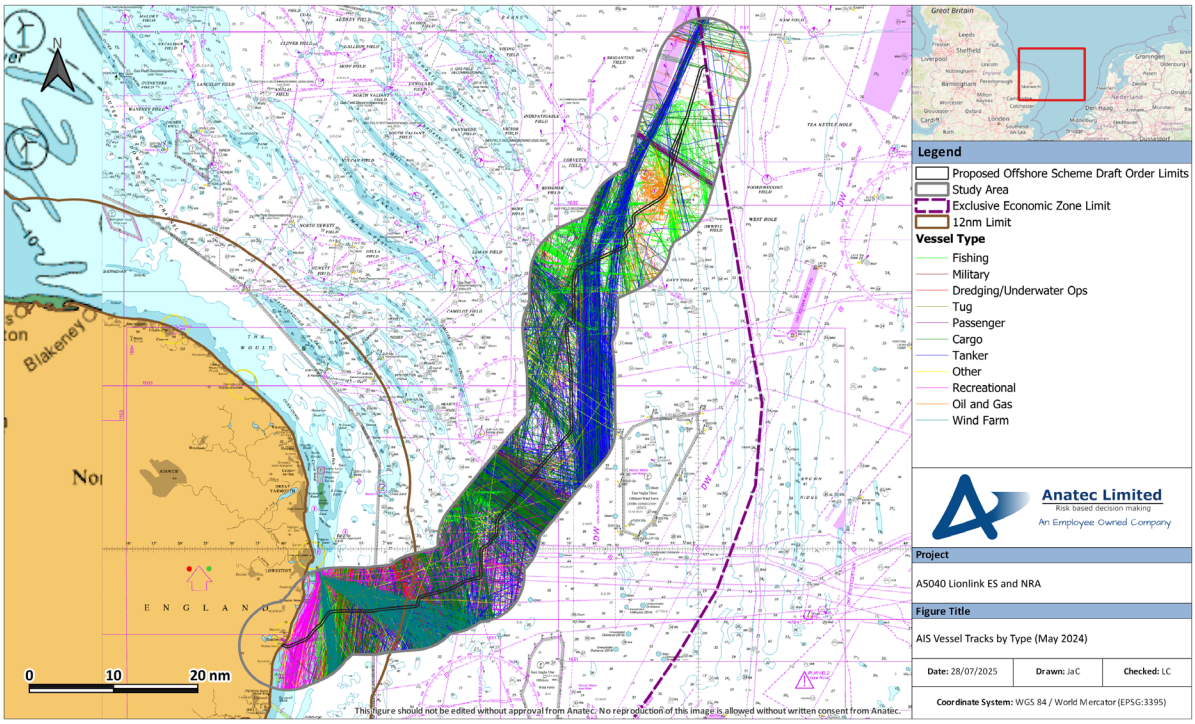

Figure 9.3 Vessels by Type (AIS, May 2024)

Figure 9.3 can be seen to demonstrate the general distribution of key vessel types. In particular, tankers were seen using the deep-water route that connects to the Off Botney Ground TSS (see Section 7), fishing vessels and oil and gas vessels were most commonly seen within the northern portion of the study area, recreational vessels and wind farm support vessels were seen weighted towards the southern portion of the study area and cargo vessels were seen within the central portion of the study area.

[6] The month with the highest daily average vessel count.

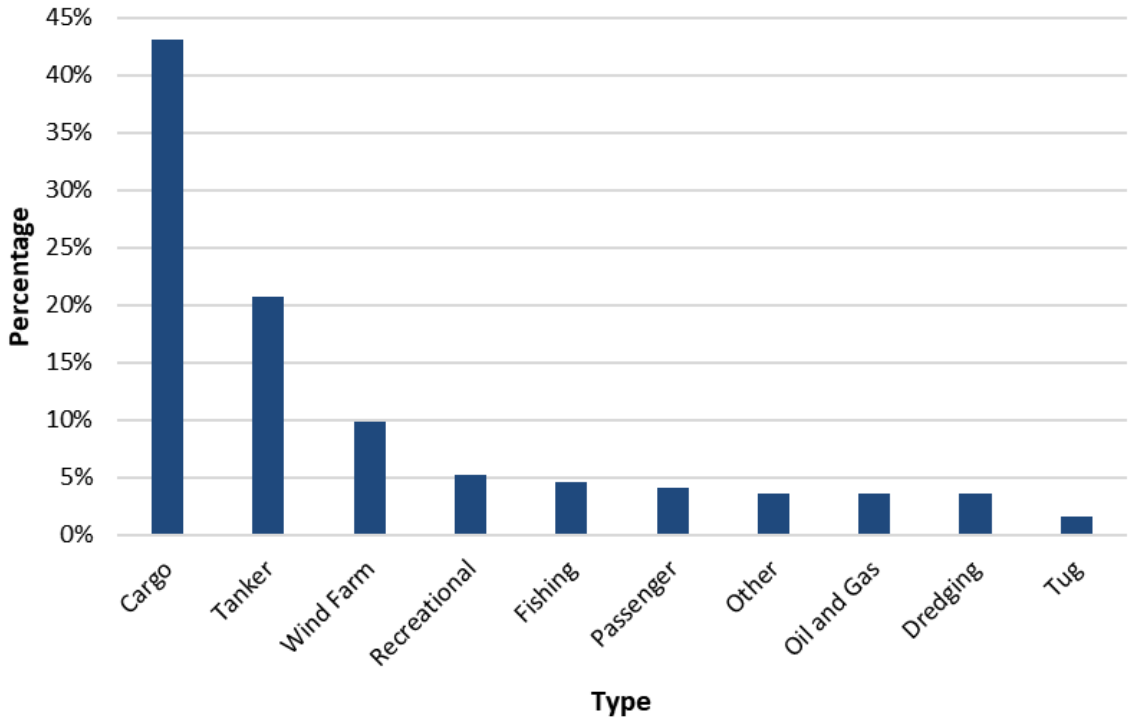

Figure 9.4 Distribution of Main Vessel Types (12 Months)

The most frequent vessel type during the 12-month period was cargo vessels (43%), followed by tankers (21%), and wind farm support vessels (10%). Recreational craft and fishing vessels each accounted for 5% of the total distribution. Passenger vessels and dredgers each accounted for 4% while oil and gas vessels and 'other' vessels each attributed 3% to the total distribution. Tugs accounted for 2% while military vessels and vessels of unspecified type each accounted for less than 1%.

It is reiterated (see Section 6.1) that fishing vessels below 15m, military vessels, and recreational craft are not required to carry AIS, but a proportion do so voluntarily.

The following subsections present further detail of key vessel types.

9.3.2 Cargo Vessels and Tankers

Figure 9.5 presents the tracks of cargo vessels and tankers recorded within the study area during the 12-month period.

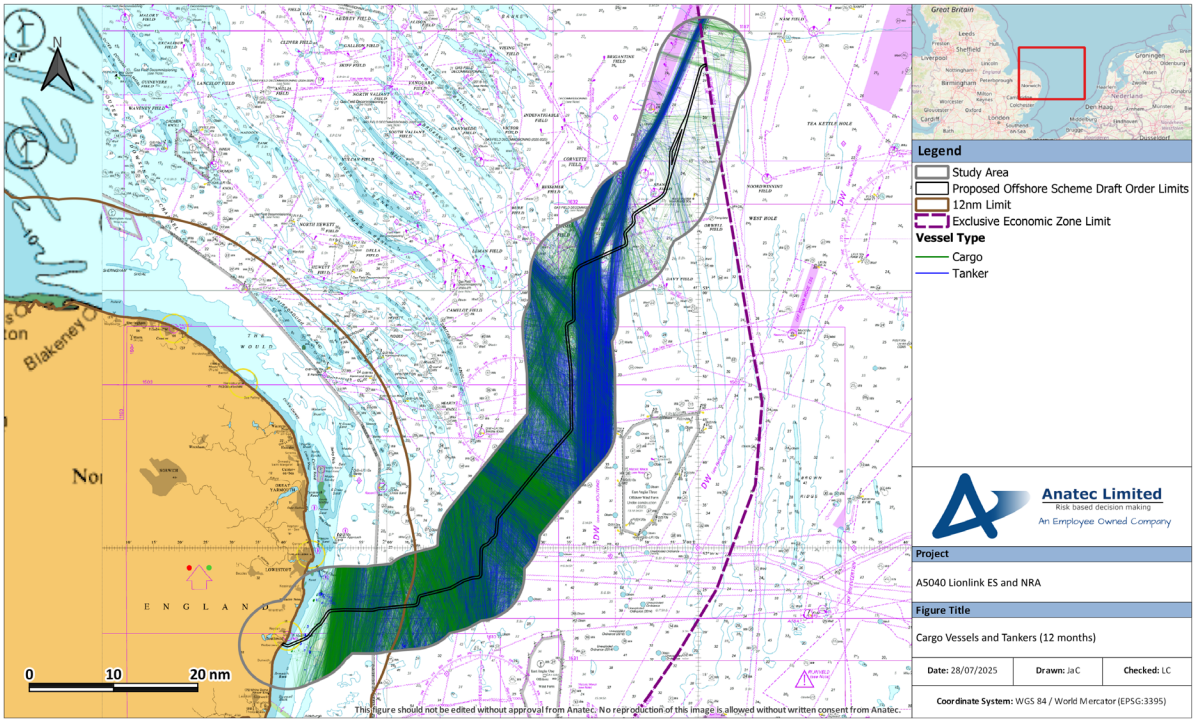

Figure 9.5 Cargo Vessels and Tankers (AIS, 12 Months)

As per Section 9.3.1, cargo vessels were approximately twice as common as tankers, with an average of 44 cargo vessels per day within the study area versus 21 tankers per day. Routeing patterns between these vessel types was strongly aligned. As discussed in Section 9.2, the heaviest routeing was seen to be north/south routeing within the deep-water route that connects to the Off Botney Ground TSS, and north west/south east routeing through the central portion of the Draft Order Limits. Common destinations broadcast by those vessels within the deep-water route included Antwerp (Belgium), Rotterdam (the Netherlands), Immingham (UK) and Teesport (UK). The most common destinations broadcast by those vessels undertaking the north west/south east routeing included Immingham and Dutch ports such as Rotterdam.

Minimal levels of cargo vessels and tankers were seen within 5NM of the proposed Landfall Site; such vessels were commonly seen anchored in this area as opposed to in transit (see Section 9.4).

9.3.3 Wind Farm Support Vessels

Figure 9.6 presents the tracks of wind farm support vessels recorded within the study area during the 12-month period. Also shown are the nearby offshore wind farms colour-coded by phase.

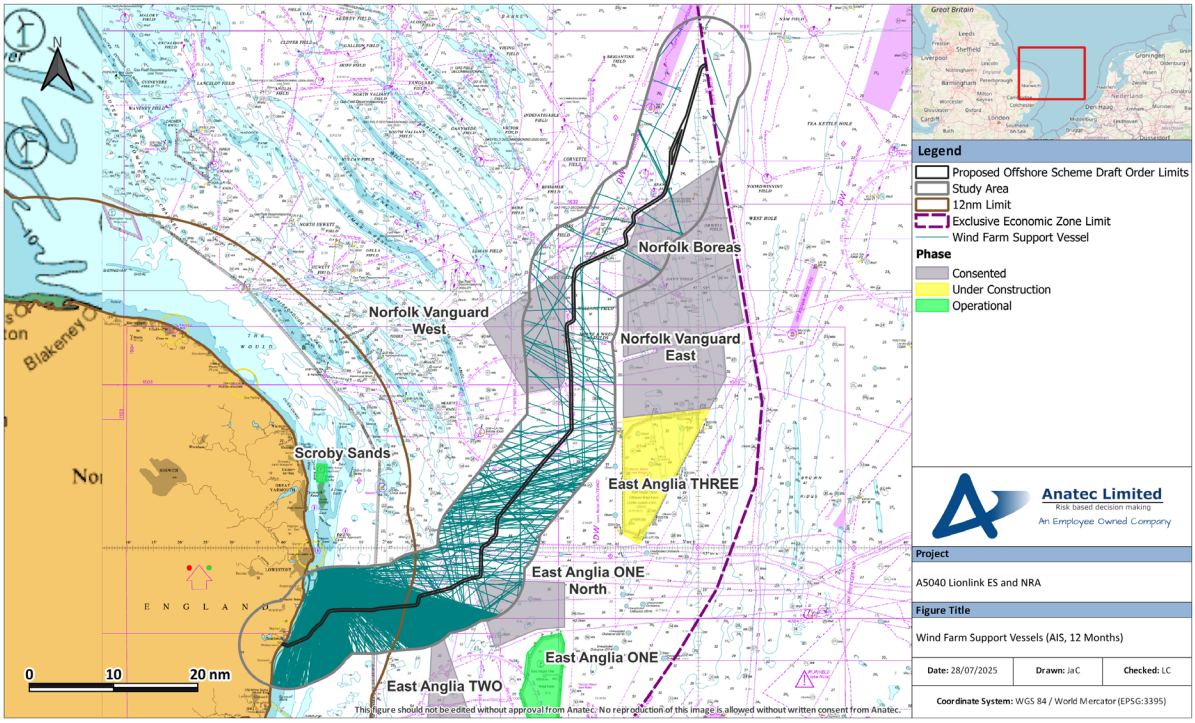

Figure 9.6 Wind Farm Support Vessels (AIS, 12 Months)

An average of ten wind farm support vessels per day was recorded within the study area during the 12-month period. The majority of wind farm support vessel traffic was seen within the southern portion of the study area, consisting of vessels transiting north west/south east between Lowestoft and East Anglia One, and vessels transiting north/south between Lowestoft and Greater Gabbard and Galloper (south of the Draft Order Limits, beyond the extent of Figure 9.6).

Also shown in Figure 9.6 are multiple offshore wind farms in proximity to the Draft Order Limits which have been consented but which have not yet begun construction. It is expected that, once under construction or operational, these will result in higher levels of wind farm support vessel traffic within the study area. This is discussed further in Section 9.9.1.

9.3.4 Recreational Vessels

9.3.4.1 AIS

Figure 9.7 presents the AIS tracks of all recreational vessels recorded on AIS within the study area. t is noted that sailing vessels and yachts that are at least 24m in length are classed as passenger vessels (see Section 9.3.6).

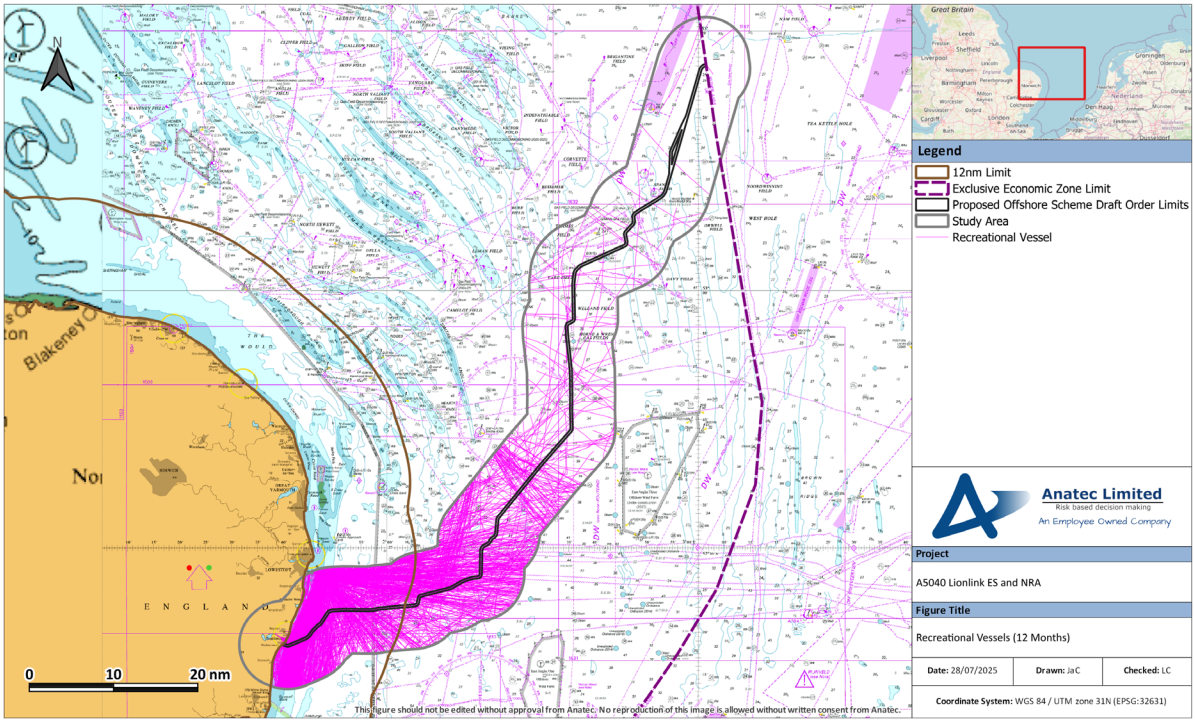

Figure 9.7 Recreational Vessels (AIS, 12 Months)

Recreational traffic was heavily weighted towards the coast, with approximately half (52%) remaining within 4NM of the coast. Over half (53%) were also below 12m in length.

Figure 9.8 presents the daily average number of recreational vessels recorded in the study area for each month during the 12-month period.

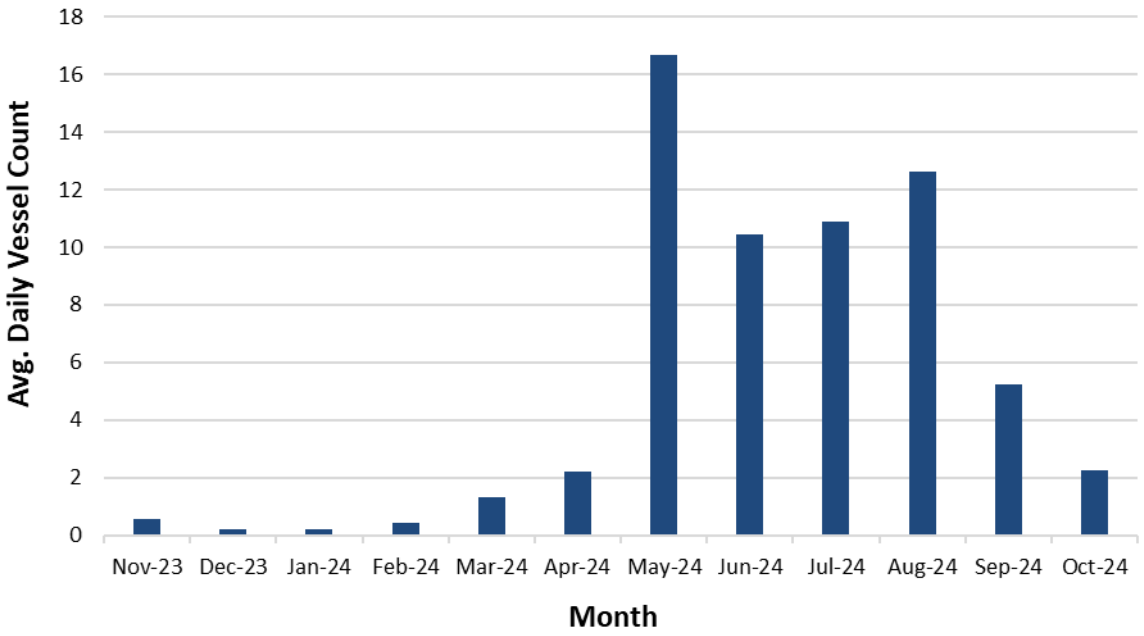

Figure 9.8 Average Daily Recreational Vessel Count per Month

Recreational traffic levels were highly seasonal. The busiest month for recreational traffic was May, with an average of 16 to 17 unique vessels per day. The quietest months were December and January, with a total of six vessels being recorded in the whole month.

9.3.4.2 RYA Coastal Atlas

The RYA Coastal Atlas may be used to "*help identify and protect areas of importance to recreational boaters, to advise on new development proposals and in discussions over navigational safety*" (Ref. xi). The RYA Coastal Atlas includes a heat map indicating the density of recreational activity around the UK coast.

Figure 9.9 presents a plot of the RYA Coastal Atlas heat map relative to the Draft Order Limits.

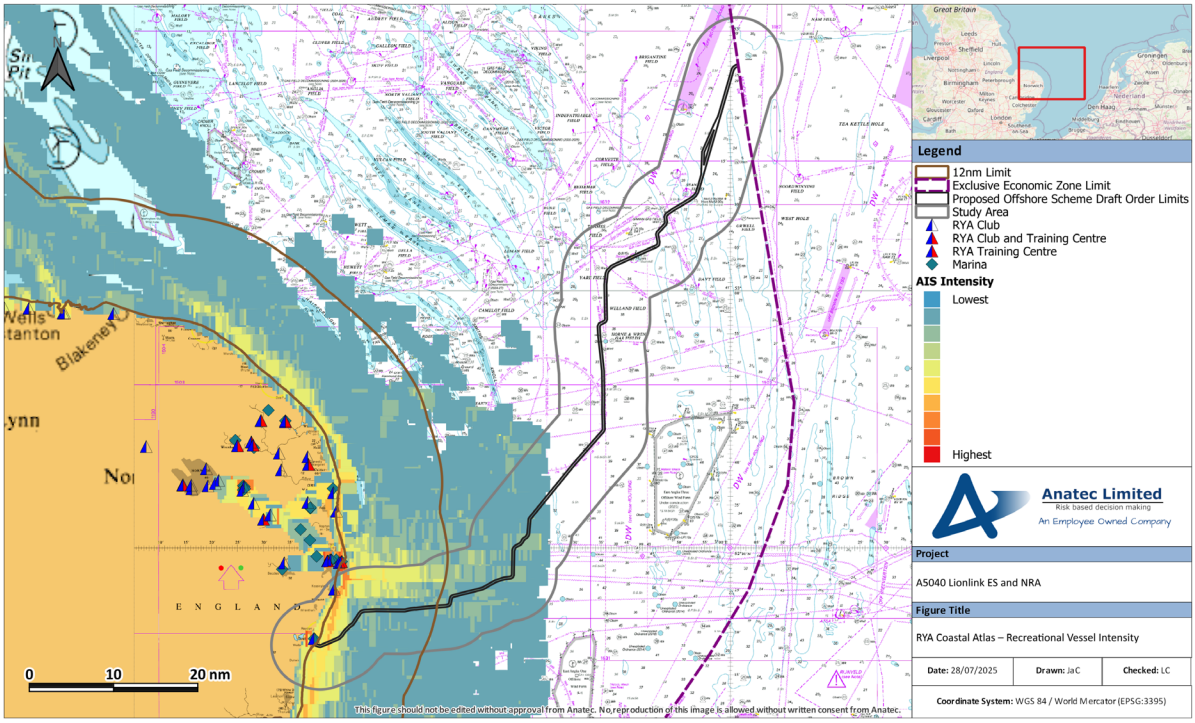

Figure 9.9 RYA Coastal Atlas – Recreational Vessel Intensity

The distribution of recreational traffic indicated by the RYA Coastal Atlas is broadly in alignment with the AIS data reviewed in Section 9.3.4.1. The density can be seen to be at its highest close to the coast, approximately 4NM from shore. Within this nearshore region, density north of the Draft Order Limits (at the approaches to Lowestoft) is higher in comparison to south of the Draft Order Limits, noting that recreational vessels were frequently seen transiting in/out of the Port of Lowestoft in the AIS data (Section 9.3.4.1).

9.3.4.3 Southwold Harbour Recreational Activity

Based on stakeholder consultation with the East Suffolk Council, Southwold Harbour is busier in summer due to regular racing and training sessions hosted by local sailing clubs and an increased number of visiting leisure boats. The Southwold Sailing Club runs a full programme of dinghy and cruiser racing, during key events including the August Regatta and the Annual Harbour Festival. Recreational boats visiting the harbour are typically under 15m, with varied keel and hull types.

9.3.5 Fishing Vessels

This section provides analysis of fishing vessels recorded on AIS within the study area during the 12-month period, including a breakdown of gear type and an assessment of the level of potential active fishing. Satellite data is also considered in Section 9.3.5.3. As per Section 6.1, fishing vessels below 15m in length may be under-represented in both AIS data and satellite data.

9.3.5.1 Overview

Figure 9.10 presents the average number of fishing vessels recorded per day within the study area and intersecting the Draft Order Limits for each month during the 12-month period.

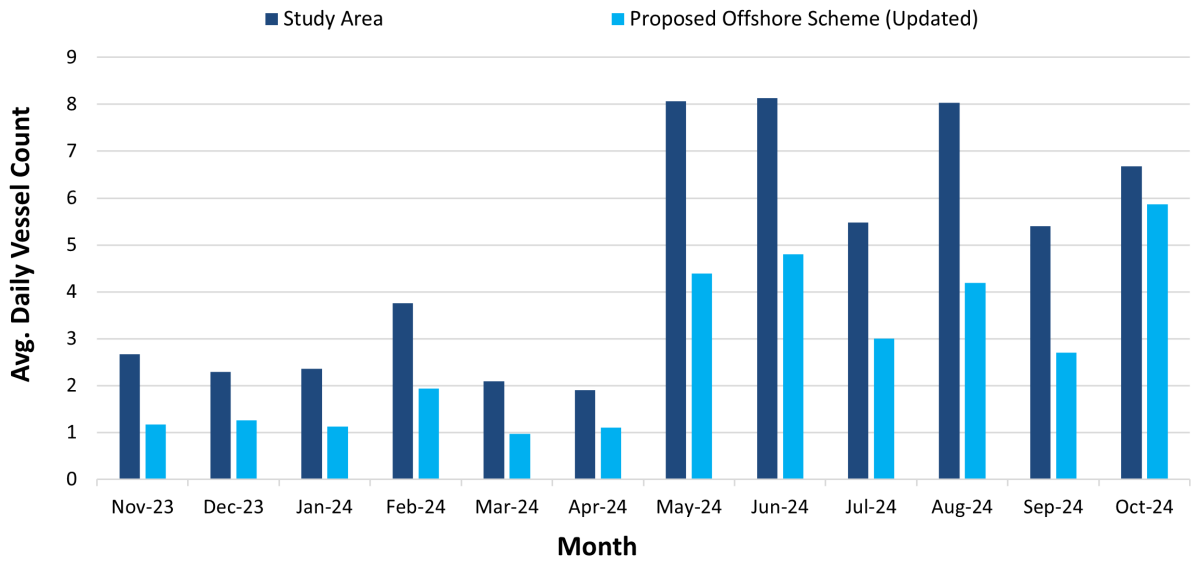

Figure 9.10 Daily Average Number of Fishing Vessels per Month

There was an average of four to five fishing vessels within the study area per day during the 12-month period. Fishing vessel levels, within both the study area and Draft Order Limits, were weighted towards the months of May to October; during these months, there was an average of seven per day within the study area, compared to three per day during the remainder of the 12 months.

Figure 9.11 presents the fishing vessels recorded within the study area during the 12-month period, colour-coded by gear type. The gear type is not broadcast on AIS and was researched separately by Anatec based on the vessel identity information broadcast over AIS.

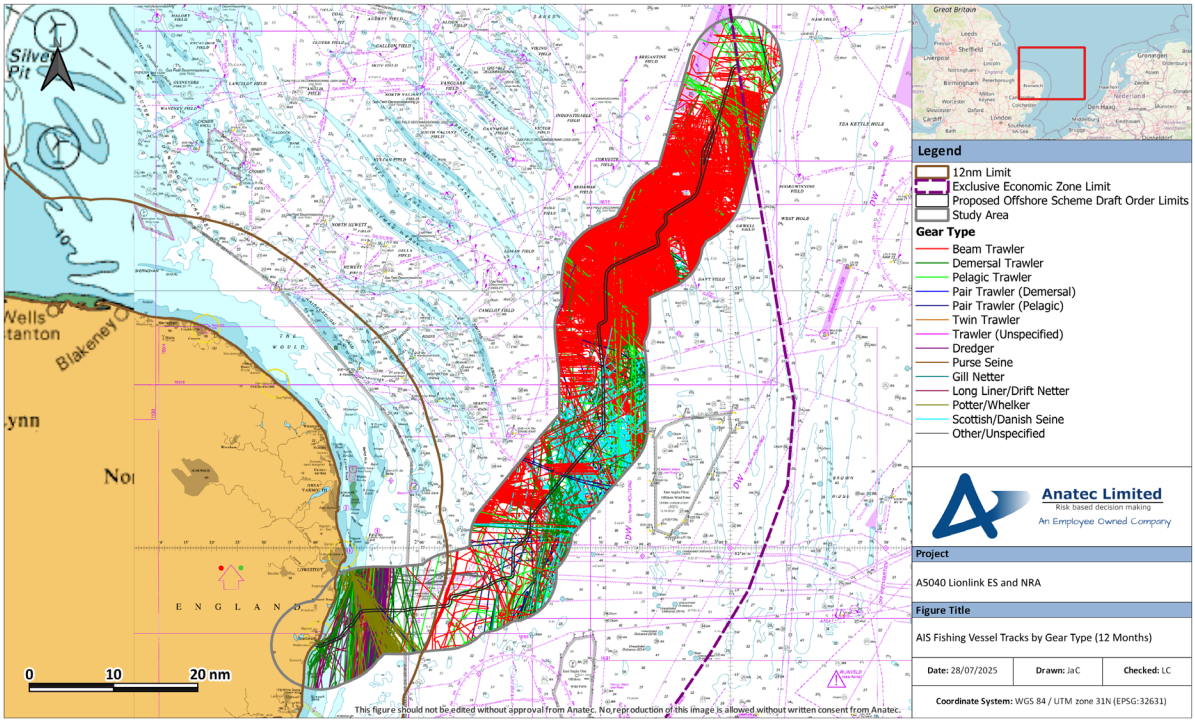

Figure 9.11 Fishing Vessels by Gear Type (AIS, 12 Months)

The most common gear type recorded within the study area was beam trawlers, accounting for 51% of the data; fishing vessels with this gear type were heavily distributed towards the northern half of the study area, with minimal levels at its southern portion. This was followed by demersal trawlers (18%) and potter/whelker gear (9%).

Fishing vessels seen close to the proposed Landfall Site typically had demersal trawling, dredger or potter/whelker gear, however mainly appeared to be transiting as opposed to actively fishing (see Section 9.3.5.2).

9.3.5.2 Potential Active Fishing

Analysis was undertaken to identify the tracks of vessels that may have been actively engaged in fishing within the study area as opposed to transiting, as these vessels are more likely to pose a risk to subsea cables. This analysis was based on average speeds (noting that average speeds of less than six knots are generally indicative of active fishing) and track behaviour, as well as the navigational status and destination broadcast on AIS (although it is noted that this information is not always kept up-to-date and was therefore considered in conjunction with speed and track behaviour).

Figure 9.12 presents the AIS tracks for fishing vessels estimated to be engaged in fishing activities, colour-coded by gear type.

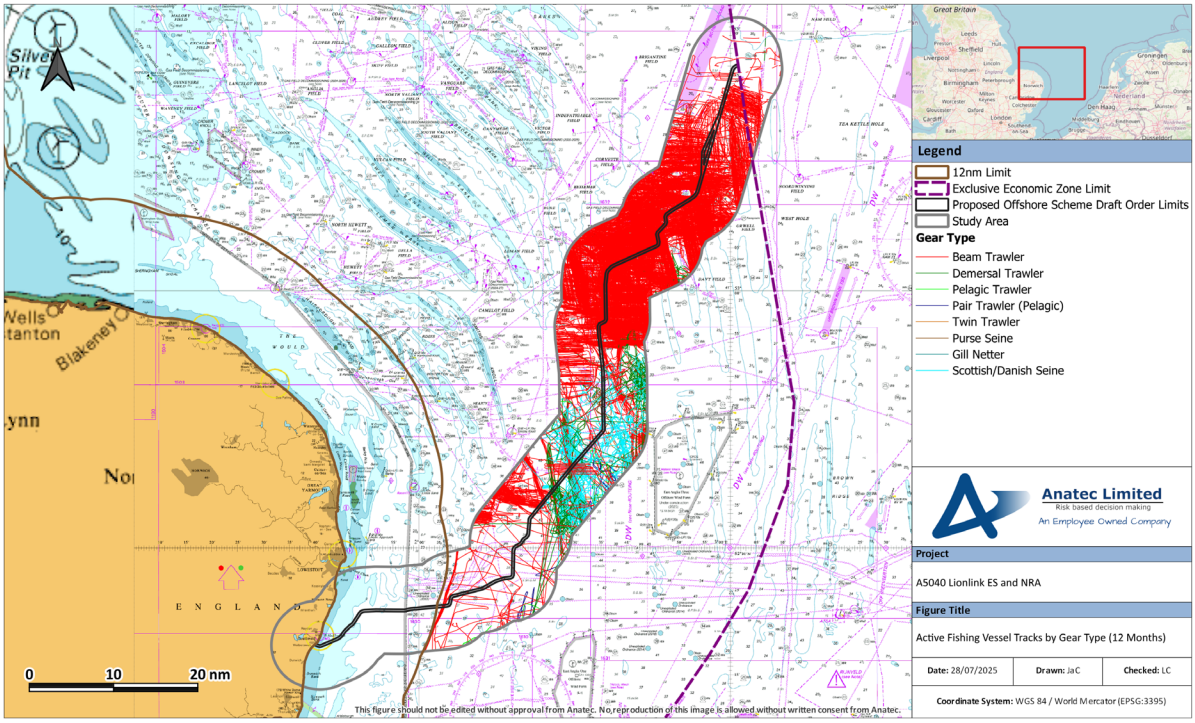

Figure 9.12 Active Fishing Vessel Tracks by Gear Type (AIS, 12 Months)

Active fishing was primarily seen within the northern half of the study area, where beam trawl gear was the dominant gear type. Active fishing could also be seen within the central portion of the study area, where Scottish/Danish seine gear and demersal trawl gear was more common.

Beam trawler gear accounted for 85% of the active fishing within the study area. This was followed by Scottish/Danish seine (7%) and demersal trawler (6%), with all other gear types accounting for less than 1%.

Figure 9.13 presents the AIS tracks for fishing vessels estimated to be engaged in fishing activities, colour-coded by vessel length..

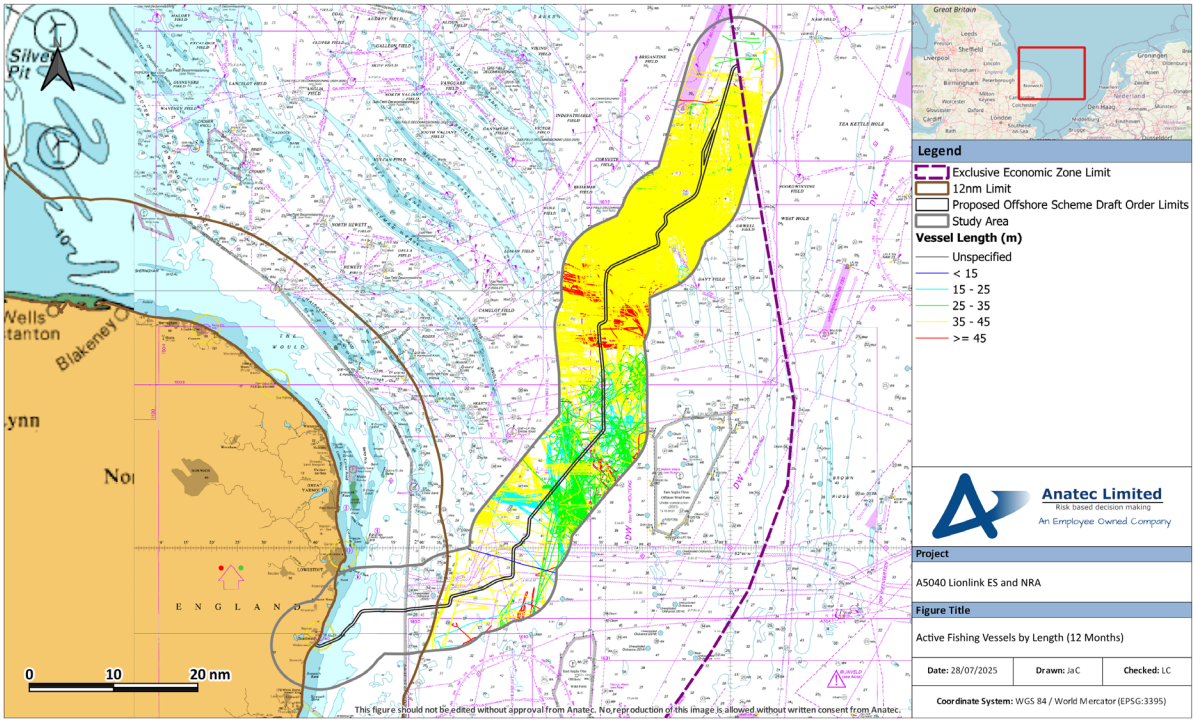

Figure 9.13 Active Fishing Vessels by Length (AIS, 12 Months)

The majority (81%) of active fishing vessels had a length between 35m and 45m, mainly associated with the beam trawlers at the northern half of the study area. The average length was 40m.

Figure 9.14 presents the AIS tracks for fishing vessels estimated to be engaged in fishing activities, colour-coded by vessel nationality.

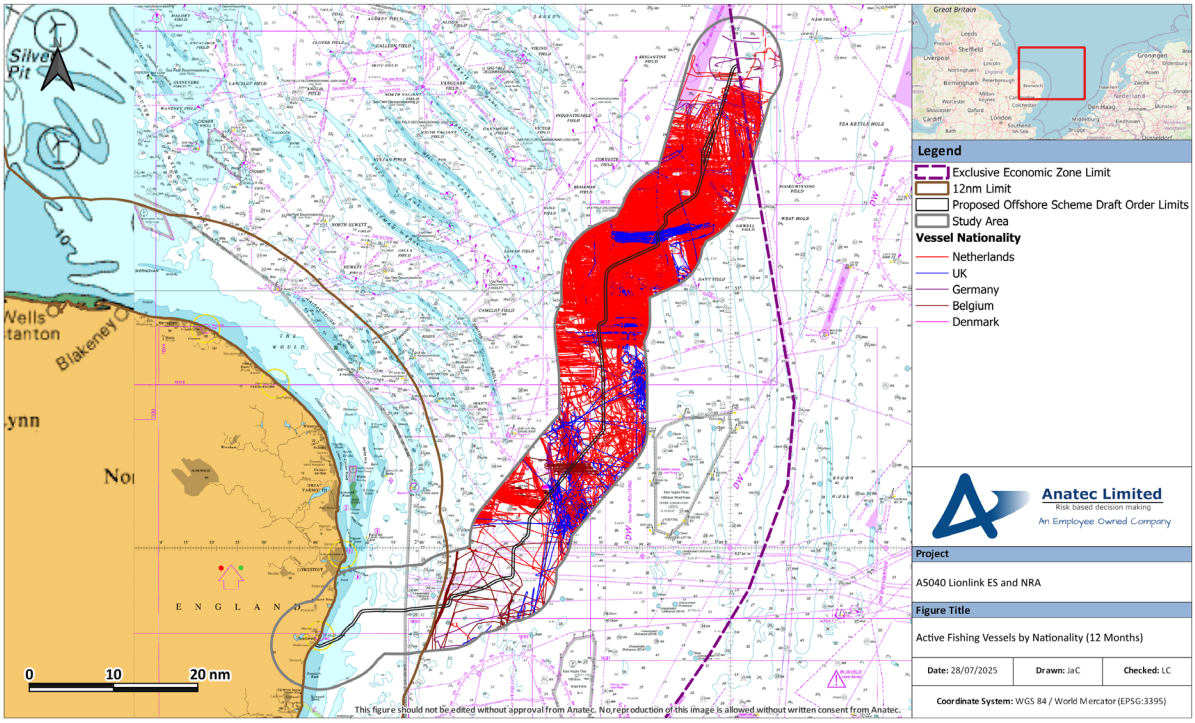

Figure 9.14 Active Fishing Vessels by Nationality (AIS, 12 Months)

The majority (82%) of active fishing vessels were sailing under the flag of the Netherlands; the majority of these vessels were the beam trawlers mentioned previously. This was followed by the UK (9%), Germany (6%) and Belgium (2%). Danish vessels were also recorded in low numbers (accounting for less than 1%).

No active fishing was identified within the 12NM limit of UK territorial waters. A Belgian vessel was seen to exhibit potential fishing behaviour along the boundary.

9.3.5.3 Satellite Data

Satellite fishing data provided by the MMO for 2020 has been reviewed. It is noted that data from 2020 is the latest available at the time of writing (June 2025). Satellite data captures fishing vessels that are at least 15m in length and therefore those below 15m in length may be under-represented. See Section 6.2 for further details on satellite data.

The VMS data indicated relatively low levels of fishing in the area, particularly within the northern half of the study area, compared to the AIS data; this may be due to the difference in time period (reflecting effects of COVID-19 and Brexit) as well as differences in the broadcast rate between the two data sources. The AIS data is considered to be the more comprehensive data source.

9.3.5.4 Southwold Harbour Fishing Vessel Activity

Based on stakeholder consultation with the East Suffolk Council, a total of 17 fishing vessels operate from the Southwold Harbour on a regular basis. All fishing vessels are under 10m in

length, and hence, not required to broadcast on AIS. These include two trawlers, a whelking boat, a charter fishing boat and 13 adaptable vessels. The adaptable vessels are multi-licensed and able to use nets, longlines and pots as per the environmental conditions and market demands. Although vessels primarily fish in local inshore waters, fishing patterns have recently become more dynamic due to various environment factors and changes in fish behaviour.

9.3.6 Passenger Vessels

Figure 9.15 presents the passenger vessels recorded within the study area during the 12-month period, colour-coded by subtype. It is noted that sailing vessels and yachts that are at least 24m in length are classed as passenger, while those of smaller length are classed as recreational (see Section 9.3.4).

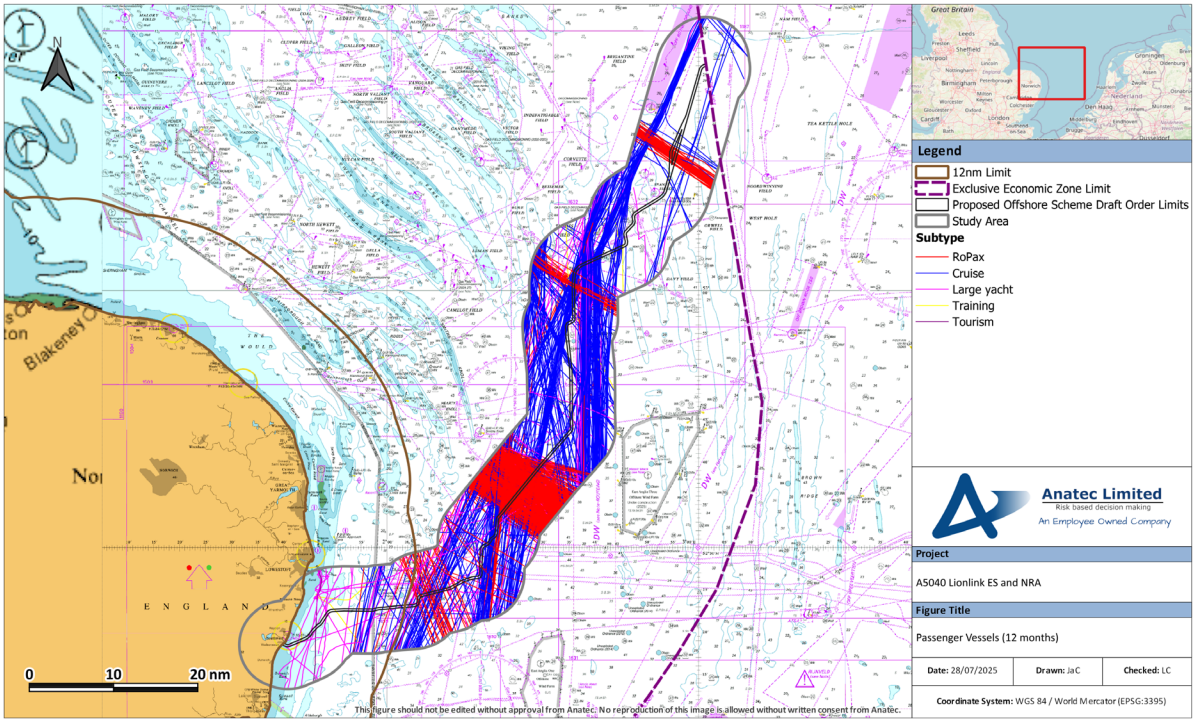

Figure 9.15 Passenger Vessels (AIS, 12 Months)

An average of four to five passenger vessels per day was recorded within the study area during the 12-month period. The majority (73%) of passenger vessels comprised Roll-on/Roll-off Passenger (RoPax) vessels, which were generally seen undertaking three north west/south east routes through the Draft Order Limits:

- A route within the centre of the study area, comprising vessels operated by P&O Ferries, DFDS Seaways and Stena Line, with main destinations including the UK ports of Hull and Killingholme, and the Dutch ports of Rotterdam and Hook of Holland.
- Two additional routes further north, each comprising vessels operated by DFDS Seaways transiting between Newcastle Upon Tyne (UK) and Ijmuiden (the Netherlands).

Also noted is a less frequently used north west/south east route within the southern portion of the study area, comprising RoPax vessels operated by P&O Ferries transiting between Zeebrugge (Belgium) and Teesport (UK) as well as vessels operated by Stena Line transiting between Killingholme (UK) and Hook of Holland (the Netherlands).

Cruises were seen throughout the study area (accounting for 22% of all passenger vessels); in particular, similarly to cargo vessels and tankers (see Section 9.3.2), north/south routeing through the deep-water route east of the Draft Order Limits. Common destinations for these vessels being Southampton (UK) and Norwegian ports.

9.3.7 Oil and Gas Vessels

Figure 9.16 presents the oil and gas vessels recorded within the study area during the 12-month period. Oil and gas infrastructure in the vicinity is also shown for context.

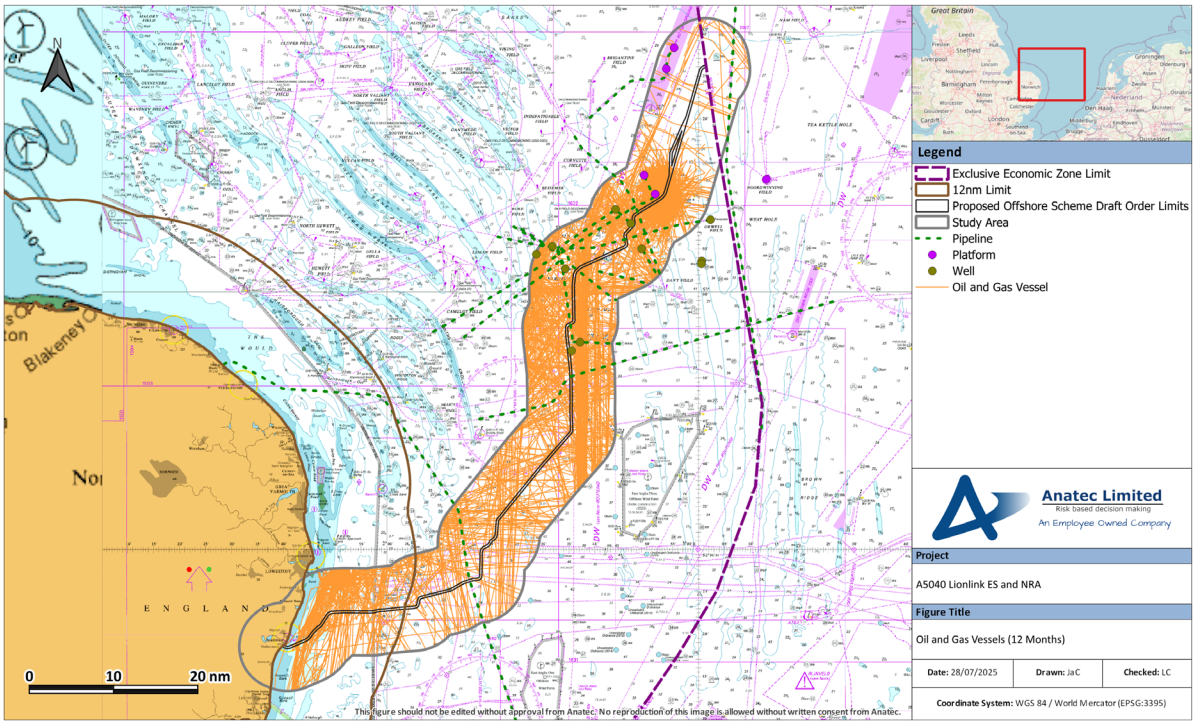

Figure 9.16 Oil and Gas Vessels (AIS, 12 Months)

An average of three oil and gas vessels per day were seen within the study area during the 12-month period. Oil and gas vessels were seen throughout the study area, with higher density traffic in the vicinity of the Sean platforms within the northern portion of the study area (see Section 7.9).

9.3.8 Dredgers

Figure 9.17 presents the dredgers recorded within the study area during the 12-month period. Also shown are the extraction areas in vicinity.

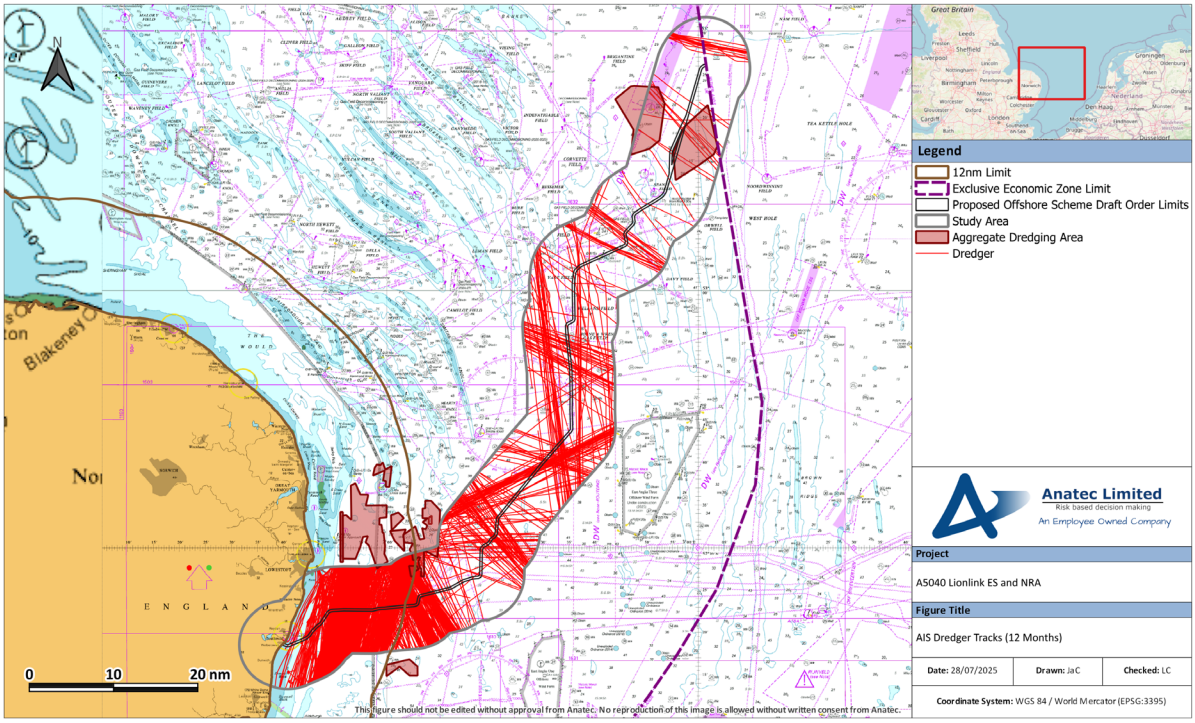

Figure 9.17 Dredgers (AIS, 12 Months)

An average of three to four dredgers per day were seen within the study area during the 12-month period. Dredgers were mainly seen transiting north/south within the southern portion of the study area; extraction areas can be seen nearby and a proportion of the traffic in this area consisted of marine aggregate dredgers transiting to/from these extraction areas. No active dredging was identified within the study area, during the entire study period.

As mentioned in Section 7.8, an aggregate site marked as an 'Exploration and Option Area' intersects the Draft Order Limits near the UK EEZ. The exploration in this area commenced in July 2024 to find aggregate sources. There may be active dredging in this area in the future, based on any survey findings. . The Draft Order Limits have been revised to include an option for avoiding Area 2109. This will be refined at the ES stage, once consultation is concluded with the aggregate operator.

9.4 Anchored Vessels

Vessels broadcast their navigation status, including whether at anchor, via AIS. Any such vessel broadcasting their navigation status as 'At Anchor' within the study area during the 12-month period was identified and manually reviewed to confirm anchoring activity. However, navigation status is not always kept up-to-date. Therefore, as an additional step, Anatec's Speed Analysis program was used to identify any vessels that may have been anchored despite not broadcasting as such over AIS; this program identifies any vessels that were travelling at a speed of below 1 knot for at least 30 minutes. The output of this program was manually reviewed and any additional cases of anchoring behaviour confirmed.

Figure 9.18 presents the results of this analysis, with each anchored vessel colour-coded by vessel type. Also shown are the reported anchorage and designated anchorage located within the study area (see Section 7.7). No vessels were observed at anchor north of the extent of the figure.

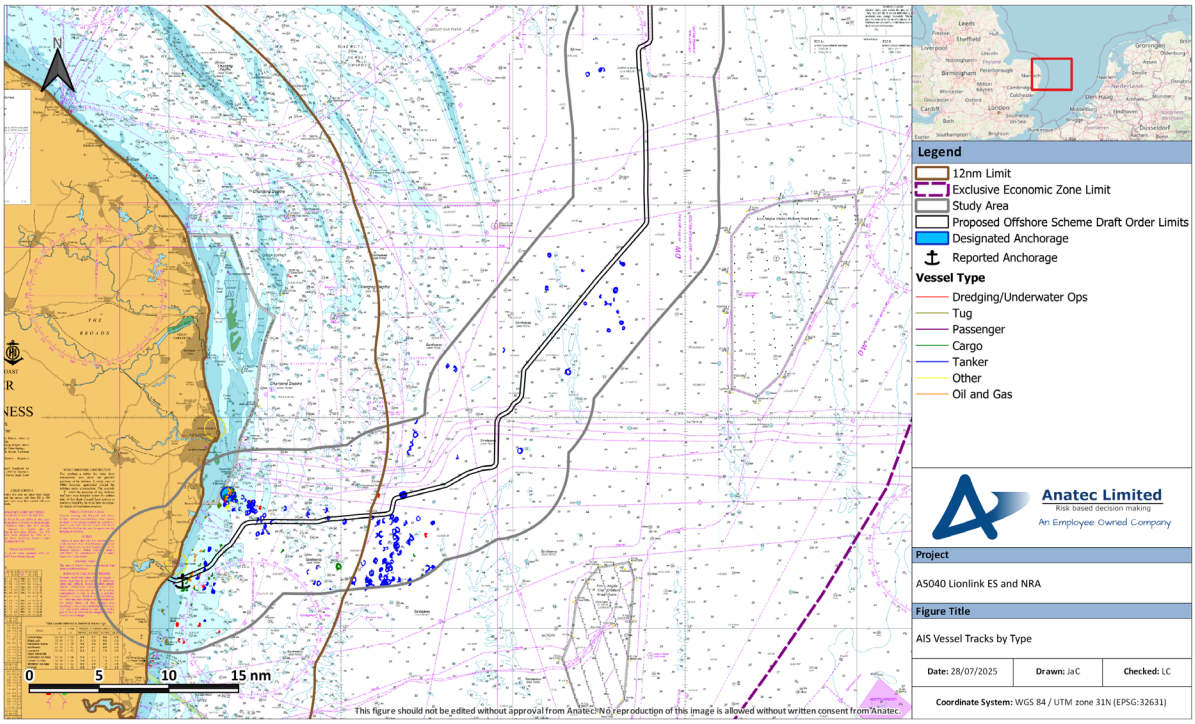

Figure 9.18 Anchored Vessels by Type

Anchoring activity was seen to take place mainly within the southern portion of the study area. Tankers were seen anchored further offshore compared to other vessel types; other vessel types were mainly seen anchored within 8NM of the proposed Landfall Site. Common locations for anchoring included within the designated anchorage area and in the vicinity of the reported anchorage location (see Section 7.7) as well as a location approximately 16NM from the proposed Landfall Site to the south of the Draft Order Limits.

A total of 20 instances of anchoring were noted within the Draft Order Limits over the 12-month period (with some occurring over multiple days). It should however be noted that once the Proposed Offshore Scheme has been installed, mariners will be made aware of its presence via its representation on charts and promulgation of information (both embedded mitigation as per Section 10) and therefore it is expected that vessels will avoid anchoring over it, in line with obligations under SOLAS Chapter V (Ref. v).

Tankers accounted for the majority (66%) of anchored vessels, followed by cargo vessels (10%), oil and gas vessels (9%), tugs (7%) and dredgers (4%).

9.5 Vessel Length

Figure 9.19 presents the vessels recorded within the study area during the 12-month period, colour-coded by vessel length.

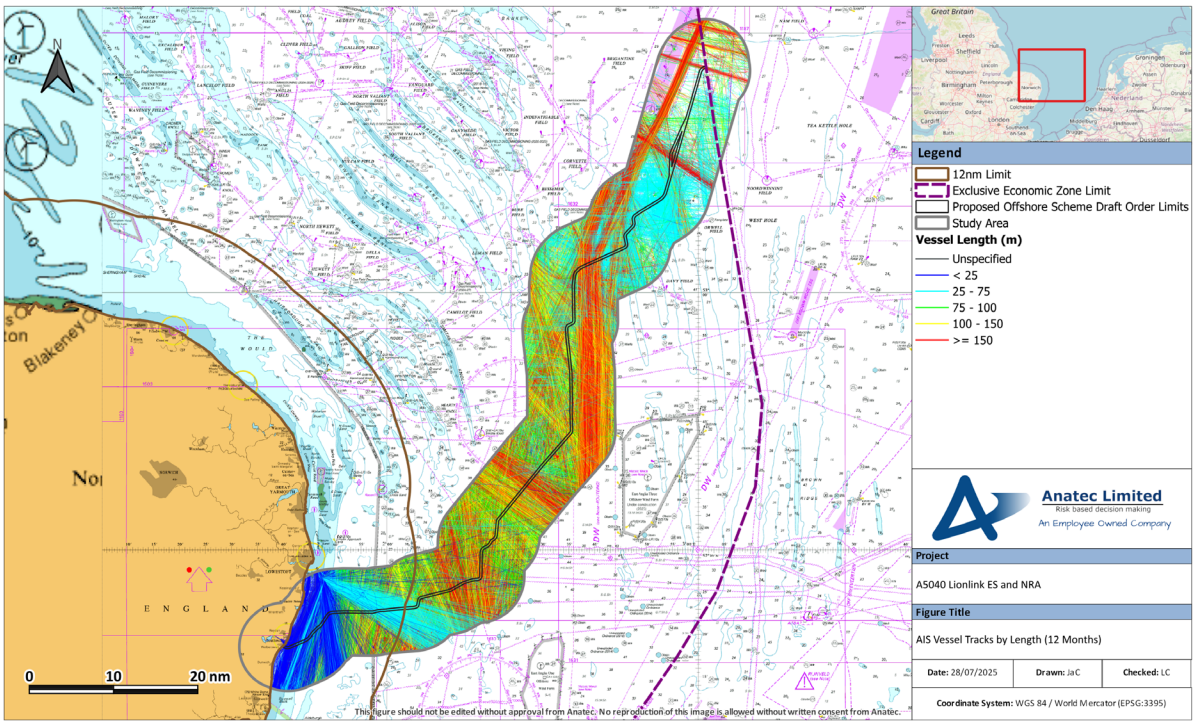

Figure 9.19 Vessels by Length (AIS, 12 Months)

The vessels with smallest lengths (less than 25m) were heavily distributed towards the coast, with the majority of this traffic consisting of recreational vessels and wind farm support vessels. The longest vessels (at least 150m) were mainly seen to use the deep-water route (see Section 7.1) or to be engaged in north west/south east routeing; the majority of vessels with these lengths consisted of cargo vessels.

Figure 9.20 presents the distribution of lengths, excluding unspecified values (which accounted for less than 1%).

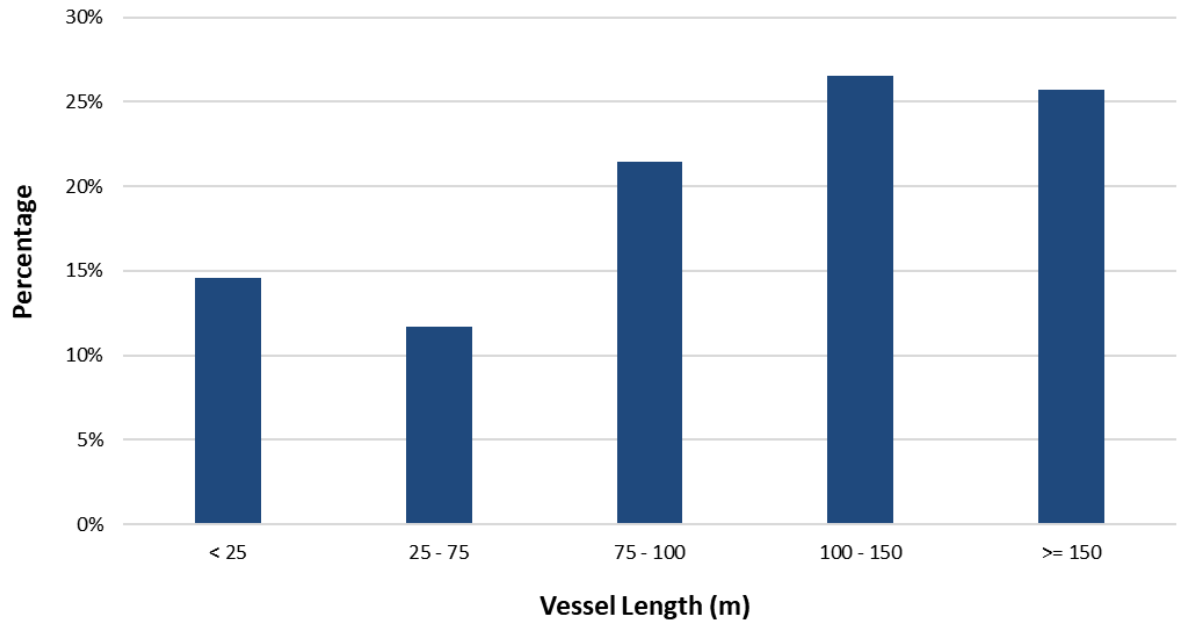

Figure 9.20 Distribution of Vessel Lengths (12 Months)

Approximately half (52%) of lengths were at least 100m. The average length was 113m. The longest vessels were 400m container carriers, which were mainly seen appearing to wait for orders within the southern portion of the study area.

9.6 Vessel Draught

Figure 9.21 presents the vessels recorded within the study area during the 12-month period, colour-coded by vessel draught.

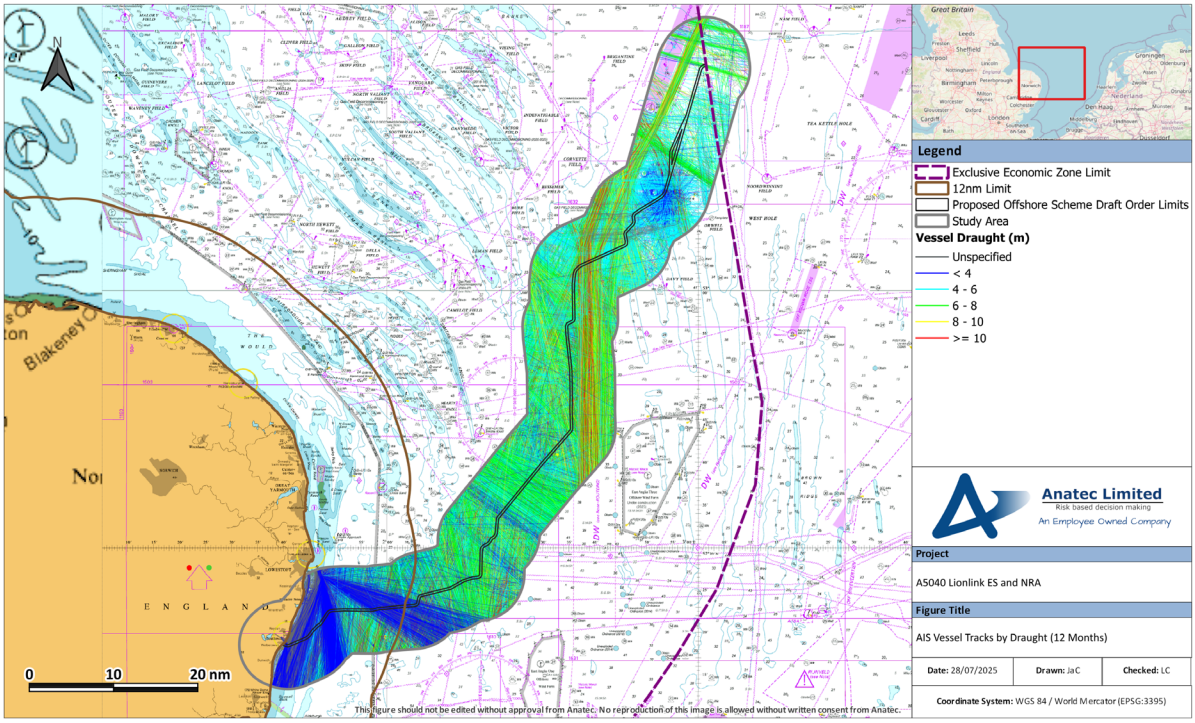

Figure 9.21 Vessels by Draught (AIS, 12 Months)

Similar to vessel lengths (see Section 9.5), the smallest vessel draughts (less than 4m) were distributed towards the coast (associated with recreational vessels and wind farm support vessels), noting that there was also an Emergency Response and Rescue Vessel (ERRV) at the Sean oil field in the northern portion of the study area with draught less than 4m. The largest vessel draughts (at least 10m) were seen within the deep-water route connecting to the Off Botney Ground TSS (see Section 7.1); vessels with these larger draughts were mainly cargo vessels and tankers.

Figure 9.22 presents the distribution of vessel draughts recorded within the study area during the 12-month period, excluding unspecified values (which accounted for 10%). The majority of tracks with unspecified draught were fishing vessels or recreational vessels and likely had shallow draught.

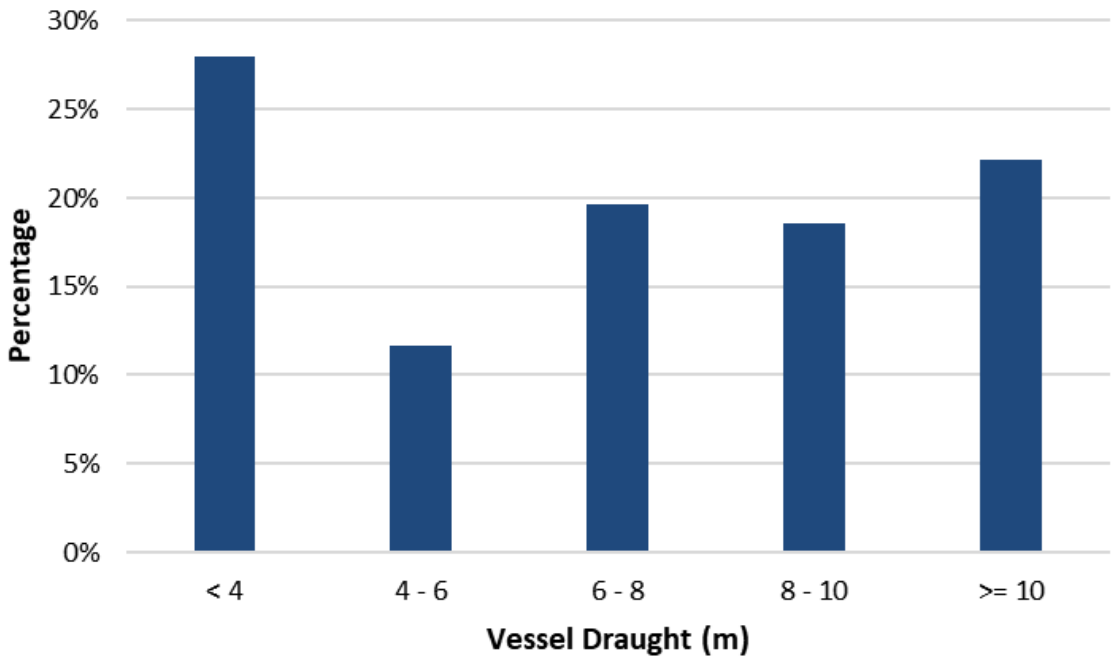

Figure 9.22 Distribution of Vessel Draughts

The average draught was 5.4m. The deepest draught broadcast was 21.1m, from a 330m long crude oil tanker in northward transit through the deep-water route connecting to the Off Botney Ground TSS.

9.6.1 Vessel Draught in Proximity to Crossings with Subsea Infrastructure

There are ten crossings with cables or pipelines located in water depths of less than 44m, corresponding to a depth reduction of 5% or more when considering the maximum height of crossing protection of 2.2m. Vessel draught has been analysed for vessels recorded passing within 1km of each of these locations. The findings of this analysis are presented in Table 9.1.

Table 9.1 Vessel Under Keel Clearance at the Crossing Locations

Crossing Name	Water Depth	Average Draught	Maximum Draught	Minimum Under Keel Clearance	Minimum Under Keel Clearance following Depth Reduction
Ulysses 2	43.3	5.4	17.0	26.3	24.1
Iceni	43.5	6.7	16.1	27.4	25.2
Scylla & Scylla RD (Two cables)	43.4	6.3	20.8	22.6	20.4

Crossing Name	Water Depth	Average Draught	Maximum Draught	Minimum Under Keel Clearance	Minimum Under Keel Clearance following Depth Reduction
Norfolk Boreas and Vanguard Cable Corridors (Three cables)	38.3-38.8	7.1	14.1	24.2	22.0
BBL Balzand to Bacton Pipeline	38.4	6.5	14.1	24.3	22.1
Davy to Inde-AT Pipeline	27.9	5.6	14.3	13.6	11.4
Bacton to Zeebrugge Pipeline	42.8	6.4	16.4	26.4	24.2

9.7 Vessel Dead Weight Tonnage (DWT)

Figure 9.23 presents the vessels recorded within the study area during the 12-month period, colour-coded by vessel DWT. DWT is not broadcast via AIS and is instead obtained from vessel databases; where DWT was not available, it was estimated using Anatec's in-house software. Approximately 24% of values were estimated, mainly comprising wind farm support vessels, recreational vessels and fishing vessels.

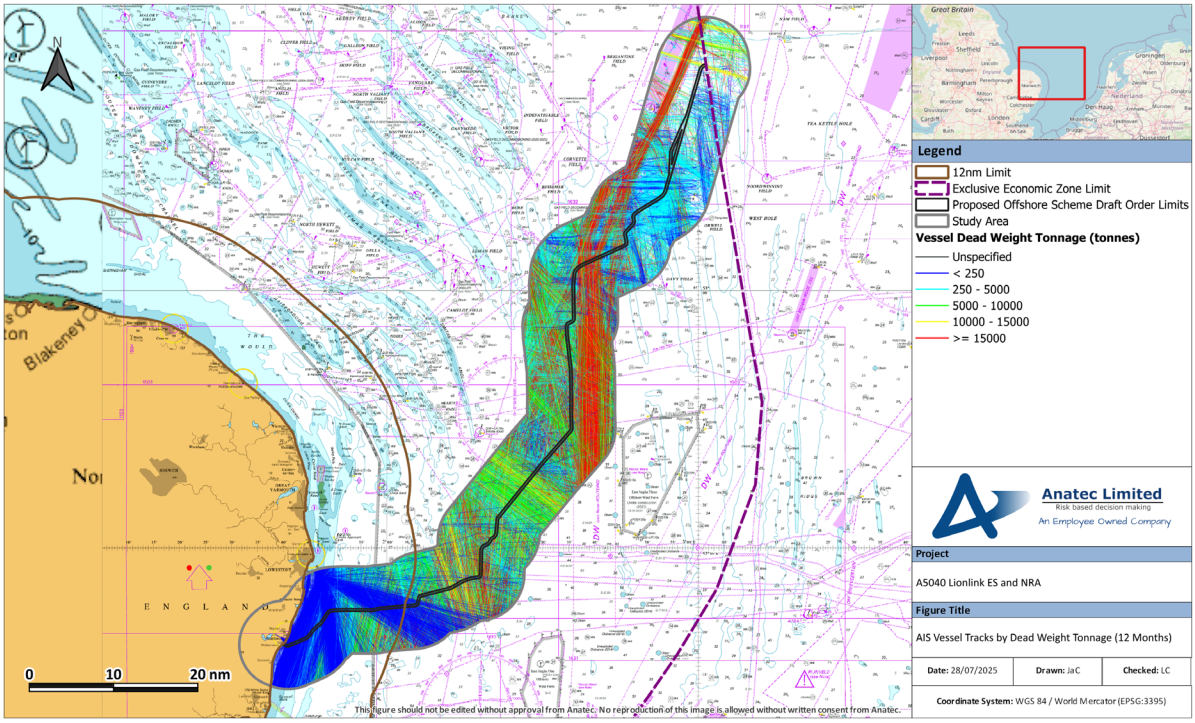

Figure 9.23 Vessels by DWT (AIS, 12 Months)

Similar to vessel length (Section 9.5) and vessel draught (Section 9.6), vessels with the lowest DWT (less than 250 tonnes) were mainly seen close to the coast (comprising recreational vessels and wind farm support vessels) while vessels with the largest DWT (at least 15,000 tonnes) were seen using the deep-water route that connects to the Off Botney Ground TSS or undertaking north west/south east routeing (mainly comprising cargo vessels and tankers).

Figure 9.24 presents the distribution of vessel DWT values recorded within the study area during the 12-month period, excluding unspecified values (which accounted for less than 1%).

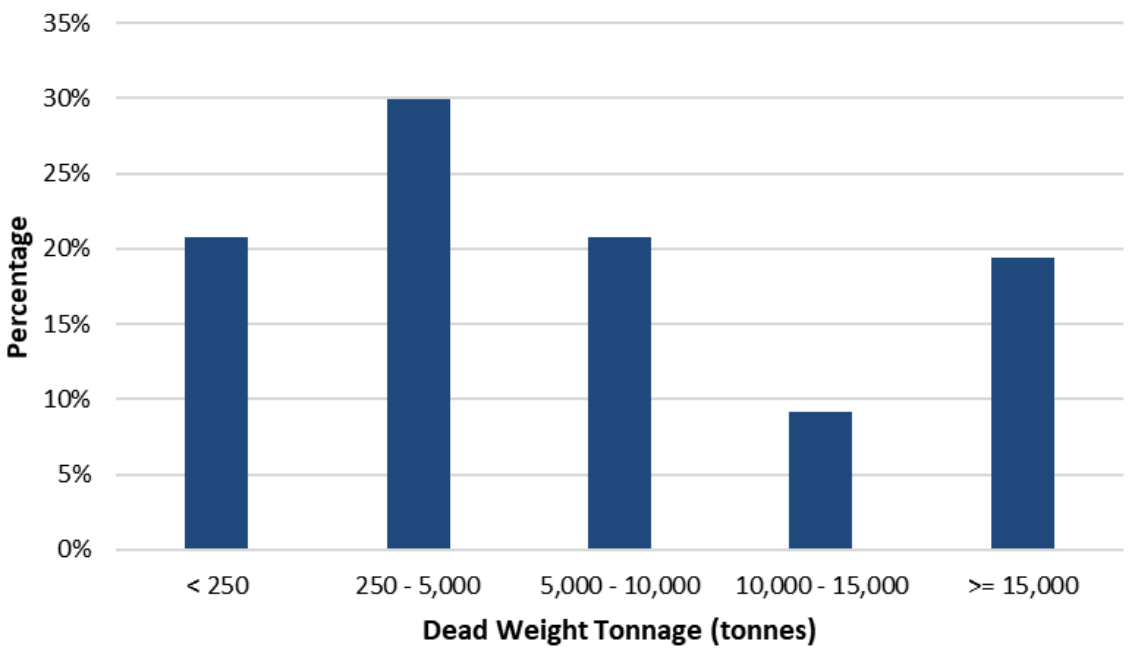

Figure 9.24 Distribution of DWT

The average DWT was 13,842 tonnes. The largest DWT was 321,038 tonnes, associated with a crude oil tanker that appeared to offload its cargo onto another tanker approximately 2.2NM south east of the Draft Order Limits (noting that there is a designated oil transhipment area, outside of the study area, approximately 23NM from where this took place (see Section 7.12)).

9.8 Vessel Speed

Figure 9.25 presents the vessels recorded within the study area during the 12-month period, colour-coded by average speed.

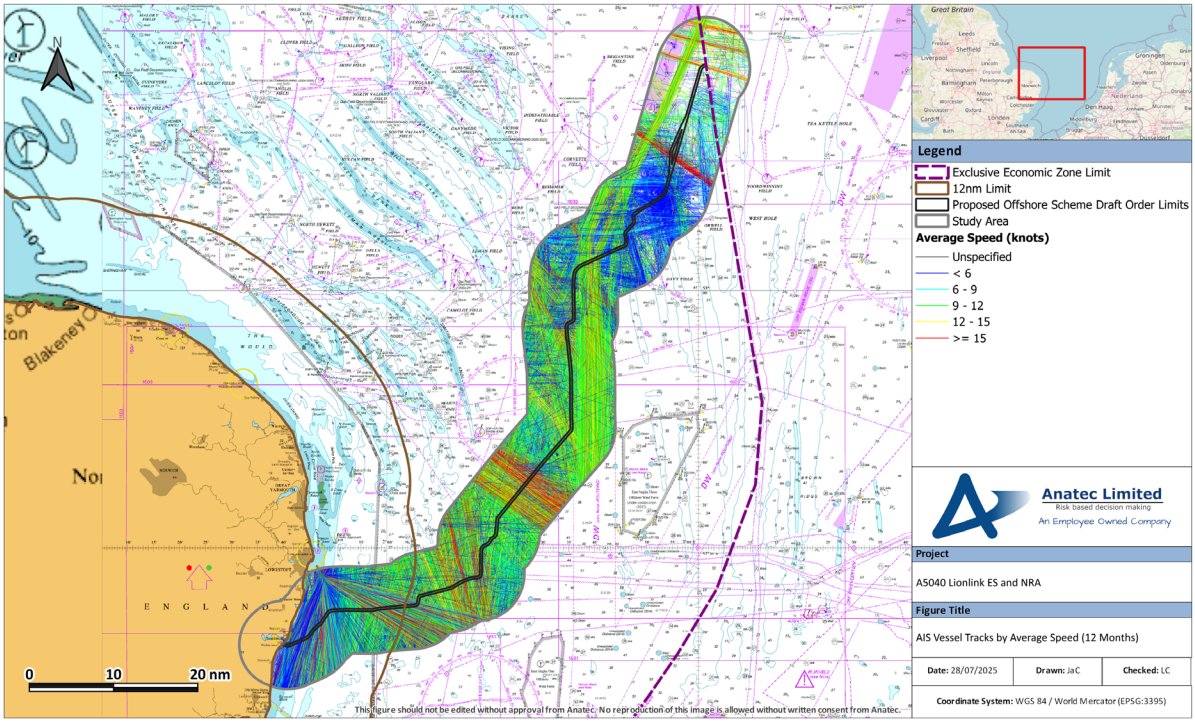

Figure 9.25 Vessels by Average Speed (AIS, 12 Months)

A wide range of speeds was recorded throughout the study area. The lowest speeds (less than six knots) were most commonly exhibited by vessels close to shore (fishing vessels, recreational vessels and wind farm support vessels) and by vessels within the northern portion of the study area (fishing vessels and oil and gas vessels). The greatest speeds (at least 15 knots) were most commonly exhibited by wind farm support vessels close to shore or commercial vessels (i.e., cargo vessels, tankers and passenger vessels) routeing north west/ south east or within the deep-water route that connects to Off Botney Ground TSS.

Figure 9.26 presents the distribution of average speeds recorded within the study area during the 12-month period (excluding unspecified values, which accounted for approximately 2%).

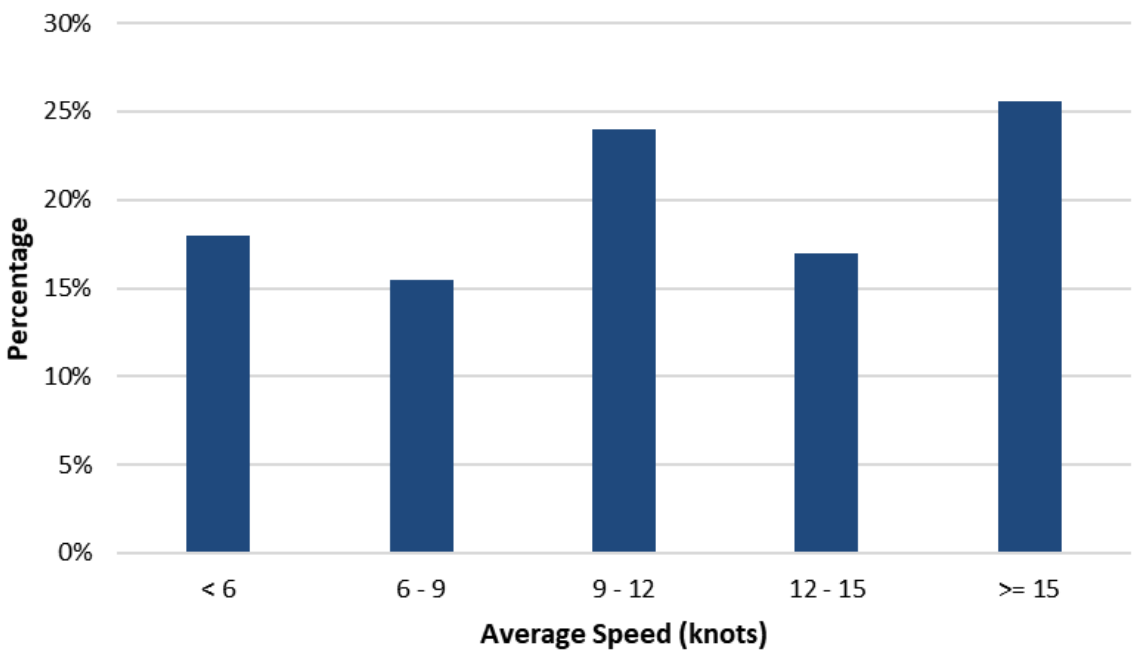

Figure 9.26 Distribution of Average Speeds

The average speed was 11 knots. The fastest average speed recorded was 39 knots, from a powered recreational vessel recorded south of the Draft Order Limits and within 10NM of the coast.

9.9 Future Baseline

This section details potential changes to shipping over the lifetime of the Proposed Offshore Scheme.

9.9.1 Offshore Wind Farm Developments

Construction buoyage for East Anglia Three is currently in place as the wind farm is under construction, however the baseline shipping data used in this NRA pre-dates any offshore construction activity associated with the offshore wind farm.

The location of East Anglia Three and the associated export cable corridor are presented in Figure 9.27.

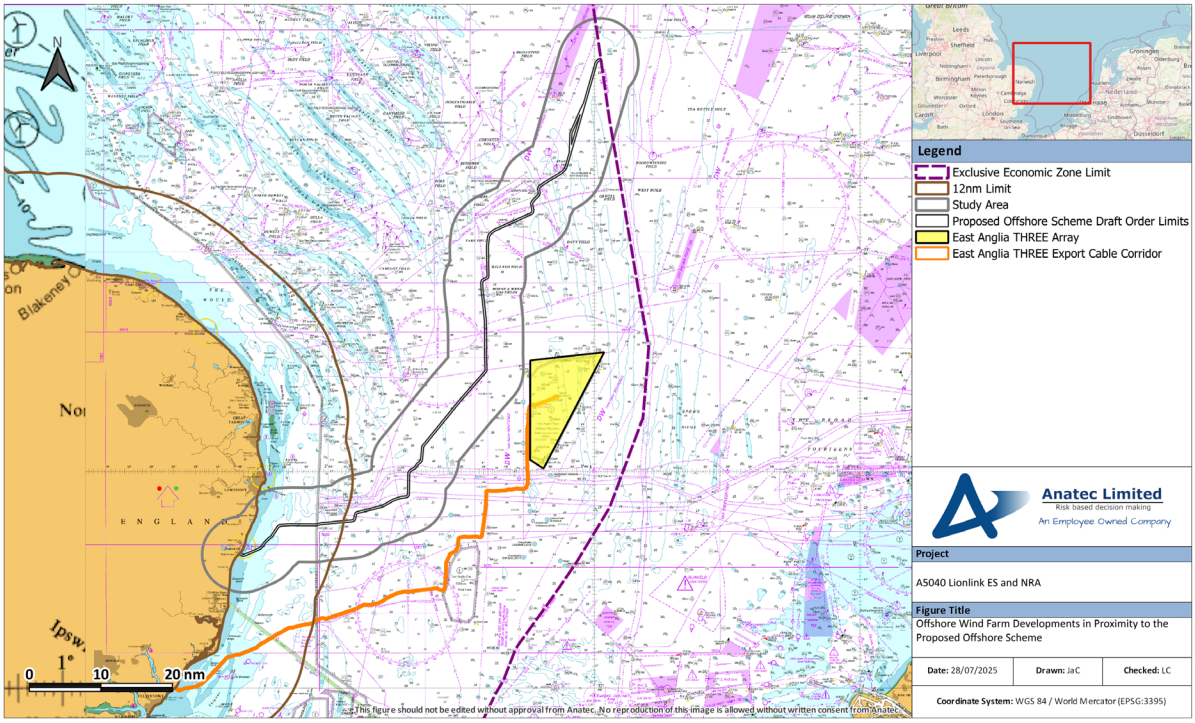

Figure 9.27 Offshore Wind Farm Developments in Proximity to the Proposed Offshore Scheme

It is expected that East Anglia Three will lead to an increase in wind farm support vessel traffic, including additional traffic to Great Yarmouth and Lowestoft. It will also lead to the displacement of existing shipping routes; in line with industry experience, commercial vessels are expected to maintain a minimum mean distance of 1NM from wind farm structures. However, smaller vessels (such as fishing vessels and recreational vessels) are more likely to pass through the developments.

It is noted that there are other wind farm development sites currently in early planning stages in close proximity to the Proposed Offshore Scheme, including in Dutch waters, which will be considered in the assessment of cumulative effects at the ES stage.

9.9.2 Port Trends and Developments

Port statistics for some of the most common commercial destinations have been reviewed to understand how traffic patterns might be expected to change over the lifetime of the Proposed Offshore Scheme. Figure 9.28 presents the most frequently reported destinations on AIS by commercial vessels.

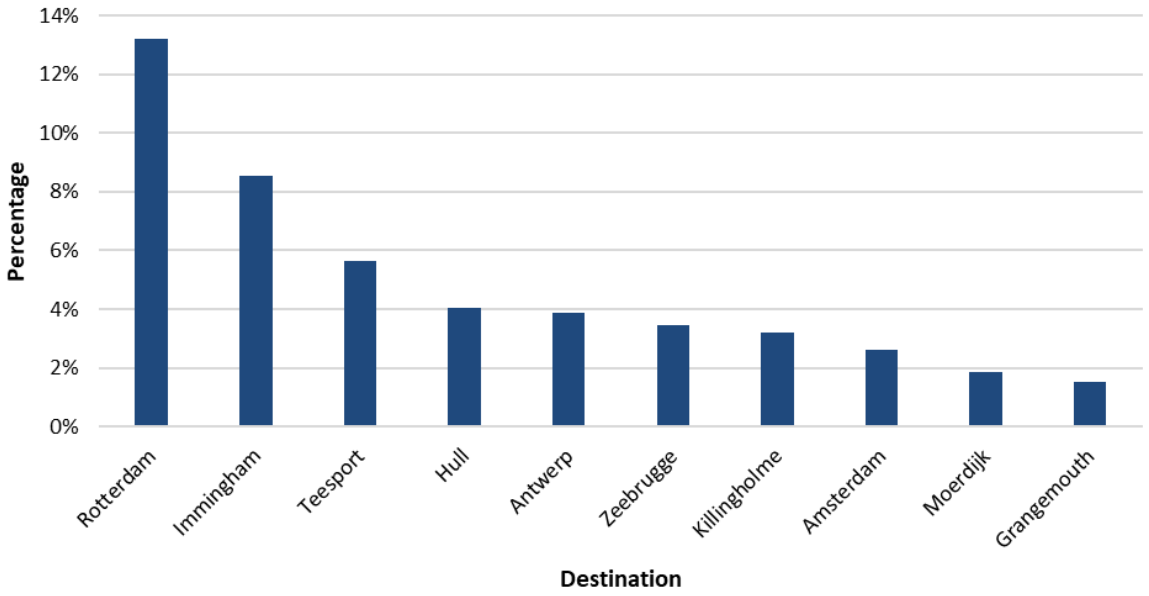

Figure 9.28 Distribution of Main Commercial Vessel Destinations

Rotterdam (the Netherlands) was the most common destination, accounting for 13%. This was followed by Immingham (UK, 9%), Teesport (UK, 6%), Hull (UK, 4%), Antwerp (Belgium, 4%), Zeebrugge (Belgium, 3%), Killingholme (UK, 3%), Amsterdam (the Netherlands, 3%), Moerdijk (the Netherlands, 2%) and Grangemouth (UK, 2%). All other destinations accounted for less than 1%.

Figure 9.29 presents the commercial throughput experienced by the Port of Rotterdam between 2017 and 2023 (Ref. xvii).

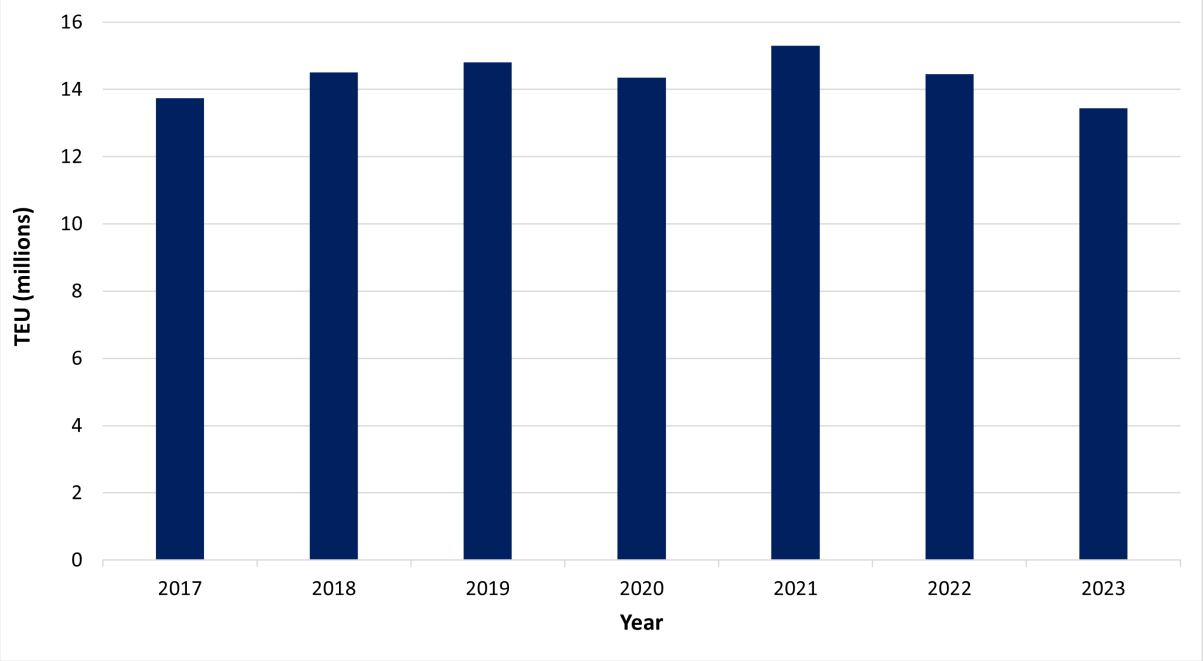

Figure 9.29 Port of Rotterdam Throughput (2017 to 2023)

Commercial throughput at Rotterdam steadily increased between 2017-2021 with the exception of 2020, likely due to the COVID-19 pandemic. From 2021-2023 there has been a decline which may be associated with the sanctions against Russia, the flattening of the Dutch economy in 2022, and changes post Brexit. The slight decline in commercial throughput continued from 2023 to the first quarter of 2024 (Ref. xviii) due to the disruptive effects of continuing geopolitical unrest and low economic growth on shipping.

The Port of Rotterdam is currently undergoing construction of new deep sea and inland shipping quays in the Prinses Amaliahaven, that will facilitate an increased flow of containers corresponding to an approximate increase of 4 million containers (TEU) annually. Construction started in spring 2021 with an expected duration of 3.5 years (Ref. xix). Additionally, plans were announced during 2023 by Rotterdam World Gateway (RWG) and Port of Rotterdam Authority to expand the container terminal in the Prinses Amaliahaven, increasing RWG's capacity by 1.8 million TEU, with the first phase of the project expected to be operational in 2025.

Port arrival statistics from the DfT covering the period from 2017 to 2023 for key UK port destinations broadcast on AIS (Immingham, Teesport and Hull) were obtained to determine trends in shipping in the recent years. These are presented in Figure 9.30.

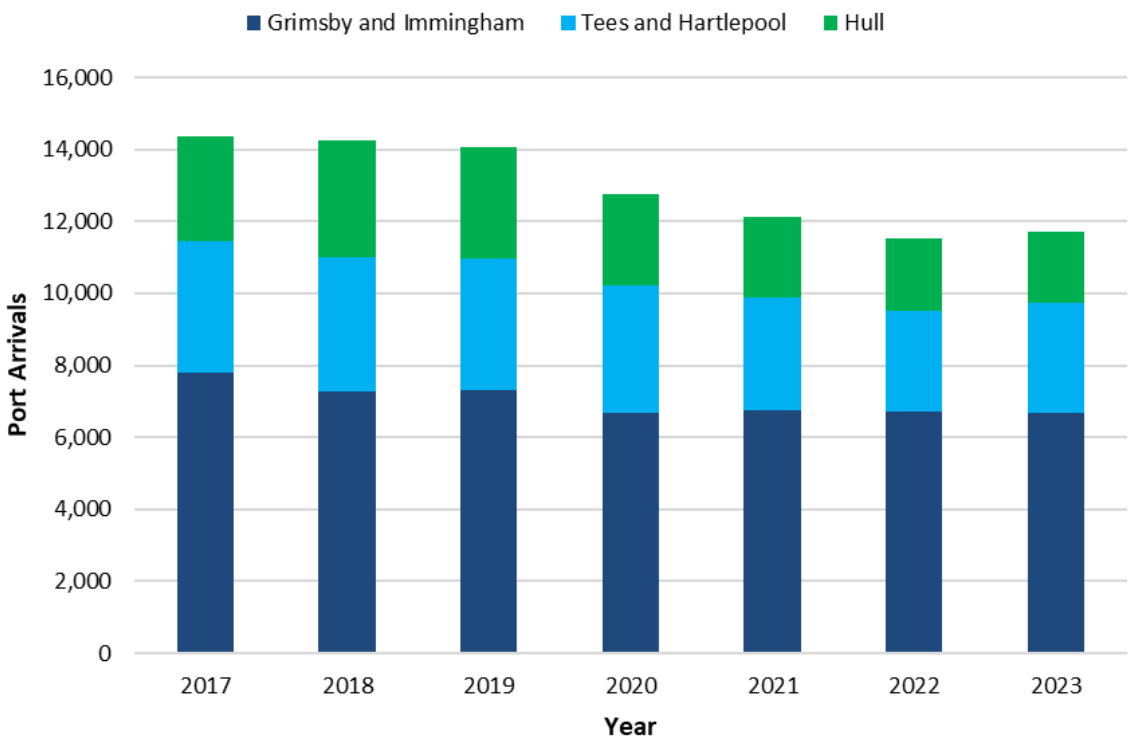

Figure 9.30 Port Arrival Statistics for Main UK Commercial Vessel Destinations (2017 to 2023)

There has been an overall decline in port arrivals over the time period shown, with this decline exhibited by each of the three main UK ports. Hull has seen the largest percentage decrease from 2017 to 2023, at 32%, followed by Tees and Hartlepool (16%) and Grimsby and Immingham (15%). It is noted that Brexit and the COVID-19 pandemic may have contributed to this decline.

There are proposed developments for each of these ports. In February 2025, the *Immingham Green Energy Terminal* was granted development consent (Ref. xx). There is a proposed LNG importation terminal for Teesport, with an application expected to be submitted before 2026 (Ref. xxi).

The Port of Antwerp-Bruges is the second largest European port, second to Rotterdam. In October 2022, the Port of Antwerp-Bruges (Belgium) officially approved plans for the renewal of the quayside and terminal at Europa Terminal. This includes the deepening of the terminal by 2.5m to accommodate larger vessels which will increase the terminal's capacity by over 700,000 TEU annually. Works are expected to take place over nine years. This development will allow the port to adapt to future shipping demands and host larger container ships, which will increase the number of vessels able to berth in the future (Ref. xxii).

Figure 9.31 presents the tonnage of freight traffic handled by Antwerp-Bruges from 2021 to 2023 (Ref. xxiii), separated by loading and unloading freight volume (millions). The freight traffic handled by the Port of Antwerp-Bruges declined by 6% from 2021 to 2023.

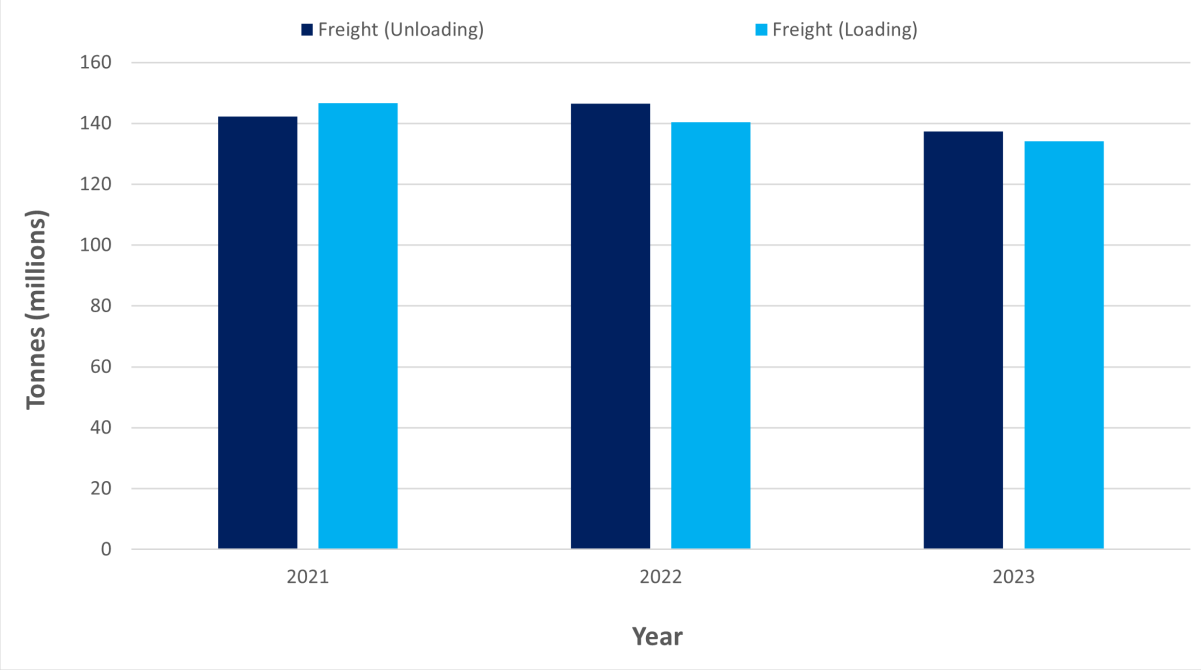

Figure 9.31 Freight Tonnage for Antwerp-Burges (2021 to 2023)

9.9.3 Fishing Vessels and Recreational Vessels

Fishing vessels accounted for 5% of the vessel traffic within the baseline assessment; however, trends are difficult to predict and can depend on various influencing factors such as fish stocks, quotas, and climate. Further changes in fishing activity could occur as agreements are made following Brexit.

Recreational vessels made up approximately 5% of vessels within the study area. Activity can be similarly difficult to predict to that of fishing vessels, but is assumed to remain similar or slightly increase in future years. Similarly, the make-up of recreational traffic may vary, with sail and electric-powered vessels expected to become more prominent in place of diesel-fuelled craft. The locations of recreational activity may also vary, while volume of activity may be dependent on other factors such as the weather, climate change and the economy.

10 Impact Assessment

This section provides a qualitative and quantitative risk assessment (using FSA) for the impacts identified due to the Proposed Offshore Scheme, based on baseline data, expert opinion, stakeholder concerns and lessons learnt from existing offshore developments.

Embedded design and control measures, considered in the assessment of each hazard, are described in full in Section 10.2. At the end of the assessment of each impact, determinations of the frequency of occurrence and severity of consequence (as defined in Section 4.2) are provided in **bold text**, with the resulting significance of risk provided in **highlighted bold text.**

10.1 Impacts Overview

The impacts during each phase of the Proposed Offshore Scheme identified based on the shipping and navigation baseline assessment are summarised and listed below.

- Collision of a passing (third-party) vessel with a vessel associated with cable installation or maintenance;
- Cable installation causing disruption to passing vessel routeing/timetables;
- Increase in the risk of a vessel-to-vessel collision due to construction vessel activity;
- Cable installation causing disruption to fishing and recreational activities;
- Cable installation causing disruption to third party marine activities (e.g., dredging);
- Reduced access to local ports and harbours;
- Anchor interaction with the cable;
- A vessel engaged in fishing snags its gear on the cable;
- Reduction in under-keel clearance resulting from laid cables and associated protection; and
- Interference with marine navigational equipment.

10.2 Design and Control Measures

As part of the design process for the Proposed Offshore Scheme, a number of embedded design and control measures have been adopted to reduce the potential for risk to shipping and navigation.

These measures include those identified as typically good or standard industry practice, and those that would be required to meet existing legislation requirements. As the project is committed to implementing these measures, they are considered to make up part of the Project design. Design and control measures considered as embedded are presented in Table 10.1.

Table 10.1 Design and Control Measures

Commitment Reference ID	Measure Adopted	Compliance Mechanism
	Design Measures	
OD01	All cables will be installed in one trench.	Construction Environmental Management Plan (CEMP) secured by Deemed Marine Licence (DML)
OD02	HVDC cables will be bundled together to minimise the EMF profile.	CEMP secured by DML
OD03	The intention is to bury the cables in the seabed, except in areas where trenching is not possible e.g. where ground conditions do not allow burial or at infrastructure crossings.	CEMP secured by DML
OD05	External cable protection shall only be used where it can be demonstrated that adequate burial depth cannot be achieved (e.g., where ground conditions do not allow burial or at infrastructure crossings); the footprint of any external protection shall be the minimum required to ensure adequate cable protection and stability.	CEMP secured by DML
OD11	Cable protection would be designed to prevent the risk of fishing gear snagging.	CEMP secured by DML
OD12	Routine surveys and inspections of the cables and associated protection measures would be conducted through the lifetime of the project, to ensure they remain in good condition, and adequately protected.	CEMP secured by DML
OD13	Cable jointing operations to be planned away from high shipping activity where possible.	CEMP secured by DML

Commitment Reference ID	Measure Adopted	Compliance Mechanism
OD14	Cable Burial Risk Assessment (CBRA) to be undertaken to identify appropriate target depth of burial based on geology, water depths and AIS data. This will reduce the chance of interaction with other marine users, and as per the CBRA recommendations deeper burial or cover will be implemented in areas of high shipping activity to further reduce this risk.	Design secured by DML
	Control Measures	
OC01	An offshore CEMP including an Emergency Spill Response Plan (ESRP), Waste Management Plan, Marine Pollution Contingency Plan (MPCP), Biosecurity Plan and a dropped objects procedure will be produced prior to installation.	DML secured through Development Consent Order (DCO)
OC02	All project vessels must comply with the International Regulations for Preventing Collisions at Sea (1972), regulations relating to International Convention for the Prevention of Pollution from Ships (the MARPOL Convention 73/78) with the aim of preventing and minimising pollution from ships and the International Convention for the Safety of Life at Sea (SOLAS, 1974).	CEMP secured by DML
OC06	As-built locations of cables and external protection will be supplied to The Crown Estate, UKHO (Admiralty) and Kingfisher Information Services for inclusion in Admiralty and KIS-ORCA charts.	DML secured through DCO

Commitment Reference ID	Measure Adopted	Compliance Mechanism
OC07	External cable protection (excluding crossing locations) shall not reduce chart datum by more than 5%, unless agreed in advance with the MCA and appropriate navigation authorities. If external cable protection at any location including crossings does impact on navigable depth, such locations shall be marked in accordance with Trinity House requirements and suitably marked on navigation charts.	DML secured through DCO
OC10	Existing shipping lanes will be utilised for vessel transiting routes to avoid additional disturbance, where practicable.	CEMP secured by DML
OC15	A Fisheries Liaison Officer (FLO) and fisheries working group(s) will be maintained throughout installation to ensure project information is effectively disseminated, dialogue is maintained with the commercial fishing industry and access to home ports is maintained during the main fishing season. Details of the FLO will be included in the Construction Fisheries Liaison and Coexistence Plan	FLCP and DML secured through DCO
OC21	Guard vessel(s), using RADAR with Automatic RADAR Plotting Aid (ARPA) to monitor vessel activity and predict possible interactions, will be employed to work alongside the installation vessel(s) during cable installation works and to protect any temporary cable exposures during installation.	CEMP secured by DML
OC22	Procedures will be in place to minimise disruption near high density shipping areas. e.g. avoidance of anchoring near busy areas, passage planning of installation vessels, emergency response plan etc.	CEMP secured by DML

Commitment Reference ID	Measure Adopted	Compliance Mechanism
OC24	Cable jointing operations to be planned away from high shipping activity where possible.	CEMP secured by DML
OC25	Crossing and/or proximity agreements will be agreed with aggregate extraction, cable and pipeline owners. The crossing agreement describes the rights and responsibilities of the parties and also the design of the crossing. Crossing design will be in line with industry standards, using procedures and techniques agreed with the cable and pipeline owners.	Crossing agreements/proximity agreements
OC26	Timely and efficient communication will be given to sea users in the area via Notices to Mariners (NtM), Kingfisher Bulletins, Radio Navigation Warnings Navigational Telex (NAVTEX and Navigational Areas (NAVAREA) warnings and /or broadcast warnings. Regular operators, including ferry operators with routes in proximity to the Proposed Offshore Scheme, will be informed in advance of the commencement of works.	DML secured through DCO
OC27	For safety purposes, all vessels will be requested to maintain a minimum distance from construction vessels to prevent interactions.	CEMP secured by DML
OC28	Client Representation onboard Project vessels ensuring compliance with crossing design and communications with Asset Owners.	CEMP secured by DML
OC30	Liaison with Southwold Harbour will be undertaken once finalised construction details are available regarding the timing of works and notifications required.	CEMP secured by DML
OC31	Activities in proximity to offshore wind farms will be coordinated via SIMOPs procedures in collaboration with wind farm developers.	CEMP secured by DML

Commitment Reference ID	Measure Adopted	Compliance Mechanism
OC32	Development of a Navigational Safety and Vessel Management Plan which would set out pre-agreed vessel routes, speeds, safety measures, communication expectations etc. The plan will be developed and agreed post-consent in consultation with the MCA and Southwold Harbour.	CEMP secured by DML

10.3 Assessment of Impacts

This section presents the analysis of the impacts considered as part of the FSA process.

10.3.1 Construction

10.3.1.1 Collision of a passing (third-party) vessel with a vessel associated with cable installation

During construction, there will be an increased risk of vessel collision due to the presence of vessels associated with the Proposed Offshore Scheme. The construction phase of the Proposed Offshore Scheme will include vessels associated with HDD works, pre-lay surveys, preparation of the route, cable-lay, post-lay burial (if cable lay and burial is not a simultaneous operation) and protection works. It is anticipated that the construction phase will take place over multiple campaigns between 2028 and 2032, beginning with a route preparation campaign followed by the cable lay and burial campaigns. Each cable lay and burial campaign would be expected to cover up to approximately 43NM (80km) of the Proposed Offshore Scheme although the actual length of each campaign would be determined with the installation contractor. In addition to vessels associated with the cable-lay, vessels associated with HDD works will also include the use of a jack-up barge (JUB) working in the nearshore area with associated support vessels for a period of 2-3 weeks. HDD works would be projected to occur in advance of cable lay alongside route surveys and preparation works. It is noted that the route preparation works may be split and combined across the cable lay and burial campaigns.

The nature of certain aspects of cable-laying will require large, slow-moving vessels, including vessels which may be Restricted in their Ability to Manoeuvre (RAM). Therefore, these vessels may have limited ability to take avoidance action to prevent a collision with a passing vessel and therefore may present a greater risk. The risk is lower for smaller support vessels such as tugs and guard vessels due to their greater ability to manoeuvre.

Vessel collision risk will also be increased in higher density areas of shipping. The vessel traffic baseline showed the highest density areas of shipping to include the deep-water route

running parallel to the Draft Order Limits, as well as nearshore routes both following the coast and associated with Lowestoft.

At any particular time, it is expected that the spatial extent to which vessels are required to deviate as a result of installation activities is expected to be small. Cable installation and protection works will be moving along the extent of the Proposed Offshore Scheme throughout the construction phase, meaning that the impact on any particular area will be short-term. It is anticipated that installation and burial would occur at speeds of 100-500m per hour, depending on the burial method. Post-lay burial is also being considered which would result in separate lay and burial operations.

During the construction phase, vessels would be managed by marine coordination and a Navigational Safety and Vessel Management Plan, will display suitable marks and lights, would broadcast on AIS (including appropriate navigational status) and would be compliant with relevant Flag State regulation including the COLREGs and SOLAS. Details of construction activities, including details of any advisory safe passing distances would be promulgated through a variety of means. This would include NtMs, Kingfisher bulletins, Radio Navigational Warnings, NAVTEX and/or broadcast warnings to maximise awareness of ongoing or upcoming installation activities. Communications with local ports and harbours, including Southwold Harbour, would also be undertaken to ensure local users are informed of works and therefore reduce collision risk. Where deemed necessary, guard vessels would also be deployed to raise awareness of the Proposed Offshore Scheme and to guide vessels around any areas of construction activity.

Severity of Consequence

In the event of a collision incident between a third-party vessel and a project vessel, the most likely consequences are minor contact between the vessels, resulting in minor damage to property and minor reputational effects on business, but no perceptible effect on people. The worst case scenario is a more severe collision between vessels, leading to a vessel foundering resulting in Potential Loss of Life (PLL) and the environmental consequence of pollution. Severe collisions are more likely if the third-party vessel involved was a smaller craft which may have weaker structural integrity than a commercial vessel. In the event of pollution occurring because of a vessel collision, the MPCP and the vessel's own Shipboard Oil Pollution Emergency Plan (SOPEP) would be implemented to minimise the impact on the environment.

The severity of consequence is assessed to be **moderate**.

Frequency of Occurrence

Noting the above design and control measures, it is considered unlikely that close encounters between third party vessels and project vessels will occur. In such a scenario, collision avoidance action in line with the COLREGS would be implemented, including Rule 18 which governs the responsibilities between vessels if one is RAM. This ensures that the likelihood of an encounter developing into a collision incident is very low.

The frequency of occurrence is assessed to be **remote**.

Tolerability of Effect

Overall, the severity of consequence is deemed to be **moderate**, and the frequency of occurrence is **remote**, giving an overall ranking of **tolerable**.

10.3.1.2 Cable installation causing disruption to passing vessel routeing/timetables

The presence of vessels associated with cable installation may also cause disruption to vessel routeing/timetables. This is most likely to affect areas of busier shipping crossed by the Proposed Offshore Scheme, such as nearshore traffic passing close to the proposed Landfall Site, vessels on shipping routes around the centre of the Proposed Offshore Scheme, and vessels using the deep-water route. In nearshore areas, disruption may also be caused to vessels approaching Southwold Harbour, close to the proposed Landfall Site, particularly during HDD works. During consultation, East Suffolk Council noted that disruption to vessels using the harbour may be experienced if the routeing is impacted by landfall works. The construction phase of the project will include vessels associated with HDD works, pre-lay surveys, preparation of the route, cable-lay and post-lay burial and protection works. It is anticipated that the construction phase will take place over mulitple phases between 2028 and 2032, beginning with a route preparation campaign followed by cable lay and burial campaigns.

Cable installation is anticipated to take place 24 hours a day to minimise the length of time any disruption lasts, and the spatial extent of any required deviations by passing vessels is expected to be small. As the construction works will move along the length of the Proposed Offshore Scheme, the duration of disruption to any particular area is expected to be short. It is anticipated that installation and burial would occur at speeds of 100-500m per hour, depending on the burial method. Post-lay burial is being considered so there may be separate lay and burial operations.

It is anticipated that through effective promulgation of information, the majority of vessels should be aware of ongoing construction activities and be able to carry out sufficient passage planning to minimise impact on schedules. Sensitive timing of works, particularly at the proposed Landfall Site should also serve to mitigate the impact on vessel routeing.

During consultation with ferry operators, P&O Ferries noted that navigational warnings should provide sufficient mitigation for impact on their operations.

Severity of Consequence

The most likely consequences are minor reputational effects on business but no perceptible effect on people.

The severity of consequence is assessed to be **minor**.

Frequency of Occurrence

The impact will be present throughout the construction phase, which will take place over approximately 36 months.

The frequency of occurrence is assessed to be **reasonably probable**.

Tolerability of Effect

Overall, the severity of consequence is deemed to be **minor**, and the frequency of occurrence is **reasonably probable**, giving an overall ranking of **tolerable**.

10.3.1.3 Increase in the risk of a vessel-to-vessel collision due to construction vessel activity

Displacement of third-party vessels due to the presence of construction activities may also lead to an increase in collision risk between two third-party vessels. In particular, vessels may be required to deviate around large, slow-moving vessels such as a CLV or JUB which may be RAM. The construction phase of the Proposed Offshore Scheme will include vessels associated with HDD works, pre-lay surveys, preparation of the route, cable-lay and post-lay burial and protection works. It is anticipated that the construction phase will take place between 2028 and 2032, beginning with a route preparation campaign followed by multiple cable lay and burial campaigns.

The risk of vessel displacement leading to increased encounters between third-party vessels and therefore increased collision risk is likely to be greatest in higher density shipping areas, such as where vessel routes cross the Proposed Offshore Scheme, and in nearshore areas. It is noted that the Proposed Offshore Scheme does cross a charted deep-water route, where deep draught vessels such as cargo vessels and tankers may have more limited sea room available for collision avoidance manoeuvres.

Offshore cable installation is anticipated to take place 24 hours a day to minimise the length of time any disruption lasts, and the spatial extent of any required deviations is expected to be small. As the construction works will move along the length of the Proposed Offshore Scheme, the duration of disruption to any particular area is expected to be short. It is anticipated that installation and burial would occur at speeds of 100-500m per hour, depending on the burial method. Post-lay burial is being considered so there may be separate lay and burial operations.

Awareness of construction activities among third-party vessels through measures such as promulgation of information will allow vessels to make suitable adjustments to passage plans if necessary and avoid unexpected encounters from occurring. In addition, project vessels will be managed by marine coordination, display suitable lights and marks, and will broadcast on AIS (including relevant navigational status for vessels which are RAM) and will comply with relevant Flag State regulations including the COLREGs and SOLAS. Along with guard vessels deployed where necessary, awareness of construction works should reduce encounter situations arising and therefore reduce the risk of collision.

Severity of Consequence

In the event of a collision between third-party vessels, the most likely consequences are minor contact between the vessels, resulting in minor damage to property, minor reputational effects on business, but not perceptible effects on people. The worst case scenario may

involve a more severe collision, leading to a vessel foundering, PLL and the environmental consequence of pollution. A collision involving a smaller craft may be more likely to lead to foundering, as these vessels may typically have weaker structural integrity than a commercial vessel. In the event of pollution occurring as a result of a vessel collision, the MPCP and the vessel's SOPEP would be implemented to minimise the impact on the environment.

The severity of consequence is assessed to be **moderate**.

Frequency of Occurrence

The impact will be present throughout the construction phase which will take place in several phases over a period of approximately 36 months, beginning in 2028. The spatial extent of any required deviations is expected to be small at any given time, with cable installation taking place over 24 hours per day to reduce the overall duration of the construction phase. Combined with effective promulgation of information and other measures to increase awareness of construction activities, it is anticipated that the probability of increased encounters and collisions is low.

The frequency of occurrence is assessed to be **remote**.

Tolerability of Effect

Overall, the severity of consequence is deemed to be **moderate**, and the frequency of occurrence is **remote**, giving an overall ranking of **tolerable**.

10.3.1.4 Cable installation causing disruption to fishing and recreational activities

Construction activities associated with the Proposed Offshore Scheme may also cause disruption to fishing and recreational activities. From the baseline vessel traffic, fishing vessels were common throughout the study area, with active fishing most common in the northern half of the study area. Active fishing mostly consisted of beam trawling, with Scottish/Danish seining and demersal trawling also recorded around the central portion of the Proposed Offshore Scheme, while recreational activity was concentrated in coastal areas. Therefore, it is likely that fishing activity is disrupted further offshore, while recreational activity is more directly impacted by landfall works and cable lay in nearshore areas. Consultation with Southwold Harbour noted a fleet of approximately 17 fishing vessels operating out of Southwold, all of which were under 10m in length. Based on information provided by Southwold Harbour, there was approximately 9-10 vessels movements per day recorded at the harbour, with recreational and fishing vessels being the most common vessel types.

The impact will be present throughout the construction phase which will take place in several phases over a period of approximately 36 months, beginning in 2028. Disruption to recreational vessels is expected to be greater if nearshore works are carried out during the summer months. The spatial extent of any required deviations by third-party vessels is expected to be small at any given time, with cable installation taking place over 24 hours per day to reduce the overall duration of the construction phase. As the construction works will move along the length of the Proposed Offshore Scheme, the duration of disruption to any

particular area is expected to be short. It is anticipated that installation and burial would occur at speeds of 100-500m per hour, depending on the burial method. Post-lay burial is being considered so there may be separate lay and burial operations.

Promulgation of information and the use of guard vessels (where required) is expected to enhance awareness of construction works among sea users. Targeted promulgation of information including the distribution of local NtMs, liaison with local ports and harbours, the Kingfisher bulletins should assist in increasing awareness among fishers and recreational users of the area. Liaison with Southwold Harbour will also help to inform local users of the works close to the proposed Landfall Site and the appointment of an FLO will also improve awareness of works among local fishers. Additionally, disruption will be reduced where possible by the management of project vessels through marine coordination, vessels displaying appropriate marks and lights, appropriate use of AIS, and the following of Flag State regulations such as the COLREGs and SOLAS.

Severity of Consequence

The most likely consequences from fishing and recreational disruption are minor reputational effects on business, with no perceptible impact on people.

The severity of consequence is assessed to be **minor**.

Frequency of Occurrence

The frequency of occurrence is assessed to be **reasonably probable**.

Tolerability of Effect

Overall, the severity of consequence is deemed to be **minor**, and the frequency of occurrence is **reasonably probable**, giving an overall ranking of **tolerable**.

10.3.1.5 Cable installation causing disruption to third-party marine activities

Construction activities may also lead to disruption to third-party marine activities, including dredging, military exercises, and wind farm and oil and gas support activities.

There are no military exercise areas within the study area based on publicly available information, with the closest areas being located approximately 10NM from the northern end of the Draft Order Limits. Only a small number of military vessels were recorded within the study area, with around half of these being recorded within the deep-water route. Other military vessels were generally recorded in nearshore areas. It is noted that military vessels are not obligated to broadcast on AIS and are therefore likely to be under-represented.

There are a number of aggregate dredging areas in proximity to the Proposed Offshore Scheme, with one of these overlapping the northern section, noting that the Draft Order Limits include alternative routeing to avoid this overlap. There are also several aggregate dredging areas to the north of the Proposed Offshore Scheme as it approaches the proposed Landfall Site. Three to four dredgers per day were recorded within the study area, noting that

these were recorded transiting rather than actively engaged in dredging. No active dredging was recorded within the study area, including within the designated aggregate dredging areas, however there may be active dredging in these areas in the future.

Wind farm support vessels were primarily recorded in the southern portion of the study area, with the most common routes being between Lowestoft and the East Anglia One and Greater Gabbard and Galloper wind farms. It was noted in consultation with SPR that during the cable lay process, some slight disruption may be caused to vessels on these routes. It is anticipated that promulgation of information including NtMs, and liaison with operators should allow disruption to suitably managed.

Oil and gas support vessels were also recorded within the study area, with particularly high numbers of vessels around the Sean platforms. Operational ports varied across the study area, with Lowestoft, Great Yarmouth, Montrose and Aberdeen all commonly broadcast as destinations by oil and gas support vessels. Similarly to wind farm support vessels, it is anticipated that through promulgation of information and liaison with operators, disruption to oil and gas activity can be suitably managed.

Severity of Consequence

The most likely consequences from disruption to third-party marine activities are minor reputational effects on business but no perceptible effect on people.

The severity of consequence is assessed to be **minor**.

Frequency of Occurrence

Given the low volumes of military vessels and dredgers recorded within the study area, and that all dredgers on AIS were recorded transiting rather than engaged in activities, it is anticipated that any disruption can be suitably managed by liaison with the MoD and dredging operators in advance of and during construction works. Should the cable be routed through the aggregate dredging area, there may be a requirement for deeper burial if the area is planned to be actively used. This will be confirmed once the final cable route is selected following further conversation with the dredging operator. Similarly, liaison with oil and gas and wind farm operators should be sufficient to suitably manage disruption to vessels associated with those activities.

The frequency of occurrence is assessed to be **reasonably probable**.

Tolerability of Effect

Overall, the severity of consequence is deemed to be **minor**, and the frequency of occurrence is **reasonably probable**, giving an overall ranking of **tolerable**.

10.3.1.6 Reduced access to local ports and harbours

During the construction phase, there is potential for reduced access to local ports and harbours due to construction works, particularly works relating to the proposed Landfall Site

close to Southwold Harbour. The entrance to Southwold Harbour is located approximately 370m to the north of the Draft Order Limits. Lowestoft is located 6.1NM to the north west of the Draft Order Limits, with the closest of its two pilot boarding stations being 4.1NM north of the Draft Order Limits, while the Sizewell C Harbour Limits are approximately 4.2NM to the south of the proposed Landfall Site.

Vessel movements associated with construction may lead to a temporary loss or disruption of access to ports and harbours. Vessels which are RAM, particularly cable lay vessels or JUB have the greatest potential to cause disruption.

The impact will be present throughout the construction phase which will take place in several phases over a period of approximately 36 months, beginning in 2028, with the impact likely to be greatest during the HDD works, for vessels accessing Southwold Harbour. HDD works may involve a JUB or multi-cat vessel being on site at the HDD exit point for 2-3 weeks during the construction phase. It was noted during consultation with the East Suffolk Council that disruption at the proposed Landfall Site may have an impact on vessels leaving Southwold Harbour.

Key design and control measures to mitigate the loss of port access will be promulgation of information to ensure mariners are aware of project vessel movements close to ports and harbours, including liaison with Southwold Harbour to facilitate promulgation about the works with local users. Additionally, disruption will be reduced where possible by the management of project vessels through marine coordination, production of a Navigational Safety and Vessel Management Plan, which will be developed in consultation with the Southwold harbour master (for works within their harbour limits), project vessels displaying appropriate marks and lights, appropriate use of AIS, and the following of Flag State regulations such as the COLREGs and SOLAS.

Severity of Consequence

The presence of project vessels, particularly cable lay vessels and JUB which may be RAM, may lead to a temporary loss or reduction in access to ports and harbours, particularly Southwold Harbour. The most likely consequences are minor reputational effects on business but no perceptible effect on people.

The severity of consequence is assessed to be **minor**.

Frequency of Occurrence

The impact will be present throughout the construction phase of the Proposed Offshore Scheme, but particularly during nearshore landfall works relating to the HDD.

Based on the AIS data, approximately two vessels per day were recorded entering/exiting Southwold Harbour, noting that vessels visiting the harbour included a large number of recreational vessels, which are typically under-represented on AIS. It is noted that the Draft Order Limits of the Proposed Offshore Scheme cross the approaches to Southwold Harbour for vessels from the southeast of the harbour entrance, with the crossing located

approximately 750m from the harbour entrance. During consultation with the East Suffolk Council, who operate Southwold Harbour, it was noted that there is a fleet of 17 fishing boats regularly operating from the harbour, with the numbers of vessels recorded on AIS under-representing vessel traffic in the harbour. Based on data from Southwold Harbour for 2023 and 2024, there were approximately 9-10 vessel movements per day in the harbour.

The frequency of occurrence is assessed to be **reasonably probable**.

Tolerability of Effect

Overall, the severity of consequence is deemed to be **minor**, and the frequency of occurrence is **reasonably probable**, giving an overall ranking of **tolerable.**

10.3.1.7 Anchor interaction with the cables

There is a risk of anchor interaction with cables during the construction phase. The risk will be present throughout the construction phase once the cables have been laid, particularly during the interval between cable laying and burial and protection works being completed, should the cable lay and burial not be a simultaneous operation.

There is a risk that a vessel loses its holding ground while at anchor, and subsequently drags anchor over the cables. Anchoring activity was typically recorded in the southern portion of the study area, particularly as the Proposed Offshore Scheme approaches the proposed Landfall Site, and therefore the probability of a vessel dragging anchor is highest in these areas. A charted anchorage is also located 60m south of the Draft Order Limits close to the proposed Landfall Site, on approach to Southwold Harbour, while a designated anchorage area is charted 1.8NM to the north-west of the Draft Order Limits, between Southwold and Lowestoft. It is noted that a large proportion of anchoring recorded within the study area took place outside of charted or designated anchorages.

There is also a risk of a vessel dropping anchor in an emergency, such as in the case of an engine failure, to avoid drifting into emergency situations such as grounding, collision or allision. Emergency anchoring is more likely to occur in high-density areas of traffic due to increased vessel numbers, such as where vessel routes cross the centre or nearshore sections of the Draft Order Limits. Vessels in the nearshore area may also be more likely to drop anchor in an emergency in order to prevent more serious consequences of engine failure, e.g., grounding in shallow waters. In open waters, it may be more likely that a vessel attempts to fix the problem or await assistance rather than dropping anchor. Incident data reported by the RNLI and MAIB between 2014 and 2023 showed that machinery failures, which in some cases may lead to vessels drifting, were among the most common incidents recorded within the study area.

Severity of Consequence

While the cables are exposed, any vessel anchor may interact with the cable. Once the cables are protected via either burial or external protection, larger vessel anchors will pose a greater threat to the cables than those of smaller vessels, as the penetration depth of the larger

anchors is greater and they have the potential to cause greater damage. Should an anchor become snagged on the cables, there could be a risk of injury while trying to free it. If the anchor cannot be freed from the cables, the safest action is to the slip the anchor, rather than attempting to raise or cut the cables. Appropriate burial and protection, as informed by a CBRA, will mitigate risks associated with vessel anchors.

The most likely consequences are limited damage to property (anchoring vessel or subsea cable), with greater damage possible depending on the anchor size and the nature of the interaction.

The severity of consequence is assessed to be **moderate**.

Frequency of Occurrence

Marking of the cables on Admiralty Charts will inform any decision to anchor, as per Regulation 34 of SOLAS. It is however noted that time available to make a decision on anchoring in an emergency, particularly if a vessel is drifting towards a hazard, may be limited.

Other mitigations will include promulgation of information relating to the position of the cables on the seabed, particularly while the cables is exposed ahead of burial and protection works. The likelihood of anchor interaction will be minimised by ensuring the time between cable lay and burial is as short as possible, thus minimising the time period where the cables are exposed on the seabed.

The frequency of occurrence is assessed to be **extremely unlikely**.

Tolerability of Effect

Overall, the severity of consequence is deemed to be **moderate**, and the frequency of occurrence is **extremely unlikely**, giving an overall ranking of **broadly acceptable**.

10.3.1.8 Vessel engaged in fishing snags its gear on the cable

There is also a potential for fishing gear to interact with cables and become snagged. This is particularly the case for demersal fishing gear, such as demersal and beam trawling, which interacts with the seabed, and therefore poses the greatest snagging risk. Beam trawling made up the majority of active fishing in the study area, and was particularly recorded around the northern half of the Draft Order Limits. Demersal trawling was also recorded around the centre of the Draft Order Limits. Based on information provided by Southwold Harbour, there is a fleet of 17 fishing vessels operating from the harbour, including two trawlers.

As per the impact relating to vessel anchors, the risk of fishing gear interaction is greatest when the cables are exposed following cable lay in advance of burial and protection works being carried out. Once the cables are protected, it is anticipated that this would offer adequate protection from fishing gear.

Severity of Consequence

While the cables are exposed, there is a higher risk from snagging, particularly with demersal fishing gear prominent in the study area. In the event of fishing gear snagging on the cable, the response may include the reversing or reduction of propulsive force, attempts to unfasten fishing gear, or releasing fishing gear. Therefore, in the majority of snagging incidents it should be possible for vessels to recover without serious consequences from a safety perspective. Accident data from the MAIB shows that safe recovery is not always the outcome, and that consequences may involve loss of stability, damage to vessels, gear and the cable, and in the worst cases, vessel capsize, crew members overboard and risk of injury or PLL. The risk of capsize is greater if vessels attempt to free their gear by raising the cable, rather than releasing the gear.

The planned cable protection, including burial and the use of external protection at cable crossings and where burial is not feasible (or does not provide full protection), is assumed to provide effective mitigation from fishing gear snagging, reducing the risk of serious consequences such as snagging, capsize of the vessel and PLL once protection is in place.

The severity of consequence is assessed to be **serious**.

Frequency of Occurrence

It is recommended that the likelihood of fishing gear interaction may be minimised by ensuring the time between cable lay and burial is as short as possible, thus minimising the time period where the cables are exposed on the seabed. If there is a period where the cables are surface laid prior to burial, promulgation of information via means such as Notices to Mariners and Kingfisher bulletins will help to ensure that fishers are aware of the cable. Guard vessels will also be deployed where necessary to inform fishers of the position of the cable, with an FLO appointed to manage liaison with the fishing industry. It is the responsibility of fishers to risk assess whether undertaking fishing activities is safe in proximity to the cables, and decide whether or not to fish.

Commercial issues relating to fishing activity are considered further in **Chapter 24 Commercial** Fisheries of this PEIR.

The frequency of occurrence is assessed to be **remote**.

Tolerability of Effect

Overall, the severity of consequence is deemed to be **serious**, and the frequency of occurrence is **remote**, giving an overall ranking of **tolerable**.

10.3.2 Operation

10.3.2.1 Collision of a passing (third-party) vessel with a vessel associated with cable maintenance

During the operation phase of the Proposed Offshore Scheme, the risk of collision between third-party vessels and project vessels remains during periods of maintenance or if repairs are required. It is not anticipated that routine maintenance will be required, however periodic geophysical inspection surveys will be undertaken to monitor cable burial and external protection. If repairs are required, these are expected to involve a single vessel which is RAM, and would last between six and twelve weeks, depending on the nature of the repair.

As per the construction phase, design and control measures including promulgation of information via means such as NtM, Kingfisher bulletins, Radio Navigational Warnings, NAVTEX and/or broadcast warnings to maximise awareness of repair works.

Severity of Consequence

In the event of a collision incident between a third-party vessel and a project vessel, the most likely consequences are minor contact between the vessels, resulting in minor damage to property and minor reputational effects on business, but no perceptible effect on people. The worst-case scenario is a more severe collision between vessels, leading to a vessel foundering resulting in Potential Loss of Life (PLL) and the environmental consequence of pollution. Severe collisions are more likely if the third-party vessel involved was a smaller craft which may have weaker structural integrity than a commercial vessel.

The severity of consequence is assessed to be **moderate**.

Frequency of Occurrence

Noting the above design and control measures, it is considered unlikely that close encounters between third party vessels and project vessels occur. In such a scenario, collision avoidance action in line with the COLREGS would be implemented, including Rule 18 which governs the responsibilities between vessels if one is RAM. This ensures that the likelihood of an encounter developing into a collision incident is very low. While the risk will be present throughout the expected 40 year operational lifespan of the Proposed Offshore Scheme, vessel presence throughout the operation phase will be limited to periodic surveys and unplanned repair works.

The frequency of occurrence is assessed to be **extremely unlikely**.

Tolerability of Effect

Overall, the severity of consequence is deemed to be **moderate**, and the frequency of occurrence is **extremely unlikely**, giving an overall ranking of **broadly acceptable**.

10.3.2.2 Anchor Interaction with the cable

As per the construction phase, there is potential during the operation phase for vessel anchors to interact with the cable, either as a result of anchor dragging, or a vessel dropping anchor in an emergency.

Once the cables are in place, the proposed offshore HVDC Submarine Cable Corridor would be marked on UKHO Admiralty Charts, with a warning regarding anchoring, trawling and seabed operations, which should help to inform mariners decision on where to anchor. Burial and external protection, as informed by a CBRA, of the Proposed Offshore Scheme should also reduce the likelihood or severity of anchors becoming snagged on the cable. It is anticipated that the cables will be buried to a depth of at least 1.0m where feasible, with cable protection used where this cannot be achieved, noting that these locations are yet to be determined.

It is noted that areas where the cables have become unburied or unprotected will be more exposed to anchor interaction. Periodic surveys will be conducted throughout the lifetime of the Proposed Offshore Scheme to monitor cable burial and protection, with remedial works carried out as the need is identified.

Severity of Consequence

During the operation phase, with the cables protected via either burial or external protection, larger vessel anchors will pose a greater threat to the cables than those of smaller vessels, as the penetration depth of these is greater and they have the potential to cause greater damage. If the cables become exposed, then any vessel anchor may interact with the cables. Should an anchor become snagged on the cables, there could be a risk of injury while trying to free it. If the anchor cannot be freed from the cables, the safest action is to the slip the anchor, rather than attempting to raise or cut the cables. Appropriate burial and protection, as informed by a CBRA, will mitigate risks associated with vessel anchors.

The most likely consequences are limited damage to property (anchoring vessel or subsea cable), with greater damage possible depending on the anchor size and the nature of the interaction.

The severity of consequence is assessed to be **minor**.

Frequency of Occurrence

Marking of the cables on Admiralty Charts will inform any decision to anchor, as per Regulation 34 of SOLAS. It is however noted that time available to make a decision on anchoring in an emergency, particularly if a vessel is drifting towards a hazard, may be limited.

The frequency of occurrence is assessed to be **extremely unlikely**.

Tolerability of Effect

Overall, the severity of consequence is deemed to be **minor**, and the frequency of occurrence is **extremely unlikely**, giving an overall ranking of **broadly acceptable**.

10.3.2.3 Vessel engaged in fishing snags its gear on the cable

There is also a potential for fishing gear to interact with cables and become snagged. This is particularly the case for demersal fishing gear, such as demersal and beam trawling, which interacts with the seabed, and therefore poses the greatest snagging risk. Beam trawling and demersal trawling made up the majority of active fishing in the study area. Based on information provided by Southwold Harbour, there is a fleet of 17 fishing vessels operating from the harbour, including two trawlers.

The cables will be marked on Admiralty Charts and KIS-ORCA, with associated notes and warnings relating to trawling, anchoring and other seabed operations. This will enable fishers to make informed choices on fishing grounds.

Periodic surveys will be conducted throughout the operational lifetime of the Proposed Offshore Scheme to monitor cable burial and protection, with remedial works carried out as the need is identified. In the case of an exposed cable, information around this will be promulgated to ensure fishers are aware of the hazard.

Cable burial and protection will be in place during the operation phase, in line with the recommendations of a CBRA. It is expected that cable burial and protection will reduce the risk of fishing gear snagging. External cable protection will be designed according to industry standards and is assumed to prevent fishing gear snagging. Cable protection will also be in place at up to 19 locations associated with infrastructure crossings, throughout the Proposed Offshore Scheme, with a maximum height of 2.2m above the seabed.

Severity of Consequence

The planned cable protection, including burial and the use of external protection at infrastructure crossings and where burial is not feasible (or does not provide full protection), is assumed to provide effective mitigation from fishing gear snagging, reducing the risk of serious consequences such as snagging, capsize of the vessel and PLL.

The severity of consequence is assessed to be **minor**.

Frequency of Occurrence

Marking of the cables on Admiralty Charts and KIS-ORCA may discourage fishing in the vicinity of the cable, however it is noted that fishing vessels have historically been observed fishing over or near charted cables. The planned burial and protection measures are assumed to provide sufficient protection against fishing gear interaction. Commercial issues relating to fishing activity are considered further in **Chapter 24 Commercial Fisheries** of this PEIR.

The frequency of occurrence is assessed to be **extremely unlikely**.

Tolerability of Effect

Overall, the severity of consequence is deemed to be **minor**, and the frequency of occurrence is **extremely unlikely**, giving an overall ranking of **broadly acceptable**.

10.3.2.4 Reduction in under-keel clearance resulting from laid cable and associated protection

Once external cable protection is in place, including protection at cable crossings, this will reduce water depth in some areas, leading to a decrease in under keel clearance and a potential increase in the risk of vessels grounding. A grounding incident may lead to possible capsize, injury, PLL, or pollution. This risk is naturally greater in coastal areas, where existing water depths are typically shallower.

Cable burial is planned as the primary means of cable protection where feasible. Where cable burial is not possible, or is not feasible to a sufficient depth, external protection in the form of concrete mattresses, rock placement or other possible alternatives will be required. The height of external protection will be informed by the CBRA, noting that the locations requiring external protection are yet to be determined.

Infrastructure crossings will also require external protection, with the maximum height of crossings above the seabed being 2.2m, noting that the design of each crossing may vary in height. The minimum water depth at a crossing with an in-service pipeline or cable is with the Davy-Inde-AT pipeline, in water depth of 27.9m, with up to twelve crossings in ten locations (noting that three of the pipelines cross in similar locations) in total in water depths of less than 44m, meaning it is possible that depth reduction exceeds 5% at these crossings.

Analysis of vessel draughts and under keel clearance in these ten locations has been presented in Section 9.6.1. Based on this, the maximum draught of vessels ranged between 14.1m and 20.8m, with the minimum under keel clearance at any of the locations being estimated as 13.6m. Applying a 2.2m reduction in water depth for the worst case protection height, this maintains a minimum under keel clearance of 11.4m. Therefore, it is not considered that under keel clearance will be sufficiently reduced at cable crossings to present an increased grounding risk.

Should external protection reduce water depth by more than 5% in any area, including at crossings, detailed assessment and further consultation with the MCA and Trinity House will be required, to ensure navigational safety is not compromised. It is anticipated that the locations of external protection will be presented with greater clarity at the ES stage, however detailed assessment and discussion with stakeholders will be carried out post-consent. This would be an iterative process phased as location specific information becomes available i.e., when Principal Contractor is appointed, the final cable centreline has been designed within the Order Limits and once the cables have been installed and as-built information is available.

Severity of Consequence

Should a vessel grounding occur, the most likely consequences are minor damage to property and minor reputational effects on business but no perceptible effect on people. The maximum adverse scenario may include the vessel foundering resulting in PLL and the environmental consequence of pollution. In the event of pollution occurring as a result of a vessel grounding, the MPCP and the vessel's SOPEP would be implemented to minimise the impact on the environment.

The severity of consequence is assessed to be **moderate**.

Frequency of Occurrence

The likelihood of a grounding is greater for larger vessels with deeper draughts, and for vessels transiting in nearshore areas where water depths may be shallower. The deepest draught vessels in the study area were typically recorded in the deep-water route, however vessels with draughts of at least 7m were recorded throughout the study area, with the exception of very close to the proposed Landfall Site, where draughts were typically shallower.

The maximum height of cable protection at crossing locations is 2.2m, noting that this may vary across the 24 planned infrastructure crossings. As noted above, it is possible that water depth will be reduced by more than 5% at some of the crossing locations, dependent on the finalised design of crossings, however a review of vessel draughts suggests that there is sufficient under keel clearance in these areas.

External protection may also be required where burial is not feasible due to seabed conditions, with the locations requiring additional protection yet to be determined. If the reduction in water depth exceeds 5% in any of these locations based on finalised design of external protection measures, further detailed assessment will be carried out on the impact to safe navigation. Additional consultation undertaken with Trinity House and the MCA would then be carried out to identify any further mitigation required.

The proposed Landfall Site will use HDD, with punch-out locations located in water depths of between 5m and 9m at the proposed Landfall Site, with no reduction exceeding 5% of available water depth where HDD is utilised.

The frequency of occurrence is assessed to be **remote.**

Tolerability of Effect

Overall, the severity of consequence is deemed to be **moderate**, and the frequency of occurrence is **remote**, giving an overall ranking of **tolerable**.

10.3.2.5 Interference with marine navigational equipment

A magnetic compass is a navigational instrument for determining direction relative to the earth's magnetic poles. It consists of a magnetised pointer (usually marked on the north end) free to align itself with the earth's magnetic field. Like any magnetic device, compasses are

affected by nearby ferrous materials as well as by local electromagnetic forces, such as magnetic fields emitted from power cables. The majority of commercial vessels use a non-magnetic gyrocompass as the primary means of navigation, which is unaffected by the earth's magnetic field. However, as the magnetic compass still serves as an essential means of navigation in the event of power loss or as a secondary source, it must not be affected to the extent that safe navigation is threatened.

In response to the LionLink Scoping Report, the MCA stated that a three degree electromagnetic compass deviation for 95% of the cable route and five degree deviation for the remaining 5% of the cable route would be acceptable. If the MCA requirement cannot be met, a post installation actual electromagnetic compass deviation survey will be conducted for the cables in areas where compliance has not been achieved , if required by the MCA.

The important mitigating factors to reduce EMF effects on magnetic compasses are:

- Spacing or separation of the cables;
- Water depth;
- Burial depth (or protection); and/or
- Type of current (alternating or direct) running through the cables.

An assessment of magnetic fields and magnetic compass deviation is presented in **Appendix 2.5 EMF Assessment** of this PEIR. The Proposed Offshore Scheme will consist of buried bundle containing; two 525kV HVDC power cables, a fibre optic cable and a DMR cable. The HVDC may result in localised static EMF of up to 51.9 µT at the seabed during normal operation, which reduces with vertical distance above the seabed. Combined with the earth's magnetic field gives a total of 99.3µT at the seabed. The magnetic field from the cables, if large enough, will combine with the earth's magnetic field causing deviations to a vessel compass. The compass deviation calculations in the EMF assessment show that, assuming the cables are bundled and buried at least 1m below the seabed, the MCA thresholds are not exceeded during normal operations. It is noted in the same report that within 300m of the shoreline, where the HVDC are separated into individual ducts, compass deviation was calculated to exceed five degrees, with a deviation of around 7.8 to 8.5 degrees. It is noted that the proposed HDD punch-out may be located up to 900m from the shoreline, in which case the cables would separate in deeper water.

Severity of Consequence

The majority of commercial vessels use non-magnetic gyrocompasses as the primary means of navigation, which are unaffected by EMF. Therefore, in general it is considered unlikely that any EMF interference created by the Proposed Offshore Scheme will have a significant impact on vessel navigation. However, as magnetic compasses can still serve as an essential means of navigation in the event of power loss, as a secondary source, or as some smaller craft (fishing or recreational) may rely on it as their sole means of navigation, it has been assessed within this impact assessment.

Vessels in shallower water should also be able to navigate visually using coastal features when conditions are suitable.

The severity of consequence is assessed to be **minor**.

Frequency of Occurrence

Given that the cables will be bundled and MCA thresholds for compass deviation are not expected to be exceeded for the majority of the cables during normal operations, there are not expected to be significant effects on compass deviation. It is noted in the EMF assessment in **Appendix 2.5: EMF Assessment** of the PEIR that, within 300m of the shoreline where the HVDC cables are separated into individual ducts, compass deviation will be more than 5 degrees, noting as above this may occur up to 900m from the shoreline. However, the spatial extent of the impact is expected to be small, and as noted, vessels in these areas may be able to navigate using coastline features where conditions permit. Vessels navigating in shallow waters around this area include recreational vessels, which may be less likely to carry alternative means of navigation.

The frequency of consequence is assessed to be **remote**.

Tolerability of Effect

Overall, the severity of consequence is deemed to be **minor**, and the frequency of occurrence is **remote**, giving an overall ranking of **tolerable**.

10.3.3 Decommissioning

It is anticipated that decommissioning activities will be similar in nature to construction activities, and therefore impacts are anticipated be lesser or similar, than those identified in the construction or operation phases. An Initial Decommissioning Plan will be produced once the final route and installation are selected, which will be periodically reviewed throughout the operation phase and will form the basis of a Final Decommissioning Plan. It is anticipated that all sections of the cables will be removed, except for any sections which are determined to present a greater risk to remove than leave in-situ.

The preliminary environmental assessment considered that the following conclusions reached for the construction phase were relevant for decommissioning:

- Collision of a passing (third-party) vessel with a vessel associated with cable decommissioning: Tolerable;
- Cable decommissioning causing disruption to passing vessel routeing/timetables: Tolerable;
- Increase in the risk of a vessel-to-vessel collision due to construction vessel activity: Tolerable;
- Cable decommissioning causing disruption to fishing and recreational activities: Tolerable;
- Cable installation causing disruption to third-party marine activities: Tolerable; and

- Reduced access to local ports and harbours: Tolerable.

The preliminary environmental assessment considered that the following conclusions reached for the operation phase were relevant for decommissioning:

- Anchor interaction with the cable (if any section of the cables remain in-situ): Broadly Acceptable;
- Vessel engaged in fishing snags its gear on the cable (if any section of the cables remain in-situ): Broadly Acceptable; and
- Reduction in under-keel clearance resulting from laid cable and associated protection any section of the cables or protection remain in-situ): Tolerable.

10.4 Proposed Mitigation and Monitoring

10.4.1 Mitigation

The impact assessment concluded that none of the impacts had a significance exceeding 'tolerable'. In order to ensure that risks are reduced to ALARP, it is required that embedded design and control measures are implemented.

10.4.2 Monitoring

To ensure impacts remain in line with the assessed maximum design scenario, it is recommended that the following monitoring measures are implemented:

- Cable burial and protection would be regularly surveyed to ensure the cables remain buried and external protection remains in place. Where the cables are found to be exposed, remedial works would be undertaken, with information promulgated to ensure mariners are aware of the hazard. Where appropriate, guard vessels or temporary buoyage may be required to mark exposed cables which pose a greater risk.
- Where the MCA requirement cannot be met, a post installation actual electromagnetic compass deviation survey will be conducted for the cables in areas where compliance has not been achieved, if required by the MCA.
- Monitoring of the decommissioned Proposed Offshore Scheme will depend on the final nature of the decommissioning works and would be identified as part of the separate decommissioning programme, maintained throughout the lifetime of the Proposed Offshore Scheme.

10.5 Residual Effects

No impacts were assessed to have a significance exceeding 'tolerable', with none identified as being 'unacceptable'. Impacts assessed as tolerable are assessed to be ALARP, with the additional mitigation measures proposed above making no change to the overall ranking of the impacts.

11 Cumulative Hazard Assessment

An assessment of cumulative hazards will be carried out as part of the ES to assess the hazards presented in Section 10 alongside other developments in proximity to the Proposed Offshore Scheme that may have a temporal and/or spatial overlap leading to cumulative effects on shipping and navigation. Transboundary hazards are not expected to exceed those considered within the baseline assessment, given the shipping data used to inform the assessment includes international vessels, and those on international voyages.

12 Summary

The NRA has presented an assessment of impacts relating to shipping and navigation, based on baseline data analysis, expert opinion and feedback received through consultation. Impacts for all phases (construction, operation and decommissioning) have been assessed following the IMO's FSA process.

12.1 Baseline Environment

12.1.1 Navigational Features

The NRA considers the Draft Order Limits of the Proposed Offshore Scheme within UK waters from the proposed Landfall Site on the East Suffolk coast to the UK EEZ boundary, where the Proposed Offshore Scheme enters Dutch waters. The Draft Order Limits intersects the harbour limits of Southwold Harbour at the proposed Landfall Site.

The Proposed Offshore Scheme intersects the deep-water route which is used by vessels associated with the Off Botney Ground TSS. In addition to these routeing measures, there are also two offshore wind farms in proximity to the Proposed Offshore Scheme, namely East Anglia Three (under construction) and East Anglia One (operational). The Proposed Offshore Scheme is expected to cross several subsea pipelines and cables requiring the construction of cable crossings.

12.1.2 Emergency Response Resources

The RNLI operate several lifeboat stations along the coast close to the Proposed Offshore Scheme. The closest of these are at Southwold, 560m from the proposed Landfall Site, and Lowestoft, 6.2NM from the Draft Order Limits. Happisburgh would be the closest station to a large extent of the Proposed Offshore Scheme and is located 65NM from the Draft Order Limits at the closest point. There was an average of 23 incidents per year recorded by the RNLI from 2014 to 2023 within the study area, with the vast majority (92%) of these within 10NM of the coast. The most common incident types reported were machinery failures (45%) and person in danger (29%).

Incident data from the MAIB was also reviewed for the period from 2014 to 2023, with an average of approximately three incidents per year. Again, the most common type of incident was machinery failure (45%).

The closest SAR helicopter bases to the Proposed Offshore Scheme are at Lydd (86NM south west of the proposed Landfall Site) and Humberside (107NM north west of the proposed Landfall Site). Between April 2015 and March 2024, an average of four helicopter taskings per year were recorded, with majority (82%) of these being rescue/recovery taskings.

12.1.3 Vessel Traffic Analysis

Twelve months of AIS vessel traffic data was analysed to establish the baseline environment. Based on this data, there was an average of 102 vessels recorded per day within the study

area, with 83 per day intersecting the Draft Order Limits. The most common vessel types recorded were cargo vessels (43%), tankers (21%) and wind farm support vessels (10%). The highest vessel density was recorded in vessel routes following the coastline and around Lowestoft, as well as the deep-water route close to the Proposed Offshore Scheme further offshore. A further high density route crosses the Draft Order Limits of the Proposed Offshore Scheme around the central area.

Anchoring activity was also reviewed, with the majority of vessels recorded at anchor in proximity to the coast, with charted anchorages off Southwold and Lowestoft. Vessels were also recorded frequently at anchor in proximity to the Draft Order Limits, approximately 16NM off the coast. The majority of vessels recorded at anchor were tankers (66%) or cargo vessels (10%).

Fishing activity was recorded throughout the study area, particularly in the northern half of the study area. Common gear types in use within the study area were beam trawlers, accounting for 51% of fishing vessels, followed by demersal trawlers (18%) and potters/whelkers (9%). Beam trawlers accounted for the vast majority (85%) of active fishing recorded within the study area.

12.2 Future Case Vessel Traffic

There are five consented offshore wind farms and one under construction in the vicinity of the Proposed Offshore Scheme (noting that the baseline data presented in the NRA pre-dates any offshore construction activity). Once construction works begin and throughout the operational phase, these are expected to lead to an increase in wind farm support traffic, as well as re-routeing of existing vessel traffic. Common commercial destinations were considered to establish any trends in vessel arrivals, and to identify notable port developments which may lead to changes in vessel traffic in the future. Vessel arrivals typically showed a slight decrease across common destinations, noting that factors such as Brexit, COVID-19 and recent sanctions against Russia may have played a role in this, among other factors. There are ongoing and planned developments at Immingham and Teesport in UK, Rotterdam in the Netherlands and Antwerp in Belgium. These may lead to a long term increase in commercial vessels (e.g., tankers and cargo vessels) crossing the Proposed Offshore Scheme.

Trends involving fishing and recreational vessels are difficult to predict as these depend on a number of factors. Fishing activity may vary depending on legislation changes post-Brexit, as well as fish stocks and quotas. Recreational activity may also vary, while volume of activity may be dependent on other factors such as the weather, climate change and the economy.

12.3 Impact Assessment

Based on the baseline data, expert opinion and stakeholder concerns, shipping and navigation impacts have been assessed in terms of frequency and severity, in line with the IMO FSA approach, giving a significance ranking for each impact. The significance of all impacts has

been determined as either broadly acceptable or tolerable (and ALARP) for all impacts assessed, assuming embedded design and control measures are implemented.

Appendix A Hazard Log

Table A.1 Hazard Log

Phase	Impact	Mitigation Measures	Most Likely Consequences	Frequency of Occurrence	Severity of Consequence	Significance of Risk
Construction Phase	Collision of a third-party vessel with a vessel associated with cable installation	Promulgation of information	Contact resulting in minor damage to vessels	Remote	Moderate	Tolerable
		Development of a vessel management plan				
		Compliance with international shipping legislation				
		Displaying of marks and lights				
		Guard vessels deployed where required				
		Management of project vessels via marine coordination and communication				
		Passing vessels requested to maintain a safe passing distance from project vessels which are RAM				
		Preparation of an MPCP.				
	Cable installation causing disruption to passing vessel routeing/timetables	Promulgation of information	Increased journey time/distance but does not impact on schedules or compliance with COLREGs	Reasonably Probable	Minor	Tolerable
		Development of a vessel management plan				
		Communication with Southwold Harbour				

Phase	Impact	Mitigation Measures	Most Likely Consequences	Frequency of Occurrence	Severity of Consequence	Significance of Risk
		Compliance with international shipping legislation				
		Displaying of marks and lights				
		Management of project vessels via marine coordination and communication				
	Increase in the risk of a vessel-to-vessel collision due to construction vessel activity	Promulgation of information	Contact resulting in minor damage to vessels	Remote	Moderate	Tolerable
		Development of a vessel management plan				
		Compliance with international shipping legislation				
		Displaying of marks and lights				
		Management of project vessels via marine coordination and communication				
		Preparation of an MPCP.				
	Cable installation causing disruption to fishing and recreational activities	Promulgation of information	Minor reputational effects on business but no perceptible effect on people	Reasonably Probable	Minor	Tolerable
		Development of a vessel management plan				
		Communication with Southwold Harbour				
		Compliance with international shipping legislation				
		Displaying of marks and lights				

Phase	Impact	Mitigation Measures	Most Likely Consequences	Frequency of Occurrence	Severity of Consequence	Significance of Risk
		Management of project vessels via marine coordination and communication				
		Appointment of an FLO				
	Cable installation causing disruption to third party marine activities (e.g., military, dredging)	Promulgation of information	Minor reputational effects on business but no perceptible effect on people	Reasonably Probable	Minor	Tolerable
		Development of a vessel management plan				
		Compliance with international shipping legislation				
		Displaying of marks and lights				
		Management of project vessels via marine coordination and communication				
	Reduced access to local ports/harbours	Promulgation of information	Minor reputational effects on business but no perceptible effect on people	Reasonably Probable	Minor	Tolerable
		Development of a vessel management plan				
		Communication with Southwold Harbour				
		Compliance with international legislation				
		Displaying of marks and lights				
		Management of project vessels via marine coordination and communication				
	Anchor interaction with the cable	Marking on Admiralty Charts	Limited damage to property (vessel or cable)	Extremely Unlikely	Moderate	Broadly Acceptable

Phase	Impact	Mitigation Measures	Most Likely Consequences	Frequency of Occurrence	Severity of Consequence	Significance of Risk
		Promulgation of information				
		Use of guard vessels at cable exposures if required				
		Implementation of cable protection informed by CBRA				
	A vessel engaged in fishing snags its gear on the cable	Marking on Admiralty Charts	Minor damage to fishing gear or cable	Remote	Serious	Tolerable
		Promulgation of information				
		Use of guard vessels at cable exposures if required				
		Implementation of cable protection informed by CBRA				
		Appointment of an FLO				
Operation Phase	Collision of a third-party vessel with a vessel associated with cable maintenance	Promulgation of information	Contact resulting in minor damage to vessels	Extremely Unlikely	Moderate	Broadly Acceptable
		Development of a vessel management plan				
		Compliance with international shipping legislation				
		Displaying of marks and lights				
		Guard vessels deployed where required				

Phase	Impact	Mitigation Measures	Most Likely Consequences	Frequency of Occurrence	Severity of Consequence	Significance of Risk
		Passing vessels requested to maintain a safe passing distance from project vessels which are RAM				
	Anchor interaction with the cable	Marking on Admiralty Charts	Limited damage to property (vessel or cable)	Extremely Unlikely	Minor	Broadly Acceptable
		Promulgation of information				
		Implementation of cable protection informed by CBRA				
	A vessel engaged in fishing snags its gear on the cable	Marking on Admiralty Charts	Minor damage to fishing gear or cable	Extremely Unlikely	Minor	Broadly Acceptable
		Promulgation of information				
		Implementation of cable protection informed by CBRA				
	Reduction in under keel clearance resulting from laid cables and associated protection	Marking on Admiralty Charts	Minor damage to vessel, minor reputational effects on business and no perceptible impact on people	Remote	Moderate	Tolerable
		Promulgation of information				
		Compliance with MCA guidance on water depth reduction				
	Interference with marine navigational equipment	Compass deviation effects minimised via design and burial and assessed via Electromagnetic Field Assessment (see Appendix 2.5 of the PEIR).	Cables have no effect upon the Radar, communication and position fixing equipment on a vessel	Remote	Minor	Tolerable
		Promulgation of information		Remote	Moderate	Tolerable

Phase	Impact	Mitigation Measures	Most Likely Consequences	Frequency of Occurrence	Severity of Consequence	Significance of Risk
Decommissioning Phase	Collision of a third-party vessel with a vessel associated with cable decommissioning	Development of a vessel management plan	Contact resulting in minor damage to vessels			
		Compliance with international shipping legislation				
		Displaying of marks and lights				
		Guard vessels deployed where required				
		Management of project vessels via marine coordination and communication				
		Passing vessels requested to maintain a safe passing distance from project vessels which are RAM				
		Preparation of an MPCP.				
	Cable decommissioning causing disruption to passing vessel routeing/timetables	Promulgation of information	Increased journey time/distance but does not impact on schedules or compliance with COLREGs	Reasonably Probable	Minor	Tolerable
		Development of a vessel management plan				
		Communication with Southwold Harbour				
		Compliance with international shipping legislation				
		Displaying of marks and lights				
		Management of project vessels via marine coordination and communication				

Phase	Impact	Mitigation Measures	Most Likely Consequences	Frequency of Occurrence	Severity of Consequence	Significance of Risk
	Increase in the risk of a vessel-to-vessel collision due to decommissioning vessel activity	Promulgation of information	Contact resulting in minor damage to vessels	Remote	Moderate	Tolerable
		Development of a vessel management plan				
		Compliance with international shipping legislation				
		Displaying of marks and lights				
		Management of project vessels via marine coordination and communication				
		Preparation of an MPCP.				
	Cable decommissioning causing disruption to fishing and recreational activities	Promulgation of information	Minor reputational effects on business but no perceptible effect on people	Reasonably Probable	Minor	Tolerable
		Development of a vessel management plan				
		Communication with Southwold Harbour				
		Compliance with international shipping legislation				
		Displaying of marks and lights				
		Management of project vessels via marine coordination and communication				
		Appointment of an FLO				
		Promulgation of information			Minor	Tolerable

Phase	Impact	Mitigation Measures	Most Likely Consequences	Frequency of Occurrence	Severity of Consequence	Significance of Risk
	Cable decommissioning causing disruption to third party marine activities (e.g., military, dredging)	Development of a vessel management plan	Minor reputational effects on business but no perceptible effect on people	Reasonably Probable		
		Compliance with international shipping legislation				
		Displaying of marks and lights				
		Management of project vessels via marine coordination and communication				
	Reduced access to local ports/harbours	Promulgation of information	Minor reputational effects on business but no perceptible effect on people	Reasonably Probable	Minor	Tolerable
		Development of a vessel management plan				
		Communication with Southwold Harbour				
		Compliance with international legislation				
		Displaying of marks and lights				
		Management of project vessels via marine coordination and communication				
	Anchor interaction with the cable	Marking on Admiralty Charts	Limited damage to property (vessel or cable)	Extremely Unlikely	Minor	Broadly Acceptable
		Promulgation of information				
		Implementation of cable protection informed by CBRA				

Phase	Impact	Mitigation Measures	Most Likely Consequences	Frequency of Occurrence	Severity of Consequence	Significance of Risk
	A vessel engaged in fishing snags its gear on the cable	Marking on Admiralty Charts Promulgation of information Implementation of cable protection informed by CBRA	Minor damage to fishing gear or cable	Extremely Unlikely	Minor	Broadly Acceptable
	Reduction in under keel clearance resulting from laid cables and associated protection	Marking on Admiralty Charts Promulgation of information Compliance with MCA guidance on water depth reduction	Minor damage to vessel, minor reputational effects on business and no perceptible impact on people	Remote	Moderate	Tolerable

Appendix B Marine Guidance Note 654 Checklist

The MGN 654 Checklist can be divided into two distinct checklists, one considering the main MGN 654 guidance document and one considering the Methodology for Assessing Marine Navigational Safety and Emergency Response Risks of OREIs which serves as Annex 1 to MGN 654 (Ref. i).

Due to the nature of the Proposed Offshore Scheme (i.e., no surface infrastructure), certain aspects of the checklists are not relevant.

The checklist for the main MGN 654 guidance document is presented in Table B.1. Following this, the checklist for the MCA's methodology annex is presented in Table B.2. For both checklists, references to where the relevant information and/or assessment is provided in the NRA is given.

Table B.1 MGN 654 Checklist for Main Document

Issue	Compliance	Comments
Site and Construction Coordinates. Developers are responsible for ensuring that formally agreed coordinates and subsequent variations of site perimeters and individual OREI structures are made available, on request, to interested parties at relevant project stages, including application for consent, development, array variation, operation and decommissioning. This should be supplied as authoritative Geographical Information System (GIS) data, preferably in Environmental Systems Research Institute (ESRI) format. Metadata should facilitate the identification of the data creator, its date and purpose, and the geodetic datum used. For mariners' use, appropriate data should also be provided with latitude and longitude coordinates in WGS84 (European Terrestrial Reference System 1989 (ETRS89)) datum. **Traffic Survey**. Includes:		
All vessel types.	✓	**Section 9: Baseline Shipping Analysis** All vessel types are considered, with specific breakdowns by vessel type. Additional data sources and consultation were used to supplement AIS data.
At least 28 days duration, within either 12 or 24 months prior to submission of the ES.	✓	**Section 6: Data Sources** A total of twelve months of AIS data has been used, covering November 2023 – October 2024.
Multiple data sources.	✓	**Section 6: Data Sources** Additional data sources such as VMS fishing data and the RYA Coastal Atlas have been used to supplement AIS data. Use of AIS as the primary source of data was agreed with key stakeholders during consultation, and non-AIS activity such as fishing and recreational activity discussed.
Seasonal variations.	✓	**Section 6: Data Sources** A full twelve months of AIS data has been reviewed, capturing seasonal variations within the analysis.
MCA consultation.	✓	**Section 5: Consultation** The MCA has been consulted as part of the NRA process.

Issue	Compliance	Comments
General Lighthouse Authority (GLA) consultation.	✓	**Section 5: Consultation** Trinity House has been consulted as part of the NRA process.
UK Chamber of Shipping consultation.	✓	**Section 5: Consultation** The UK Chamber of Shipping has been consulted during the NRA process.
Recreational and fishing vessel organisations consultation.	✓	**Section 5: Consultation** The RYA and Cruising Association have been consulted during the NRA process. Fishing organisations have been consulted as part of the commercial fisheries assessment, presented in **Chapter 24 Commercial Fisheries** of this PEIR**.**
Port and navigation authorities consultation, as appropriate.	✓	**Section 5: Consultation** Southwold Harbour have been consulted as part of the NRA process.
Assessment of the cumulative and individual effects of (as appropriate):		
i. Proposed OREI site relative to areas used by any type of marine craft.	✓	**Section 9: Baseline Shipping Analysis** Vessel traffic data in proximity to the Proposed Offshore Scheme has been analysed. **Section 10: Impact Assessment** The impacts associated with the Proposed Offshore Scheme have been assessed for the construction, operation and decommissioning phases. **Section 11: Cumulative Hazard Assessment** [HOLD – cumulative impacts to be assessed as part of the ES.]
ii. Numbers, types and sizes of vessels presently using such areas.	✓	**Section 9: Baseline Shipping Analysis** Vessel traffic data in proximity to the Proposed Offshore Scheme has been analysed, including by number, type and size.
iii. Non-transit uses of the areas, e.g., fishing, day cruising of leisure craft, racing, aggregate dredging, personal watercraft, etc.	✓	**Section 7: Navigational Features** Navigational features in proximity to the Proposed Offshore Scheme have been reviewed, including pilotage services and anchorages. **Section 9: Baseline Shipping Analysis** Vessel traffic data in proximity to the Proposed Offshore Scheme has been analysed, including non-transit uses such as fishing, recreational, pilotage and anchoring activities.
iv. Whether these areas contain transit routes used by coastal or deep-draught vessels on passage.	✓	**Section 9: Baseline Shipping Analysis** Vessel traffic data in proximity to the Proposed Offshore Scheme has been analysed, including the identification of main commercial routes passing through the area.
v. Alignment and proximity of the site relative to adjacent shipping lanes.	✓	**Section 7: Navigational Features** Navigational features in proximity to the Proposed Offshore Scheme have been reviewed, including identifying IMO routeing measures such as the Off Botney Ground TSS and the deep-water route.

Issue	Compliance	Comments
vi. Whether the nearby area contains prescribed routeing schemes or precautionary areas.	✓	**Section 7: Navigational Features** Navigational features in proximity to the Proposed Offshore Scheme have been reviewed, including identifying IMO routeing measures such as the TSSs.
vii. Proximity of the site to areas used for anchorage (charted or uncharted), safe haven, port approaches and pilot boarding or landing areas.	✓	**Section 7: Navigational Features** Navigational features in proximity to the Proposed Offshore Scheme have been reviewed, including ports and harbours, pilotage services and anchorages.
viii. Whether the site lies within the jurisdiction of a port and/or navigation authority.	✓	**Section 7: Navigational Features** Navigational features in proximity to the Proposed Offshore Scheme have been reviewed, including port and harbour limits. The Draft Order Limits of the Proposed Offshore Scheme intersect the harbour limits of Southwold Harbour.
ix. Proximity of the site to existing fishing grounds, or to routes used by fishing vessels to such grounds.	✓	**Section 9: Baseline Shipping Analysis** Vessel traffic data in proximity to the Proposed Offshore Scheme has been analysed, including the identification of fishing activity. Fishing activity is reviewed in further detail in **Chapter 24 Commercial Fisheries** of this PEIR.
x. Proximity of the site to offshore firing/bombing ranges and areas used for any marine military purposes.	✓	**Section 7: Navigational Features** Navigational features in proximity to the Proposed Offshore Scheme have been reviewed, including identifying military exercise areas and firing ranges. **Section 5: Consultation** The MOD DIO was contacted to provide further detail on military activities in proximity to the Proposed Offshore Scheme.
xi. Proximity of the site to existing or proposed submarine cables or pipelines, offshore oil/gas platforms, marine aggregate dredging, marine archaeological sites or wrecks, Marine Protected Areas or other exploration/exploitation sites.	✓	**Section 7: Navigational Features** Navigational features in proximity to the Proposed Offshore Scheme have been identified, including identifying existing cables and pipelines, oil and gas infrastructure, aggregate dredging areas and wrecks. **Section 11: Cumulative Hazard Assessment** [HOLD – cumulative impacts to be assessed as part of the ES.]
xii. Proximity of the site to existing or proposed OREI developments, in cooperation with other relevant developers, within each round of lease awards.	✓	**Section 7: Navigational Features** Navigational features in proximity to the Proposed Offshore Scheme have been reviewed, with two existing offshore wind farms identified. Further consented and under construction wind farms have been identified. **Section 11: Cumulative Hazard Assessment** [HOLD – cumulative impacts to be assessed as part of the ES.]

Issue	Compliance	Comments
xiii. Proximity of the site relative to any designated areas for the disposal of dredging spoil or other dumping ground.	✓	**Section 7: Navigational Features** Navigational features in proximity to the Proposed Offshore Scheme have been reviewed including spoil grounds.
xiv. Proximity of the site to aids to navigation and/or VTS in or adjacent to the area and any impact thereon.	✓	**Section 7: Navigational Features** Navigational features in proximity to the Proposed Offshore Scheme have been reviewed, including aids to navigation.
xv. Researched opinion using computer simulation techniques with respect to the displacement of traffic and, in particular, the creation of 'choke points' in areas of high traffic density and nearby or consented OREI sites not yet constructed.	✓	No permanent displacement of traffic and no choke points are anticipated.
xvi. With reference to xv. above, the number and type of incidents to vessels which have taken place in or near to the proposed site of the OREI to assess the likelihood of such events in the future and the potential impact of such a situation.	✓	**Section 8: Emergency Response Overview** Historical incident data including DfT SAR helicopter taskings and incident data from the MAIB and RNLI has been reviewed.
xvii. Proximity of the site to areas used for recreation which depend on specific features of the area.	✓	**Section 9: Baseline Shipping Analysis** Vessel traffic data in proximity to the Proposed Offshore Scheme has been analysed, including recreational activities based on both AIS data and the RYA Coastal Atlas.
Predicted effect of OREI on traffic and interactive boundaries. Where appropriate, the following should be determined:		
a. The safe distance between a shipping route and OREI boundaries.	✓	Not applicable for subsea cables.
b. The width of a corridor between sites or OREIs to allow safe passage of shipping.	✓	Not applicable for subsea cables.
OREI Structures. The following should be determined:		

Issue	Compliance	Comments
a. Whether any feature of the OREI, including auxiliary platforms outside the main generator site, mooring and anchoring systems, inter-device and export cabling could pose any type of difficulty or danger to vessels underway, performing normal operations, including fishing, anchoring and emergency response.	✓	**Section 10: Impact Assessment** The impacts due to the Proposed Offshore Scheme have been assessed for the construction, operation and decommissioning phases, including consideration of users such as commercial vessels, recreational vessels and fishing vessels.
b. Clearances of fixed or floating WTG blades above the sea surface are not less than 22 m (above Mean High Water Springs (MHWS) for fixed). Floating turbines allow for degrees of motion.	✓	Not applicable for subsea cables.
c. Underwater devices: i. Changes to charted depth; ii. Maximum height above seabed; and iii. Under keel clearance.	✓	**Section 2: Project Overview** The aspects of the Proposed Offshore Scheme relevant to shipping and navigation are detailed, including details on external protection which may lead to reduced under keel clearance. **Section 10: Impact Assessment** The impacts due to the Proposed Offshore Scheme have been assessed for the construction, operation and decommissioning phases, including consideration of reduction in under keel clearance.
d. Whether structures block or hinder the view of other vessels or other navigational features.	✓	Not applicable for subsea cables
The effect of tides, tidal streams and weather. It should be determined whether:		
a. Current maritime traffic flows and operations in the general area are affected by the depth of water in which the proposed construction is situated at various states of the tide, i.e. whether the construction could pose problems at high water which do not exist at low water conditions, and vice versa.	✓	**Section 9: Baseline Shipping Analysis** Vessel traffic data in proximity to the Proposed Offshore Scheme has been analysed, including by vessel draught. **Section 10: Impact Assessment** The hazards due to the Proposed Offshore Scheme have been assessed for the construction, operation and decommissioning phases, including consideration of reduction in under keel clearance and reduced access to local ports/harbours, which may be a greater impact during low water conditions.

Issue	Compliance	Comments
b. The set and rate of the tidal stream, at any state of the tide, has a significant effect on vessels in the area of the OREI site.	✓	Not applicable for subsea cables.
c. The maximum rate tidal stream runs parallel to the major axis of the proposed site layout, and, if so, its effect.	✓	
d. The set is across the major axis of the layout at any time, and, if so, at what rate.	✓	
e. In general, whether engine failure or other circumstance could cause vessels to be set into danger by the tidal stream, including unpowered vessels and small, low speed craft.	✓	Not applicable for subsea cables.
f. The structures themselves could cause changes in the set and rate of the tidal stream.	✓	Not applicable for subsea cables.
g. The structures in the tidal stream could be such as to produce siltation, deposition of sediment or scouring, affecting navigable water depths in the wind farm area or adjacent to the area.	✓	**Section 10: Impact Assessment** The impacts due to the Proposed Offshore Scheme have been assessed for the construction, operation and decommissioning phases, including consideration of reduction in under keel clearance.
h. The site, in normal, bad weather, or restricted visibility conditions, could present difficulties or dangers to craft, including sailing vessels, which might pass in close proximity to it.	✓	Not applicable for subsea cables.
i. The structures could create problems in the area for vessels under sail, such as wind masking, turbulence or sheer.	✓	Not applicable for subsea cables.
j. In general, taking into account the prevailing winds for the area, whether engine failure or other circumstances could cause vessels to drift into danger, particularly if in conjunction with a tidal set such as referred to above.	✓	Not applicable for subsea cables.

Issue	Compliance	Comments
Assessment of access to and navigation within, or close to, an OREI. To determine the extent to which navigation would be feasible within the OREI site itself by assessing whether:		
a. Navigation within or close to the site would be safe:		
i. For all vessels.	✓	No restriction to access associated with subsea cables.
ii. For specified vessel types, operations and/or sizes.		
iii. In all directions or areas.		
iv. In specified directions or areas.		
v. In specified tidal, weather or other conditions.		
b. Navigation in and/or near the site should be prohibited or restricted:		
i. For specified vessel types, operations and/or sizes.	✓	No restriction to access associated with subsea cables.
ii. In respect of specific activities.	✓	
iii. In all areas or directions.	✓	
iv. In specified areas or directions.	✓	
v. In specified tidal or weather conditions.	✓	
c. Where it is not feasible for vessels to access or navigate through the site it could cause navigational, safety or routeing problems for vessels operating in the area, e.g., by preventing vessels from responding to calls for assistance from persons in distress.	✓	No restriction to access associated with subsea cables.

Issue	Compliance	Comments
d. Guidance on the calculation of safe distance of OREI boundaries from shipping routes has been considered.	✓	Not applicable for subsea cables.
SAR, maritime assistance service, counter pollution and salvage incident response.		
The MCA, through HM Coastguard, is required to provide SAR and emergency response within the sea area occupied by all OREIs in UK waters. To ensure that such operations can be safely and effectively conducted, certain requirements must be met by developers and operators.		
a. An ERCoP will be developed for the construction, operation and decommissioning phases of the OREI.	✓	Not typically required for cable projects, however Emergency Response Procedures will be in place..
b. The MCA's guidance document *Offshore Renewable Energy Installations: Requirements, Guidance and Operational Considerations for Search and Rescue and Emergency Response* (MCA, 2021) for the design, equipment and operation requirements will be followed.	✓	**Section 3: Guidance and Legislation** Outlines the guidance and legislation used within the NRA including Annex 5 of MGN 654.
c. A SAR checklist will be completed to record discussions regarding the requirements, recommendations and considerations outlined in Annex 5 (to be agreed with MCA).	✓	Not typically required for cable projects, however Emergency Response Procedures will be in place as per the CEMP.
6. Hydrography. In order to establish a baseline, confirm the safe navigable depth, monitor seabed mobility and to identify underwater hazards, detailed and accurate hydrographic surveys are included or acknowledged for the following stages and to MCA specifications:		
i. Pre-construction: The proposed generating assets area and proposed cable route.	✓	Section 10.4 notes that ongoing surveys will be carried out throughout the operation phase to ensure burial and protection remains adequate.
ii. On a pre-established periodicity during the life of the development.	✓	
iii. Post construction: Cable route(s).	✓	
iv. Post decommissioning of all or part of the development: the installed generating assets area and cable route.	✓	

Issue	Compliance	Comments
Communications, Radar and positioning systems. To provide researched opinion of a generic and, where appropriate, site specific nature concerning whether:		
a. The structures could produce radio interference such as shadowing, reflections or phase changes, and emissions with respect to any frequencies used for marine positioning, navigation and timing (PNT) or communications, including GMDSS and AIS, whether ship borne, ashore or fitted to any of the proposed structures, to:		
i. Vessels operating at a safe navigational distance.	✓	Not applicable for subsea cables.
ii. Vessels by the nature of their work necessarily operating at less than the safe navigational distance to the OREI, e.g., support vessels, survey vessels, SAR assets.	✓	
iii. Vessels by the nature of their work necessarily operating within the OREI.	✓	
b. The structures could produce Radar reflections, blind spots, shadow areas or other adverse effects:		
i. Vessel to vessel.	✓	Not applicable for subsea cables.
ii. Vessel to shore.	✓	
iii. VTS Radar to vessel.	✓	
iv. Racon to/from vessel.	✓	
c. The structures and generators might produce SONAR interference affecting fishing, industrial or military systems used in the area.	✓	Not applicable for subsea cables.
d. The site might produce acoustic noise which could mask prescribed sound signals.	✓	Not applicable for subsea cables
e. Generators and the seabed cabling within the site and onshore might produce EMFs affecting compasses and other navigation systems.	✓	**Section 10: Impact Assessment** Assesses the potential risks associated with the use of navigation, communication and position fixing equipment due to the Proposed Offshore Scheme in relation to electromagnetic interference.
Risk mitigation measures recommended for OREI during construction, operation and decommissioning.		
Mitigation and safety measures will be applied to the OREI development appropriate to the level and type of risk determined during the EIA. The specific measures to be employed will be selected in consultation with the MCA and will be listed in the developer's ES. These will be consistent with international standards contained in, for example, SOLAS Chapter V (IMO, 1974), and could include any or all of the following:		

Issue	Compliance	Comments
i. Promulgation of information and warnings through notices to mariners and other appropriate MSI dissemination methods.	✓	**Section 10: Impact Assessment** Section 10.2 details embedded mitigation measures, including promulgation of information.
ii. Continuous watch by multi-channel VHF, including DSC.	✓	**Section 10: Impact Assessment** Section 10.2 details embedded mitigation measures, including marine coordination and the use of an approved Navigational Safety and Vessel Management Plan.
iii. Safety zones of appropriate configuration, extent and application to specified vessels[7].	✓	Not applicable for subsea cables.
iv. Designation of the site as an Area to be Avoided (ATBA).	✓	Not applicable for subsea cables.
v. Provision of aids to navigation as determined by the GLA.	✓	**Section 10: Impact Assessment** Section 10.2 details embedded mitigation measures. Trinity House was consulted as part of the NRA process and will be consulted throughout the remaining ES process.
vi. Implementation of routeing measures within or near to the development.	✓	There are no plans to implement any new routeing measures in proximity to the Proposed Offshore Scheme.
vii. Monitoring by Radar, AIS, Closed Circuit Television (CCTV) or other agreed means.	✓	Not applicable for subsea cables.
viii. Appropriate means for OREI operators to notify, and provide evidence of, the infringement of Safety Zones.	✓	Not applicable for subsea cables.
ix. Creation of an ERCoP with the MCA's SAR Branch for the construction phase onwards.	✓	Not typically required for cable projects, however Emergency Response Procedures will be in place as per the final offshore CEMP.
x. Use of guard vessels, where appropriate.	✓	**Section 10: Impact Assessment** Section 10.2 details embedded mitigation measures, including deployment of guard vessels.
xi. Update NRAs every two years, e.g. at testing sites.	✓	Not applicable to the Proposed Offshore Scheme.
xii. Device-specific or array-specific NRAs.	✓	**Section 2: Project Overview** All offshore aspects of the Proposed Offshore Scheme relevant to shipping and navigation have been considered in this NRA.

[7] As per SI 2007 No 1948 "The Electricity (Offshore Generating Stations) (Safety Zones) (Application Procedures and Control of Access) Regulations 2007.

Issue	Compliance	Comments
xiii. Design of OREI structures to minimise risk to contacting vessels or craft.	✓	Not applicable for subsea cables.
xiv. Any other measures and procedures considered appropriate in consultation with other stakeholders.	✓	**Section 10: Impact Assessment** Section 10.2 details embedded mitigation measures to be implemented to reduce the impact on shipping and navigation users.

Table B.2 MGN 654 Checklist Annex 1

Item	Compliance	Comments
A risk claim is included that is supported by a reasoned argument and evidence.	✓	**Section 10: Impact Assessment** The impact assessment provides a risk claim for a range of hazards based on a number of inputs including (but not limited to) baseline data, expert opinion, stakeholder concerns and lessons learnt from existing offshore developments.
Description of the marine environment.	✓	**Section 7: Navigational Features** Navigational features in proximity to the Proposed Offshore Scheme have been identified in order to describe the marine environment. **Section 11: Cumulative Hazard Assessment** [HOLD – cumulative impacts to be assessed as part of the ES.]
SAR overview and assessment.	✓	**Section 8: Emergency Response Overview** Existing SAR resources in proximity to the Proposed Offshore Scheme are summarised including the UK SAR operations contract, RNLI stations and assets and HMCG stations.
Description of the OREI development and how it changes the marine environment.	✓	**Section 2: Project Overview** The offshore aspects of the Proposed Offshore Scheme relevant to shipping and navigation have been described to detail how the marine environment will be changed. No permanent re-routeing of vessel traffic is anticipated as part of the Proposed Offshore Scheme.
Analysis of the marine traffic, including base case and future traffic densities and types.	✓	**Section 9: Baseline Shipping Analysis** Vessel traffic data in proximity to the Proposed Offshore Scheme has been analysed, including by analysis of the density and type of vessels recorded in the study area. Future case shipping is also discussed.
Status of the hazard log: ▪ Hazard identification; ▪ Risk assessment; ▪ Influences on level of risk; ▪ Tolerability of risk; and ▪ Risk matrix.	✓	**Appendix A Hazard Log** of this PEIR A hazard log has been prepared detailing the result of the assessment.

Item	Compliance	Comments
NRA: ▪ Appropriate risk assessment; ▪ MCA acceptance for assessment techniques and tools; ▪ Demonstration of results; and ▪ Limitations.	✓	**Section 3: Guidance and Legislation** MGN 654 and the IMO's FSA guidelines are the primary guidance documents used for the assessment. **Section 10: Impact Assessment** Provides qualitative and quantitative risk assessment (using FSA) for the hazards identified due to the Proposed Offshore Scheme, based on baseline data, expert opinion, stakeholder concerns and lessons learnt from existing offshore developments.
Risk control log	✓	**Appendix A Hazard Log** of this PEIR The hazard log constitutes a risk control log.

13 References

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