NORTH FALLS

Offshore Wind Farm

ENVIRONMENTAL STATEMENT

Appendix 15.1 Navigational Risk Assessment (Part 1 of 3)

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NORTH FALLS
Offshore Wind Farm

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North Falls Offshore Wind Farm Navigational Risk Assessment

Prepared by	Anatec Limited
Presented to	North Falls Offshore Wind Farm Limited
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Revision Number	Date	Summary of Change
00	18/11/2022	First Issue
01	25/01/2023	Internal Updates
02	24/04/2023	Final for PEIR
03	05/02/2024	Initial ES draft
04	22/02/2024	Initial ES draft comments
05	10/06/2024	Further ES Updates
06	10/07/2024	Further updates
07	15/07/2024	Final updates

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Abbreviations Table

Abbreviation	Definition
AC	Alternating Current
AIS	Automatic Identification System
ALARP	As Low as Reasonably Practicable
ALB	All-Weather Lifeboat
AtoN	Aid to Navigation
BMAPA	British Marine Aggregate Producers Association
BWEA	British Wind Energy Association
CAA	Civil Aviation Authority
CBA	Cost Benefit Analysis
CD	Chart Datum
CHIRP	Confidential Human Factors Incident Reporting Programme
COLREGs	Convention on International Regulations for Preventing Collisions at Sea
CTV	Crew Transfer Vessel
DCO	Development Consent Order
DECC	Department of Energy and Climate Change
DESNZ	Department for Energy Security & Net Zero
DF	Direction Finding
DfT	Department for Transport
DSC	Digital Selective Calling
DW	Deep Water
DWT	Dead Weight Tonnage
E	East
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMF	Electromagnetic Field
ERCoP	Emergency Response Cooperation Plan
ES	Environmental Statement
FSA	Formal Safety Assessment
GMDSS	Global Maritime Distress and Safety System
GPS	Global Positioning System

Abbreviation	Definition
GRP	Glass Reinforced Plastic
GT	Gross Tonnage
HHA	Harwich Haven Authority
HMCG	His Majesty's Coastguard
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
ILB	Inshore Lifeboat
IMCA	International Marine Contractors Association
IMO	International Maritime Organization
kHz	Kilohertz
kt	Knot
LOA	Length Overall
LNG	Liquid Natural Gas
m	Metre
MAIB	Marine Accident Investigation Branch
MCA	Maritime Coastguard Agency
MDS	Maximum Design Scenario
MEPC	Marine Environment Protection Committee
MGN	Marine Guidance Note
MHWS	Mean High Water Springs
MRCC	Maritime Rescue Coordination Centre
MRSC	Maritime Rescue Sub-Centre
MSI	Maritime Safety Information
N	North
NAVTEX	Navigational Telex
NIP	Navigation and Installation Plan
nm	Nautical Mile
nm^2`	Square Nautical Mile
NPS	National Policy Statement
NRA	Navigational Risk Assessment
NSIP	Nationally Significant Infrastructure Projects

Abbreviation	Definition
NUC	Not Under Command
O&M	Operation and Maintenance
OCP	Offshore Convertor Platform
OREI	Offshore Renewable Energy Installations
OSP	Offshore Substation Platform
PEIR	Preliminary Environmental Information Report
PEXA	Military Practice and Exercise Areas
PINS	The Planning Inspectorate
PLA	Port of London Authority
PLL	Potential Loss of Life
QHSE	Quality, Health, Safety and Environment
Racon	Radar Beacon
Radar	Radio Detection and Ranging
RNLI	Royal National Lifeboat Institution
RoPax	Roll-On/Roll-Off Passenger
RoRo	Roll-On/Roll-Off Cargo
RYA	Royal Yachting Association
SAR	Search and Rescue
SMS	Safety Management System
SOLAS	International Convention for the Safety of Life at Sea
SONAR	Sound
SOV	Service and Operation Vessel
TSS	Traffic Separation Scheme
UK	United Kingdom
UKHO	United Kingdom Hydrographic Office
UTM	Universal Transverse Mercator
VHF	Very High Frequency
VTS	Vessel Traffic Service
WETREP	Western European Tanker Reporting System
WGS84	World Geodetic System 1984
WTG	Wind Turbine Generator

1 Introduction

1.1 Background

1. Anatec was commissioned by North Falls Offshore Wind Farm Limited, hereafter referred to as 'The Applicant', to undertake a Navigational Risk Assessment (NRA) for the proposed North Falls Offshore Wind Farm (hereafter 'the Project') to support the shipping and navigation assessment undertaken in **Environmental Statement (ES) Chapter 15 Shipping and Navigation.**

2. The NRA has built upon the work undertaken as part of the Preliminary Environmental Information Report (PEIR).

1.2 Navigational Risk Assessment

3. An Environmental Impact Assessment (EIA) is a process which identifies the environmental effects of a Project, both negative and positive. An important requirement of the EIA for offshore projects is the NRA. Following the Maritime and Coastguard Agency (MCA) methodology under Marine Guidance Note (MGN) 654 (MCA, 2021) in particular Annex 1: Methodology for Assessing the Marine Navigational Safety & Emergence Response Risks of Offshore Renewable Energy Installations, this NRA includes:

- Outline of methodology applied in the NRA;
- Summary of consultation undertaken with shipping and navigation stakeholders to date;
- Lessons learnt from previous offshore wind farm developments;
- Summary of the project description relevant to shipping and navigation;
- Baseline characterisation of the existing environment;
- Discussion of potential impacts on navigation, communication and position fixing equipment;
- Cumulative and transboundary overview;
- Future case marine traffic characterisation;
- Collision and allision risk modelling Assessment of navigational risk (following the Formal Safety Assessment (FSA) process);
- Outline of embedded mitigation measures; and
- Completion of MGN 654 Checklist.

4. Potential hazards are considered for each phase of development as follows:

- Construction;
- Operation and maintenance (O&M); and
- Decommissioning.

5. The assessment of the Project is based on a parameter-based design envelope approach, which is recognised in the Overarching National Policy Statement (NPS)

for Energy (EN-1) (Department for Energy Security & Net Zero (DESNZ), 2023), the NPS for Renewable Energy Infrastructure (EN-3) (DESNZ, 2023), and Planning Inspectorate Advice Note Nine: Rochdale Envelope (The Planning Inspectorate (PINS), 2018). The design envelope includes conservative assumptions to form a Maximum Design Scenario (MDS) which is considered and assessed for all risks. Further details on the design envelope as it pertains to shipping and navigation are provided in Section 6.

6. The shipping and navigation baseline and risk assessment has been undertaken based upon the information available and responses received at the time of preparation, including the MDS assumptions as discussed above.

1.3 Site Refinement

7. It is noted that significant changes have been made to project design post PEIR. In particular, the array area represents a decrease of approximately 36% in total area covered compared to the equivalent area considered at PEIR stage. The array area refinement resulted in the northern array being removed in its entirety and 26% of the southern array removed. This reduction is due to various issues raised in relation to a number of aspects, however shipping and navigation stakeholder concerns were a primary driving factor. Issues raised in relation to shipping and navigation and their outcomes include:

- Concerns over proximity of the south western extent of the northern array area to the Sunk TSS North: the northern array has been removed in its entirety.
- Concerns over overlap of north western extent of southern array area and the Sunk Outer Precautionary Area: the overlap has been removed in its entirety.
- Concern over proximity of the southern array area to the Sunk TSS South and Sunk TSS East: a minimum 0.8nm buffer from the Sunk TSS South and Sunk TSS East has been applied.

8. As part of the NRA process, in addition to the array area refinement, the implementation of a Structure Exclusion Zone (SEZ) within the array area has also been identified as additional mitigation. Surface piercing infrastructure will not be installed within the SEZ unless otherwise agreed with the MCA. Further details are provided in Section 14.4.3.2, noting in summary the SEZ has been implemented to allow for a 1nm buffer between the Sunk routeing measures and any surface piercing infrastructure associated with North Falls.

9. Concerns over the inclusion of the Galloper Recommended Ferry route within the southern array area have also been raised. A full analysis of the route has been undertaken in Section 10.3, and impacts in terms of deviation considered in Section 14.4.3.1.

10. Due to the northern array area being removed, the interconnector cable that previously connected the northern and southern arrays has also been removed.

11. Figure 1-1 presents the refinement of the array area from the PEIR stage, and also shows the SEZ.

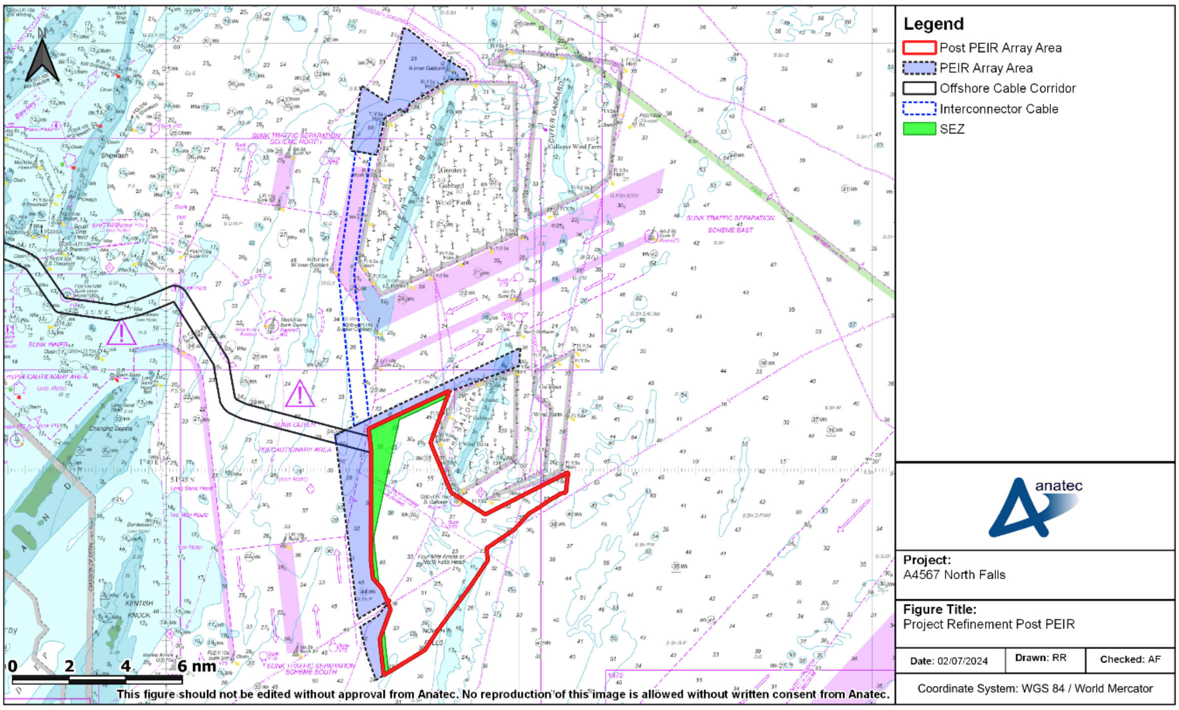

Figure 1-1 Project Refinement Post PEIR

2 Guidance and Legislation

2.1 Legislation

12. Planning policy on offshore renewable energy Nationally Significant Infrastructure Projects (NSIP) specifically in relation to shipping and navigation is contained in the NPS for Renewable Energy Infrastructure (EN-3) (DESNZ, 2023). Additionally, planning policy on NSIP for ports is contained in the NPS for Ports (Department for Transport (DfT), 2012). **Chapter 15 Shipping and Navigation** summarises the relevant matters within NPS EN-3 and the NPS for Ports, and where they are considered in **Chapter 15 Shipping and Navigation**, this NRA, and/or the wider EIA.

2.2 Primary Guidance

13. The primary guidance documents used during the assessment are the following:

- MGN 654 (Merchant and Fishing) Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response (MCA, 2021) including its annexes; and
- Revised Guidelines for FSA for Use in the International Maritime Organization (IMO) Rule-Making Process (IMO, 2018).

14. MGN 654 highlights issues that shall be considered when assessing the effect on navigational safety from offshore renewable energy developments, proposed in United Kingdom (UK) internal waters, UK territorial sea, or the UK Exclusive Economic Zone (EEZ).

15. The MCA require that their methodology (Annex 1 to MGN 654) is used as a template for preparing NRAs. It is centred on risk management and requires a submission that shows that sufficient controls are, or will be, in place for the assessed risk to be judged as broadly acceptable or tolerable with mitigation (see Section 3.2). Across **Chapter 15 Shipping and Navigation** and the NRA, both base and future case levels of risk have been identified, in addition to the measures required to ensure that both the future case remains broadly acceptable or tolerable with mitigation.

2.3 Other Guidance

16. Other guidance documents used during the assessment are as follows:

- MGN 372 Amendment 1 (Merchant and Fishing) OREIs: Guidance to Mariners Operating in the Vicinity of UK OREIs (MCA, 2022);
- International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Recommendation O-139 on The Marking of Man-Made Offshore Structures (IALA, 2021);
- IALA Guideline G1162 The Marking of Offshore Man-Made Structures (IALA, 2021);

- The Royal Yachting Association's (RYA) Position on Offshore Renewable Energy Developments: Paper 1 (of 4) – Wind Energy (RYA, 2019); and
- Standard Marking Schedule for Offshore Installations (Department of Energy and Climate Change (DECC), 2011).

2.4 Lessons Learnt

17. There is considerable benefit for the Applicant in the sharing of lessons learnt within the offshore industry. The NRA (and **Chapter 15 Shipping and Navigation**), and in particular the risk assessment undertaken in Section 16, includes general consideration for lessons learnt and expert opinion from previous offshore wind farm developments and other sea users, capitalising on the UK's position as a leading generator of offshore wind power.

3 Navigational Risk Assessment Methodology

3.1 Formal Safety Assessment Methodology

18. 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 and is reliant upon data, defined risk assessment criteria and expert judgement. The assessments presented herein for shipping and navigation users have considered the following criteria:

- Baseline data and assessment;
- Expert opinion;
- Level of stakeholder concern including output of the Hazard Workshop;
- Time and/or distance of any deviation;
- Number of transits of specific vessels and/or vessel types; and
- Lessons learnt from existing offshore developments.

19. It is noted that, with regards to commercial fishing vessels, the methodology and assessment has been applied to hazards considering commercial fishing vessels in transit. A separate methodology and assessment have been applied in **Chapter 14 Commercial Fisheries** to consider hazards on commercial fishing vessels including safety risks which are directly related to commercial fishing activity (rather than commercial fishing vessels in transit) and risks of a commercial nature.

3.2 Formal Safety Assessment Process

20. The IMO FSA process (IMO, 2018) as approved by the IMO in 2018 under Maritime Safety Committee – Marine Environment Protection Committee (MEPC).2/circ. 12/Rev.2 will be applied to the risk assessment within this NRA and informs **Chapter 15 Shipping and Navigation.**

21. The FSA process is a structured and systematic methodology based upon risk analysis and Cost Benefit Analysis (CBA) (if applicable) to reduce impacts to As Low as Reasonably Practicable (ALARP). There are five basic steps within this process as illustrated by Figure 3-1 and summarised in the following list:

- Step 1 – Identification of hazards (a list is produced of hazards prioritised by risk level specific to the problem under review);
- Step 2 – Risk assessment (investigation of the causes and initiating events and risks of the more important hazards identified in step 1);
- Step 3 – Risk control options (identification of measures to control and reduce the identified risks);
- Step 4 – CBA (identification and comparison of the benefits and costs associated with the risk control options identified in step 3); and

- Step 5 – Recommendations for decision-making (defining recommendations based upon the outputs of steps 1 to 4).

Figure 3-1 Flow Chart of the FSA Methodology

22. It is noted that hazards of a commercial nature are considered outside the remit of the NRA but have been assessed using the FSA process in **Chapter 15 Shipping and Navigation**, where appropriate.

3.2.1 Hazard Workshop Methodology

23. A key tool used in the NRA process is the Hazard Workshop which ensures that all hazards are identified, and the corresponding risks qualified in discussion with relevant consultees. Table 3.1 and Table 3.2 define the severity of consequence and the frequency of occurrence rankings that have been used to assess risks within the hazard log, completed based on the outputs of the Hazard Workshop.

Table 3.1 Severity of Consequence Ranking Definitions

Rank	Description	Definition			
		People	Property	Environment	Business
1	Negligible	No perceptible impact	No perceptible impact	No perceptible impact	No perceptible impact

Rank	Description	Definition			
		People	Property	Environment	Business
2	Minor	Slight injury(s)	Minor damage to property i.e., superficial damage	Tier 1 local assistance required	Minor reputational risks – limited to users
3	Moderate	Multiple minor or single serious injury	Damage not critical to operations	Tier 2 limited external assistance required	Local reputational risks
4	Serious	Multiple serious injuries or single fatality	Damage resulting in critical impact on operations	Tier 2 regional assistance required	National reputational risks
5	Major	More than one fatality	Total loss of property	Tier 3 national assistance required	International reputational risks

Table 3.2 Frequency of occurrence ranking definitions

Rank	Description	Definition
1	Negligible	< 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

24. 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 3.3. The significance of risk is defined as **Broadly Acceptable** (low risk), **Tolerable** (intermediate risk) or **Unacceptable** (high risk).

Table 3.3 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)

25. 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.

3.3 Methodology for Cumulative Risk Assessment

26. The hazards identified in the FSA are also assessed for cumulative risks with the inclusion of other offshore developments. Given the varying type, status and location of developments, a tiered approach to cumulative risk assessment has been applied, splitting developments into separate tiers depending on the following factors:

- Project status;
- Distance to the array area and offshore cable corridor;
- Level of interaction with baseline traffic relevant to the Project;
- Level of concern raised during consultation; and
- Data confidence.

27. An aggregate of the criteria is used to determine the tier of each development.

28. The tiers are summarised in Table 3.4, with the level of assessment undertaken for each tier included. It should be noted that quantitative assessment of long term displacement of main commercial routes (Tiers 1 and 2 only) is limited to potential offshore wind farm developments – it is anticipated that displacement due to marine aggregate areas and subsea cables will be limited to situations where associated activities are ongoing (based on experience) and so these developments are assessed only qualitatively. In the absence of any available information to the contrary, it is assumed as a worst case that cumulative developments will be fully built out.

29. The maximum distance within which developments are considered for the cumulative risk assessment is dependent upon the type of development:

- Offshore wind farms – up to 50 nautical miles (nm) from the array area and up to 2nm from the offshore cable corridor;
- Marine aggregate areas – up to 20nm from the array area and up to 5nm from the offshore cable corridor; and
- Subsea cables – up to 2nm from the array area and offshore cable corridor.

30. These distances have been selected on the basis that at greater distances there is no direct pathway between the Project and other developments.

31. Projects meeting the assessment criteria are detailed in Section 13.

Table 3.4 Cumulative Risk Assessment Screening Summary

Tier	Development Status	Distance from the Project	Interaction with Baseline Traffic	Consultation Responses	Data Confidence	Level of Cumulative Risk Assessment
N/A	Operational or under construction	N/A	N/A	N/A	N/A	None – considered as part of the baseline assessment
1	Consented	*Offshore wind farms:* ▪ Up to 10nm from the array area; or ▪ Up to 2nm from the offshore cable corridor. *Marine aggregate areas:* ▪ Up to 10nm from the array area; or ▪ Up to 2nm from the offshore cable corridor. *Subsea cables:* ▪ Up to 2nm from the array area; or ▪ Up to 2nm from the offshore cable corridor.	▪ May impact a main commercial route passing within 1nm of the array area or offshore cable corridor; and/or ▪ Interacts with traffic which may be directly displaced by the array area or offshore cable corridor.	Raised as having a potential cumulative effect.	High	Detailed qualitative and quantitative assessment of displacement of main commercial vessels.

Tier	Development Status	Distance from the Project	Interaction with Baseline Traffic	Consultation Responses	Data Confidence	Level of Cumulative Risk Assessment
2	Scoped	*Offshore wind farms:* ▪ Between 10 and 25nm from the array area; or ▪ Between 2 and 5nm from the offshore cable corridor. *Marine aggregate areas:* ▪ Between 10 and 20nm from the array area; or ▪ Between 2 and 5nm from the offshore cable corridor.	▪ May impact a main commercial route passing within 1nm of the array area or offshore cable corridor; and/or ▪ Interacts with traffic which may be directly displaced by the array area or offshore cable corridor.	Raised as having a potential cumulative effect.	Medium	Detailed qualitative and quantitative assessment of displacement of main commercial vessels.
3	Pre scoping or early development	*Offshore wind farms:* ▪ Between 25 and 50nm from the array area.	▪ Does not impact a main commercial route passing within 1nm of the array area; and ▪ Does not interact with traffic which may be directly displaced by the array area.	No concerns raised.	Low	High level qualitative assumptions of displacement of main commercial vessels only.

3.4 Study Area

32. The study area for the array area, hereafter referred to as the 'study area', has been defined as a 10nm buffer around the array area. This is a standard radius for shipping and navigation assessment, which was discussed with the MCA and Trinity House, and presented to various other consultees including at the hazard workshop (see Section 3.2.1).

33. The 10nm radius ensures that relevant routeing which may be affected is captured while still remaining specific to the area being studied. The study area captures the following key local elements and features in the vicinity of the array area:

- Key Sunk routeing measures and associated traffic;
- Sunk Pilot Station; and
- Marine aggregate dredging areas adjacent to the array area.

34. It is noted that there are also IMO adopted routeing measures further offshore to the east, including the Traffic Separation Scheme (TSS) North Hinder South, North Hinder Junction and the associated deep water (DW) routes. These measures sit outside of the study area. Given their large distance from the array area and the risk of diluting the site-specific traffic analysis based on the heavy volumes of traffic using these measures, it is considered appropriate to retain the standard 10nm radius.

35. An additional study area for the offshore cable corridor, hereafter referred to as the 'cable corridor study area', has been defined as a minimum 2nm buffer of the offshore cable corridor. This radius, like that of the array area buffer, has been chosen to capture relevant routeing while still remaining specific to the offshore cable corridor.

36. The study area and cable corridor study area are shown in Figure 3-2.

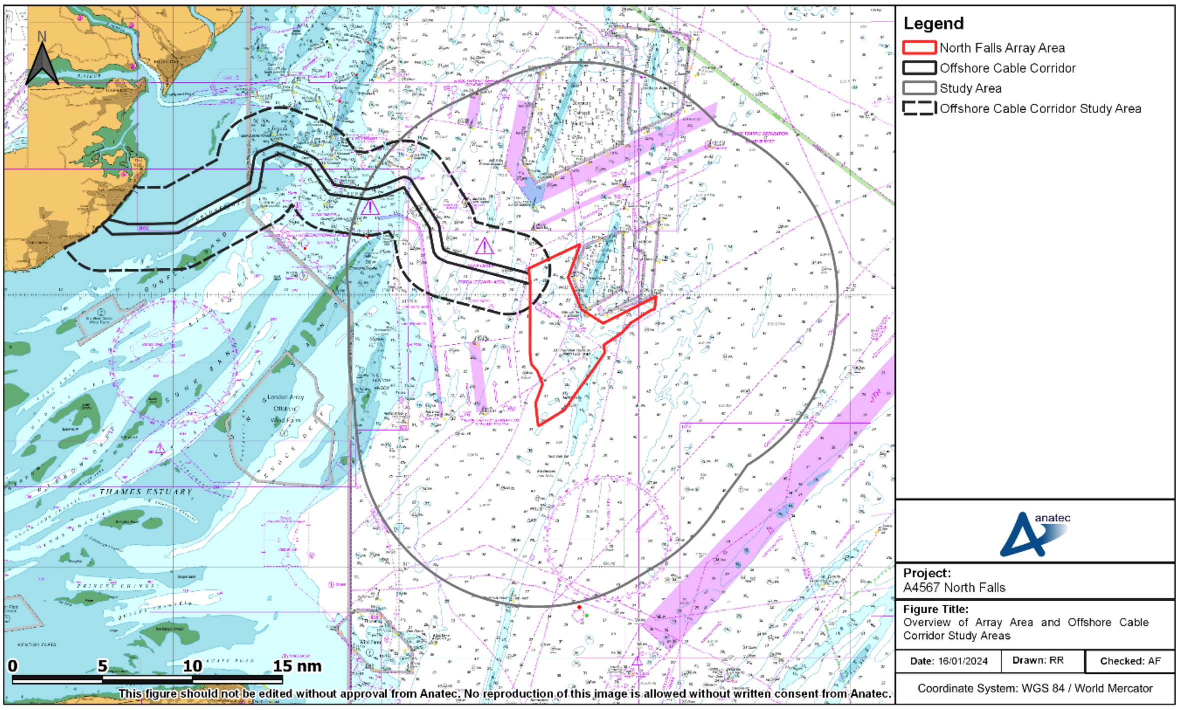

Figure 3-2 Overview of Array Area and Offshore Cable Corridor Study Areas

4 Consultation and Stakeholder Engagement

4.1 Engagement with Stakeholders in the Evidence Plan Process

37. Key shipping and navigation stakeholders have been consulted in the NRA process. The following stakeholders have been consulted via dedicated meetings including the hazard workshop:

- MCA;
- Trinity House;
- UK Chamber of Shipping;
- Cruising Association;
- Harwich Haven Authority (HAA);
- Belgian Authority for Maritime Safety;
- Sunk Vessel Traffic Service (VTS);
- Port of London Authority (PLA);
- London Gateway;
- Port of Felixstowe;
- Stena Line;
- DFDS Seaways;
- RYA;
- CLdN;
- DEME; and
- CEMEX.

38. Meetings have included the Hazard Workshop (see Section 4.2) and standalone consultation meetings held both prior to and following the Scoping Opinion and Section 42 consultation, including consultation on site refinements.

39. As well as consulting with the above organisations, engagement with regular operators identified from the long-term Automatic Identification System (AIS) data has been undertaken. Identified regular operators were provided with an overview of the Project and offered the opportunity to provide comment and participate in the Hazard Workshop. The full regular operator letters are provided in Annex E.

40. Regular operators included:

- A2B-online;
- Aegeanoil;
- Cemex UK Marine;
- CLdN;
- Costa Cruises;
- DEME Group;
- DFDS Seaways;
- Duzgit;
- Godby Shipping;
- HS Schiffahrts Group;
- Interislander;
- James Fisher and Sons;
- K Line;
- Koole Terminals
- NaviMag Ferries;
- P&O Ferries;
- Reederei Foroohari;
- Scot Tanker;
- StenaLine;
- Tarmac Marine;
- Vadero Shipping
- Van Oord;
- Volharding Group;
- Volker Dredging; and
- Whitaker Tankers.

41. DFDS Seaways, CLdN, Tarmac Marine, CEMEX and Whitaker Tankers provided feedback directly.

4.2 Hazard Workshop

42. A key element of the Evidence Plan Process was the Hazard Workshop – a meeting of local and national marine stakeholder to identify and discuss potential shipping and navigation hazards. Using the information gathered from the Hazard Workshop, a hazard log (see Annex B) was produced for use as input into the risk assessment undertaken from Section 16. This ensured that expert opinion and local knowledge was incorporated into the risk assessment, and that the hazard log was site-specific.

4.2.1 Hazard Workshop Attendance

43. The Hazard Workshop was held in London on 12 October 2023, featuring a hybrid of in-person and remote attendance. The Hazard Workshop was attended by the organisations listed below:

- MCA;
- UK Chamber of Shipping;
- HHA;
- Port of Felixstowe
- PLA;
- London Gateway;
- DEME Group;
- CLdN; and
- Belgian National Authority for Maritime Safety.

4.2.2 Hazard Workshop Process and Hazard Log

44. During the Hazard Workshop, key maritime hazards associated with the construction, O&M and decommissioning of the Project were identified and discussed. Where appropriate, hazards were considered by vessel type to ensure risk control options could be identified on a type-specific basis.

45. Following the Hazard Workshop, the risks associated with the identified hazards were ranked in the hazard log based upon the discussions held during the workshop, with appropriate embedded mitigation measures identified, including any additional measures required to reduce the risks to ALARP. The hazard log was then provided to the Hazard Workshop attendees for comment and their feedback incorporated into the NRA. The hazard log has been used to inform the risk assessment from Section 16 and is provided in full in Annex B.

4.3 Consultation Response

46. Various responses have been received from stakeholders during engagement undertaken in the NRA process, either during conference calls, via email correspondence or through the Scoping Opinion (PINS, 2021). The key points and where they have been addressed are provided in **Chapter 15 Shipping and Navigation**.

5 Data Sources

47. This section summarises the main data sources used to characterise the shipping and navigation baseline relative to the Project.

5.1 Summary of Data Sources

48. The main data sources used to characterise the shipping and navigation baseline relative to the array area and offshore cable corridor are outlined in Table 5.1.

Table 5.1 Data Sources Used to Inform Shipping and Navigation Baseline

Data	Source(s)	Purpose
Vessel traffic[1]	Winter vessel traffic survey data consisting of AIS, Radio Detection and Ranging (Radar) and visual observations for the study area (28 days[2] collected between 29 January to 2 March 2022) recorded from a dedicated survey vessel on-site.	Characterising vessel traffic movements within and in proximity to the boundary of the array area in line with MGN 654 (MCA, 2021) requirements.
	Summer vessel traffic survey data consisting of AIS, Radar and visual observations for the study area (28 days, 29 June to 28 July 2022) recorded from a dedicated survey vessel on-site.	
	AIS-only dataset comprising the same 2 x 28-day periods as the 2022 vessel traffic surveys within the cable corridor study area, recorded from the same dedicated survey vessel on-site for the array area and from coastal receivers.	Characterising vessel traffic movements within and in proximity to the offshore cable corridor.
	AIS data for the study area (12 months, March 2019 to February 2020) (hereafter the 'long-term vessel traffic data') recorded from coastal receivers.	Validation of the vessel traffic surveys and characterising seasonal variations and weather routeing.
	AIS data for the study area (three years, July 2020 to June 2023) recorded from coastal receivers.	Characterising vessel traffic movements within and in proximity to the Galloper Recommended Ferry Route.
	Anatec's ShipRoutes database (2024).	Secondary source for characterising vessel traffic movements including cumulatively within and in proximity to the boundary of the array area.

[1] The Applicant has collected vessel traffic survey data for twice the normal period required under MGN 654 to ensure adequate Radar coverage, noting the distance between the original northern and southern arrays.
[2] Effective survey period noting vessel was offsite on certain days between 29th January and 2nd March.

Data	Source(s)	Purpose
Maritime incidents	Maritime Accident Investigation Branch (MAIB) marine accidents database (2012 to 2021). With additional 10 years (2002 to 2011).	Review of maritime incidents within and in proximity to the boundary of the array area.
	Royal National Lifeboat Institution (RNLI) incident data (2013 to 2022).	
	Department for Transport (DfT) UK civilian Search and Rescue (SAR) helicopter taskings (April 2015 to March 2023).	
Marine aggregate dredging	Marine aggregate dredging areas (licenced and active) (The Crown Estate, 2023).	Characterising marine aggregate dredging areas within and in proximity to the boundary of the array area.
	Transit routes (British Marine Aggregate Producers Association (BMAPA), published 2009, downloaded 2020)[3].	
Recreational traffic density and features	*UK Coastal Atlas of Recreational Boating 2.1* (RYA, 2019).	Characterising recreational activity within and in proximity to the array area.
Other navigational features	Admiralty Charts 1183-0, 1543-0, 1610-0, 1630-0, 1872-0, 1975-0, 2052-0, 2182A-0, 2692-0, 2693-0 and 2695-3 (United Kingdom Hydrographic Office (UKHO), 2023)	Characterising other navigational features in proximity to the boundary of the array area.
	Admiralty Sailing Directions Dover Strait Pilot NP28 (UKHO, 2020).	
Weather	Wind direction data collected from offshore MetOffice station locations between 2017 and 2022 provided by The Applicant.	Characterising weather conditions in proximity to array area for use as input in the collision and allision risk modelling.
	Significant wave height data recorded from an offshore MetOffice station location between 2017 and 2022 provided by The Applicant.	
	Tidal data provided by Admiralty Charts 1610, 1630, 1183 and 1975 (UKHO, 2023).	
	Visibility data provided in *Admiralty Sailing Directions Dover Strait Pilot NP28* (UKHO, 2020).	

[3] Given the age of this data source it was found to not be wholly reflective of marine aggregate dredger movements within the study area. It is noted that the AIS data (both the vessel traffic survey data and long-term vessel traffic data) was considered comprehensive for marine aggregate dredgers.

Data	Source(s)	Purpose
	Case Studies of Past Weather Events (Met Office, 2023).	Identifying periods of adverse weather in proximity to the array area.

5.2 Vessel Traffic Surveys

49. The Applicant has undertaken three dedicated vessel traffic surveys, two per PEIR in 2022, and one in 2024. Details are provided in Sections 5.2.1 and 5.2.2 respectively.

5.2.1 2022 Surveys

50. The 2022 vessel traffic surveys were undertaken by the survey vessel *Karima* (IMO number 7,427,403) noting the survey methodology was agreed with the MCA and Trinity House.

51. In order to provide site specific and up to date information on which to base the risk assessment, and as required by the MCA under MGN 654 (MCA, 2021), the Applicant undertook two dedicated vessel traffic surveys during 2022 undertaken during the following periods:

- 29 January to 2 March 2022 (28-day winter survey);
- 29 January to 12 February within northern array;
- 14 February to 2 March within southern array;
- 29 June to 28 July 2022 (28-day summer survey);
- 29 June to 13 July within northern array; and
- 14 to 28 July within southern array.

52. Noting the size of the study area assessed at the PEIR stage (which has now been refined (see Section 1.3)), for each survey the vessel collected a total of 14 days' data while stationed in each of the northern and southern array areas. This means a total of 28 days' data was collected during each survey; therefore, the overall total was 56 days' data. This approach ensured adequate range of radar coverage (supported by visual observations), noting that MGN 654 only requires collection of 28 days in total.

53. On this basis, as only the southern array has been taken forward (see Section 1.3), it should be considered that 28 of the 56 days of vessel traffic data were recorded when the vessel was stationed at the northern array. The typical range of AIS coverage and the fact that additional shore-based AIS has been incorporated mean that the AIS data is considered comprehensive for the study area for the entire 56 day period. However, the radar data is only likely to be comprehensive for the 28 days when the survey vessel was at the southern array. This has been referenced where appropriate within the vessel traffic analysis (Section 10).

54. Noting the above, the survey vessel recorded vessels via AIS, Radar and visual observations for a full 28-days within the array area as required under MGN 654 (MCA, 2021).

55. AIS limitations are detailed in Section 5.4.1

56. During the winter vessel traffic survey, the survey vessel left site on two separate occasions to re-fuel and due to adverse weather conditions, but the survey continued until 28 full days were collected. Where periods of partial survey data are recorded, due to vessel leaving and changing site, this is explicitly stated in the text and within relevant illustrations.

57. A number of vessel tracks recorded during the survey period were classified as temporary (non-routine), which included the *Karima* itself, other survey vessels, guard vessels guarding the *BritNed* cable and autonomous (unmanned) craft within the Greater Gabbard Wind Farm sites. Any such vessels were removed from the analysis.

58. The dataset is assessed in full in Section 10.

5.2.2 2024 Survey

59. The 2024 survey was undertaken by the guard vessel *Star of Hope* between the 17th of January and the 1st of February 2024. An effective survey period of 14 days was collected (noting this accounts for a period between the 21st and 22nd January when the vessel was off site due to adverse weather). The vessel was stationed within the array area for the entirety of the effective 14-day survey period meaning comprehensive coverage of the study area.

60. As for the 2022 surveys, any temporary traffic was excluded.

5.3 Long-Term Vessel Traffic Data

61. The long-term vessel traffic data consists of AIS covering 12 months from March 2019 to February 2020 and was collected from coastal receivers. Taking into account the distance offshore of the array area, the long-term vessel traffic data is considered to be comprehensive for the study area.

62. The assessment of this long-term dataset allowed seasonal and weather-related variations in routeing patterns and activities, as well as lighter trafficked routes, to be captured and considered within the NRA. The dataset is assessed in full in Annex D, which includes a comparison against the vessel traffic survey data.

5.4 Data Limitations

5.4.1 Automatic Identification System Data

63. The carriage of AIS is required on board all vessels of greater than 300 Gross Tonnage (GT) engaged on international voyages, cargo vessels of more than 500GT not engaged on international voyages, passenger vessels irrespective of size built on or after 1 July 2002 and fishing vessels over 15 metres (m) Length Overall (LOA).

64. Therefore, for the vessel traffic surveys, larger vessels were recorded on AIS while smaller vessels without AIS installed (including fishing vessels under 15m LOA and recreational craft) were recorded, where possible, on the Automatic Radar Plotting Aid Radar on board the *Karima*. As per section 5.2, for each survey, the survey vessel was stationed in the northern array for half the survey duration and the southern array for the remainder. On this basis, it should be considered that non-AIS data collected via Radar (most pertinently smaller fishing vessels and recreational vessels) in particular may not be comprehensive in the vicinity of the array area when the survey vessel was stationed within the northern array area (see Section 5.2).

65. A proportion of smaller vessels also carry AIS voluntarily, typically utilising a Class B AIS device. For each of the surveys, the vast majority of vessel tracks were recorded via AIS with a small minority recorded via Radar.

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

5.4.2 Historical Incident Data

67. Although all UK commercial vessels are required to report accidents to the MAIB, non-UK vessels do not have to report unless they are in a UK port or within 12nm territorial waters (noting that the study area is not located entirely within 12nm territorial waters) or carrying passengers to a UK port. There are also no requirements for non-commercial recreational craft to report accidents to the MAIB.

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

5.4.3 United Kingdom Hydrographic Office Admiralty Charts

69. The UKHO Admiralty charts are updated periodically and therefore the information shown may not reflect the real time features within the region with total accuracy. Additionally, not all navigational features may be charted, e.g. certain aids to navigation (AtoNs) and wrecks.

6 Project Description Relevant to Shipping and Navigation

70. The NRA reflects the design envelope which is detailed in full in **Chapter 5 Project Description (Document Reference 3.1.7)**.

71. One area of optionality is in relation to the National Grid connection point (discussed further in Chapter 5, Project Description (Document Reference 3.1.7)). The following grid connection options are included in the Project design envelope:

- Option 1: Onshore electrical connection at a National Grid connection point within the Tendring peninsula of Essex, with a project alone onshore cable route and onshore substation infrastructure;
- Option 2: Onshore electrical connection at a National Grid connection point within the Tendring peninsula of Essex, sharing an onshore cable route (but with separate onshore export cables) and co-locating separate project onshore substation infrastructure with Five Estuaries; or
- Option 3: Offshore electrical connection, supplied by a third party provider.

72. With regards to shipping and navigation, options 1 and 2 would be the same and represent the MDS described below. Under these options the transmission infrastructure would include two offshore export cables and two offshore substation platforms (OSPs). For option 3, there would be no project offshore export cables as the project's connection to the national grid would be in the array area via an offshore converter platform (OCP) and one OSP.

73. The following subsections outline the maximum extent of the Project for which any shipping and navigation hazards are assessed.

6.1 Array Area and Offshore Cable Corridor

74. The array area is located approximately 22nm south-east of the East Suffolk coast. The total area covered by the array area is approximately 95 square nautical miles (nm^2) with charted water depths ranging between 8m and 46m below Chart Datum (CD). The total area covered by the offshore cable corridor is approximately $16nm^2$ with charted water depths ranging between zero (nearshore) and 39m below CD.

75. The key coordinates defining the boundary of the offshore element of the array area are illustrated in Figure 6-1 and provided in Table 6.1 using World Geodetic System 1984 (WGS84) Universal Transverse Mercator (UTM) Zone 31N.

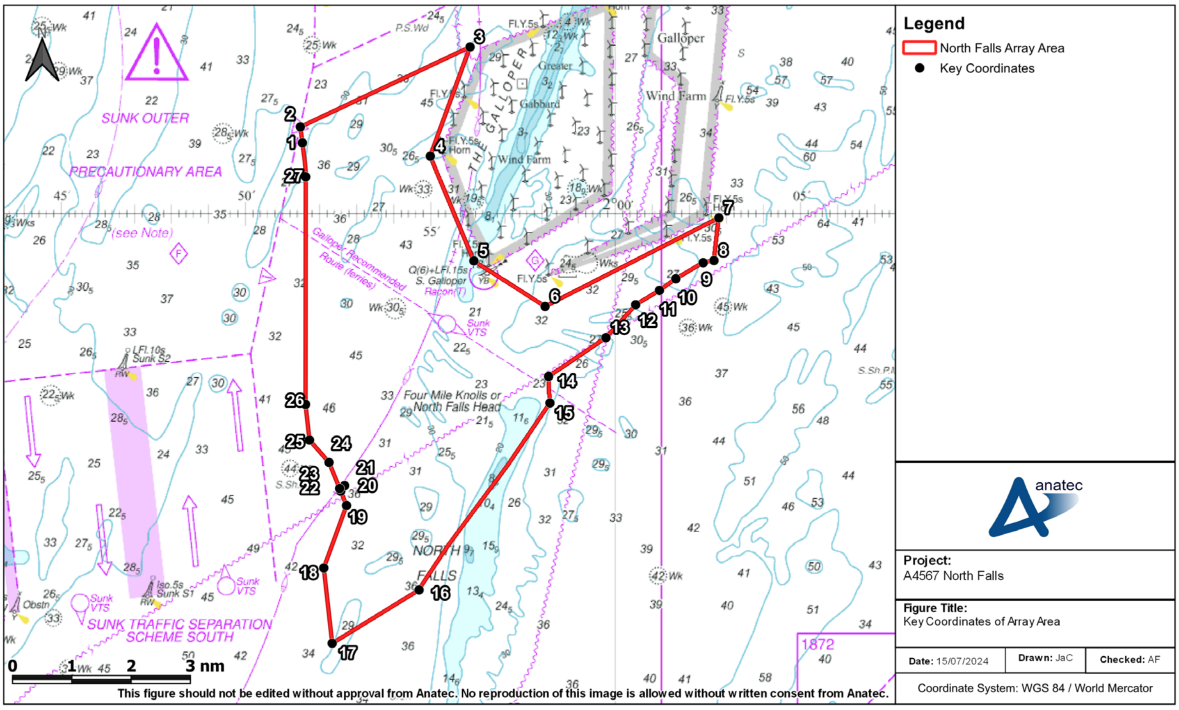

Figure 6-1 Key coordinates for the Array Area

Table 6.1 Key coordinates for the Array Area

Point	Latitude	Longitude
1	51° 46.18399' North (N)	001° 51.52207' East (E)
2	51° 46.45215'N	001° 51.46739'E
3	51° 47.79417'N	001° 56.0602'E
4	51° 45.96006'N	001° 54.98406'E
5	51° 44.20008'N	001° 56.16270'E
6	51° 43.43466'N	001° 58.08954'E
7	51° 44.92260'N	002° 02.79174'E
8	51° 44.20590'N	002° 02.65992'E
9	51° 44.16756'N	002° 02.36766'E
10	51° 43.89822'N	002° 01.62702'E
11	51° 43.70418'N	002° 01.18500'E
12	51° 43.46172'N	002° 00.54066'E
13	51° 42.90816'N	001° 59.73738'E
14	51° 42.25464'N	001° 58.18482'E

Point	Latitude	Longitude
15	51° 41.80842'N	001° 58.22082'E
16	51° 38.66118'N	001° 54.67986'E
17	51° 37.76189'N	001° 52.32853'E
18	51° 39.03140'N	001° 52.10085'E
19	51° 40.08359'N	001° 52.71647'E
20	51° 40.32461'N	001° 52.55921'E
21	51° 40.41888'N	001° 52.66356'E
22	51° 40.36970'N	001° 52.53295'E
23	51° 40.36967'N	001° 52.52982'E
24	51° 40.80925'N	001° 52.24298'E
25	51° 41.18441'N	001° 51.71421'E
26	51° 41.78502'N	001° 51.60623'E
27	51° 45.61162'N	001° 51.61163'E

6.2 Surface Infrastructure

6.2.1 Indicative Worst-Case Layout

76. Up to 59 surface structures will be installed, consisting of 57 Wind Turbine Generators (WTGs) and two offshore electrical platforms (OCP and/or OSPs). All surface structures will be located within the array area.

77. Although the final locations of infrastructure have not yet been defined, an indicative worst-case layout has been determined for shipping and navigation and is presented in Figure 6-2. The worst case assumptions are for the purposes of modelling/risk assessment only and the final array layout will need to be agreed with the MCA and Trinity House post consent.

78. The indicative worst-case layout maintains a single line of orientation within the array area. It is noted that it will be necessary to account for the presence of the existing WTGs associated with the neighbouring Greater Gabbard and Galloper projects in the final post consent layout to ensure suitable SAR access is maintained. This has been discussed with the MCA at a high level as part of the NRA process.

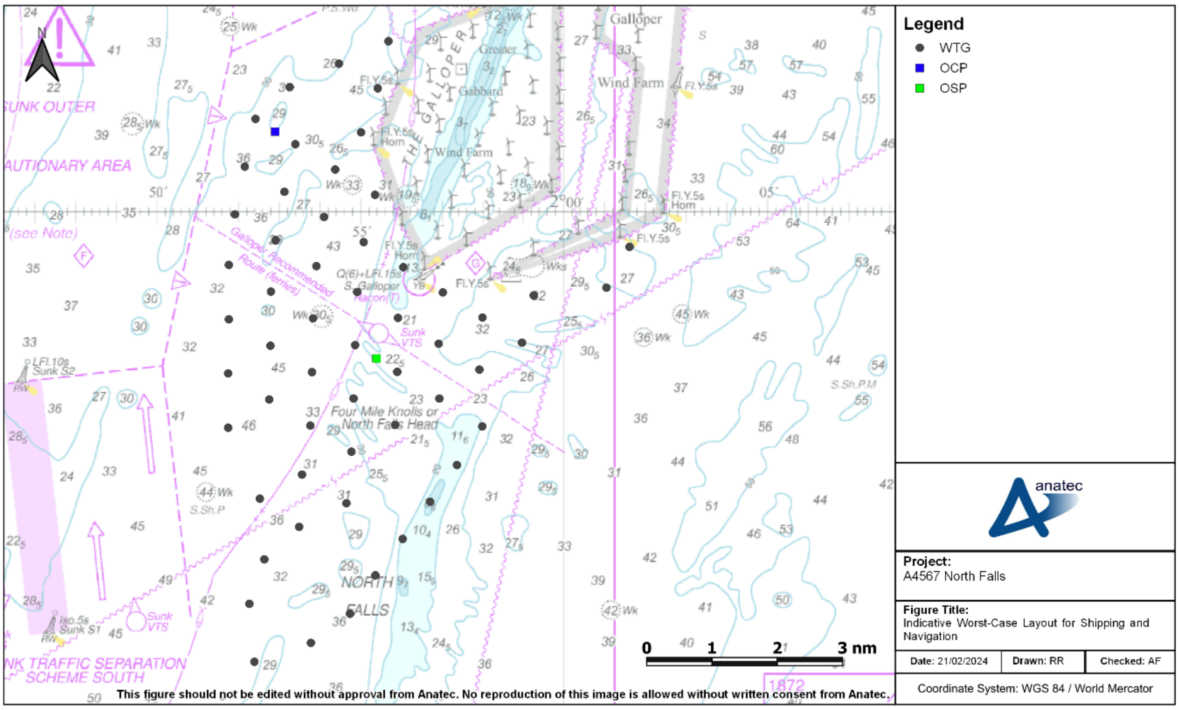

Figure 6-2 Indicative Worst-Case Layout for Shipping and Navigation

6.2.2 Wind Turbine Generators (WTGs)

79. The maximum number of smallest WTGs in the design envelope represents the MDS for shipping and navigation. The full design envelope is described in **Chapter 5 Project Description**.

80. The WTGs within the indicative layout each have a maximum rotor diameter of 236m (noting the indicative layout assumes the largest number of smallest WTGs under consideration) and a minimum blade tip height of 27m above Mean High Water Springs (MHWS), noting that these values represent the worst-case for shipping and navigation and are above the minimum MCA and RYA requirement of 22m above MHWS.

81. Minimum crosswind and downwind spacings between WTGs (measured centre-to-centre) will be 944m and 1,180m respectively.

82. Multileg foundations (with a maximum of four-legs per foundation) have been considered as the MDS for shipping and navigation as this foundation type provides the maximum structure dimensions at the sea surface. The MDS WTG measurements assuming use of multileg foundations are provided in Table 6.2, noting that the values provided are specific to the worst-case selected for shipping and navigation, and do not necessarily represent the maximum values within the design envelope overall.

Table 6.2 MDS for Shipping and Navigation – WTGs

Parameter	MDS for Shipping and Navigation
Foundation type	Multileg
Dimensions at sea surface	50 x 50m
Maximum blade tip height (above MHWS)	276m
Minimum air gap (above MHWS)	27m
Maximum rotor diameter	236m

83. Other foundation types under consideration include monopiles and multi-legged jackets with suction buckets and gravity based structures (for both monopile or multi-leg). Descriptions of each foundation type under consideration are provided in **Chapter 5 Project Description (Document Reference 3.1.7)**.

6.2.3 Offshore Electrical Platforms

84. The OCP/OSPs may be installed on installed on monopile, six-legged jacket, six-legged jacket with suction bucket, or gravity-based foundations. The OCP (if required under option 3) will have maximum topside dimensions of 130 x 80m. The OSP(s) will have maximum topside dimensions of 60 x 40m.

85. For grid connection options 1 and 2, there would be up to two OSPs and for option 3, there would be one OSP and one OCP. As only one OCP is considered under any option, one OCP and one OSP has been used for the MDS as illustrated in Figure 6-2.

6.3 Subsea Cables

86. Various types of subsea cables will be installed and can be categorised as array cables, offshore export cables, or platform interconnector cables. Each of these categories is summarised in the following subsections.

6.3.1 Array Cables

87. The array cables will connect individual WTGs and the OSPs/OCP. Up to 103nm of array cables will be required, with the final length dependent on the final array layout. All array cables will be installed within the array area.

6.3.2 Export Cables

88. The export cables will carry the energy generated by the WTGs from the array area to shore. Up to two export cable circuits may be required with each circuit consisting of power cables and auxiliary cables, e.g. communication cables. Each circuit will be installed as a bundle. A combined total length of up to 68nm and will be installed within the offshore cable corridor with a minimum spacing of 50m between circuits.

6.3.3 Platform Interconnector Cables

89. Should two offshore electrical platforms be installed an interconnector cable(s) may be used to link the platforms. Such cable(s) will be located within the array area.

6.3.4 Cable Burial

90. Where available, the primary means of cable protection will be by seabed burial. The extent and method by which the sub-sea cables will be buried will depend on the results of a detailed seabed survey of the final cable routes and associated cable burial risk assessment. The target minimum cable burial depth for the export and array cables is 0.6m.

91. Cable burial installation methods may include:

- Jet-trenching;
- Pre-cut and post-lay ploughing;
- Mechanical trenching;
- Dredging;
- Mass flow excavation;
- Rock cutting;
- Burial sledge;
- Ducted cable (cable in pipe); and
- Surface laying.

92. Where cable burial is not possible, alternative cable protection methods may be deployed which will again be determined within the cable burial risk assessment. The exact form of cable protection used will depend upon local ground conditions, hydrodynamic processes, and the selected cable protection contractor. However, the final choice may include one or more of the following: concrete 'mattresses'; rock placement; geotextile bags filled with stone, rock, or gravel; polyethylene or steel pipe half shells, or sheathes; and bags of grout, concrete, or another substance that cures hard over time.

93. Protection measures may be placed alone or in combination and may be secured to the seabed where appropriate. Where appropriate, cable clips (also known as cable anchors, or anchor clamps) may also be utilised to secure cables to the seabed. The indicative height of cable protection is 1.4m.

94. Cable burial and protection is captured in the embedded mitigation measures (see Section 19)

6.4 Construction Phase

95. The overall North Falls construction programme is anticipated to be approximately 5 years, with onshore construction works starting in year 1 and offshore construction works in year 4, lasting for up to approximately two years. Table 6.3 outlines an

indicative construction programme for the Project which indicates the duration of construction for each element.

Table 6.3 Indicative construction programme (likely timescale for works shown in dark green, potential construction window in light green)

	Year 1 -3	Year 4			Year 5			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Substation installation	N/A (onshore construction during years 1)	Dark green	Light green					
Substation commissioning			Dark green	Dark green	Dark green	Light green		
Export cable installation		Light green	Dark green	Light green				
Foundation installation		Dark green	Dark green	Light green	Light green	Light green		
Array cable installation		Dark green	Dark green		Light green	Light green		
Wind turbine installation					Dark green	Dark green	Light green	
Commissioning					Dark green	Dark green	Dark green	Light green

96. An application for safety zones associated with surface infrastructure (array area) will be sought during the construction phase, including 500m around ongoing construction activities and 50m around installed structures pre commissioning (see Section 19).

97. A maximum number of 35 construction vessels may be located on-site simultaneously, with a maximum of 2,532 return trips to port throughout the construction phase. Table 6.4 provides a breakdown of the installation activities and vessel types during the construction phase.

Table 6.4 Breakdown of Construction Vessel Peak Numbers

Construction Element	Vessel Type	Peak Vessels	Maximum Return Trips to Port
Foundations	WTG and OSP foundation installation vessels	43	983
WTGs and OCP/OSPs	WTG installation vessels	24	688
	OCP/OSP topside installation vessels	10	104
Cable installation (including seabed preparation)	Array cable installation vessels (including support, cable protection and anchor handling vessels)	12	325
	Export cable installation vessel spreads (including support, cable protection and anchor handling vessels)	12	432
Indicative peak vessels on-site simultaneously		**35**	

98. There may be a requirement for helicopters to travel to and from the North Falls offshore project area to assist with construction activities. It is estimated that approximately 100 helicopter return trips may be required during the offshore construction period.

6.5 Operation and Maintenance Phase

99. The indicative operational life of the Project is 30 years. Throughout the O&M phase, a maximum of 22 O&M vessels may be located on-site simultaneously with a maximum of 1,222 annual round trips to port. Table 6.5 provides a breakdown of the installation activities and vessel types during the construction phase.

Table 6.5 Breakdown of O&M Vessel Peak Numbers

Vessel Type	Peak Number On-Site Simultaneously	Maximum Annual Return Trips to Port
Jack-up vessels	2	7
Service and Operation Vessel (SOVs)	2	52
Crew Transfer Vessel (CTVs)	6	1,095
Lift vessels	2	7
Cable maintenance vessels	2	1
Auxiliary vessels	8	60
Total	**22**	**1,222**

100. There may be a requirement for helicopters to travel to and from the North Falls array area to assist with O&M activities. It is estimated that approximately 100 helicopter return trips may be required during the O&M period.

6.6 Decommissioning Phase

101. The decommissioning sequence will generally be the reverse of the construction sequence and involve similar types and numbers of vessels. The decommissioning duration of the offshore infrastructure may take the same amount of time as construction of the Project.

6.7 Maximum Design Scenario

102. The MDS for each shipping and navigation hazard is provided in Table 6.6 and is based on the parameters described in the previous subsections.

Table 6.6 MDS by Hazard for Shipping and Navigation

Potential Hazard	Phase(s)	MDS for Shipping and Navigation	Justification
Vessel displacement	Construction	▪ Single continuous construction phase of up to two years; ▪ Up to 35 vessels on site at any one time ▪ Up to 2,532 return trips; ▪ Full build out of the array area; ▪ Buoyed construction area encompassing the maximum extent of the array area including presence of 500m construction Safety Zones and 50m pre-commissioning Safety Zones; and ▪ Up to four offshore export cables with a combined total length of 68nm.	Largest possible extent of infrastructure, greatest number of simultaneous vessel activities and greatest duration resulting in the maximum spatial and temporal effect on vessel displacement.
	O&M	▪ O&M phase of indicative 30 years; ▪ Up to 22 vessels at any one time ▪ Up to 1,222 return trips per year; ▪ Full build out of the array area; and ▪ Presence of 500m operational Safety Zones for major maintenance activities.	
	Decommissioning	The MDS for the decommissioning phase will be similar to the construction phase noting that from a shipping and navigation perspective the activities during both of these phases will be similar.	
Increased vessel to vessel collision risk between a third-party	Construction	▪ Single continuous construction phase of up to two years; ▪ Up to 35 vessels on site at any one time, making up to 2,532 return trips;	Largest possible extent of infrastructure, greatest number of simultaneous vessel activities and greatest duration resulting in

Potential Hazard	Phase(s)	MDS for Shipping and Navigation	Justification
vessel and a project vessel		▪ Full build out of the array area; and ▪ Buoyed construction area encompassing the maximum extent of the array area including presence of 500m construction Safety Zones and 50m pre-commissioning Safety Zones.	the maximum spatial and temporal effect on vessel to vessel collision risk involving a third-party vessel and a project vessel.
	O&M	▪ O&M phase of up to 30 years; ▪ Up to 22 vessels at any one time making up to 1,222 return trips per year; ▪ Full build out of the array area; and ▪ Presence of 500m operational Safety Zones for major maintenance activities.	
	Decommissioning	▪ The MDS for the decommissioning phase will be similar to the construction phase noting that from a shipping and navigation perspective the activities during both of these phases will be similar.	
Increased vessel to vessel collision risk between third-party vessels	Construction	▪ Single continuous construction phase of up to two years; ▪ Full build out of the array area; ▪ Buoyed construction area encompassing the maximum extent of the array area including presence of 500m construction Safety Zones and 50m pre-commissioning Safety Zones; and ▪ Up to two offshore export cables with a combined total length of 68nm.	Largest possible extent of infrastructure, greatest number of simultaneous vessel activities and greatest duration resulting in the maximum spatial and temporal effect on collision risk involving third-party vessels.
	O&M	▪ O&M phase of up to 30 years;	

Potential Hazard	Phase(s)	MDS for Shipping and Navigation	Justification
		▪ Full build out of the array area; and ▪ Presence of 500m Safety Zones for major maintenance activities.	
	Decommissioning	The MDS for the decommissioning phase will be similar to the construction phase noting that from a shipping and navigation perspective the activities during both of these phases will be similar.	
Vessel to structure allision risk	Construction	▪ Single continuous construction phase of up to two years; ▪ Full build out of the array area; ▪ Buoyed construction area encompassing the maximum extent of the array area including presence of 500m construction Safety Zones and 50m pre commissioning Safety Zones; ▪ Up to 57 wind turbines and two OSPs/OCP partially constructed or not yet commissioned and located as per Figure 6-2; ▪ WTGs with a maximum surface dimension of 50x50m; ▪ Two OSPs/OCP with a maximum surface dimension of 130x80m; and ▪ Minimum spacing of 1,180m between WTGs.	Largest possible extent of surface infrastructure, greatest number of surface structures and greatest duration resulting in the maximum spatial and temporal effect on vessel to structure allision risk.
	O&M	▪ O&M phase of up to 30 years; ▪ Full build out of the array area; ▪ Up to 57 wind turbines and two OSPs/OCP located as per Figure 6-2; ▪ WTGs with a maximum surface dimension of 50x50m;	

Potential Hazard	Phase(s)	MDS for Shipping and Navigation	Justification
		▪ OSPs/OCP with a maximum surface dimension of 130x80m; and ▪ Minimum spacing of 1,180m between WTGs.	
	Decommissioning	The MDS for the decommissioning phase will be similar to the construction phase noting that from a shipping and navigation perspective the activities during both of these phases will be similar.	
Reduced access to local ports and reduction in underkeel clearance	Construction	▪ Single continuous construction phase of up to two years; ▪ Full build out of the array area; ▪ Buoyed construction area encompassing the maximum extent of the array area including presence of 500m construction Safety Zones and 50m pre-commissioning Safety Zones; and ▪ Up to 103nm of array cables; ▪ Up to two offshore export cables with a combined total length of 68nm; ▪ Indicative separation of 50m between export cables; ▪ Indicative height of cable protection of 1.4m; and ▪ Up to 35 construction/decommissioning vessels on-site simultaneously and up to 2,532 return trips to port.	Largest possible extent of infrastructure, greatest number of simultaneous vessel activities and greatest duration resulting in the maximum spatial and temporal effect on access to local ports and harbours and reduction in under keel clearance.
	O&M	▪ O&M phase of up to 30 years; ▪ Up to 22 vessels at any one time making up to 1,222 visits per year ▪ Full build out of the array area;	

Potential Hazard	Phase(s)	MDS for Shipping and Navigation	Justification
		▪ Presence of 500m operational Safety Zones for major maintenance activities; ▪ Up to 103nm of array cables; ▪ Up to two offshore export cables with a combined total length of 68nm; ▪ Indicative separation of 50m between export cables; and ▪ Indicative height of cable protection of 1.4m.	
	Decommissioning	The MDS for the decommissioning phase will be similar to the construction phase noting that from a shipping and navigation perspective the activities during both of these phases will be similar.	
Interaction with subsea cables including cable protection	O&M	▪ O&M phase of up to 30 years; ▪ Full build out of the array area; ▪ Presence of 500m Safety Zones for major maintenance activities; ▪ Up to 103nm of array cables; ▪ Up to two offshore export cables with a combined total length of 68nm; ▪ Indicative separation of 50m between export cables; and ▪ Indicative height of cable protection of 1.4m.	Largest possible extent of subsea infrastructure and greatest duration resulting in the maximum spatial and temporal effect on anchor interaction with subsea cables.
Interference with marine navigation, communications and position fixing equipment	O&M	▪ O&M phase of up to 30 years; ▪ Full build out of the array area; ▪ Up to 57 wind turbines and two OSPs/OCP located as per Figure 6-2; ▪ WTGs with a maximum surface dimension of 50x50m;	Largest possible extent of surface and seabed infrastructure resulting in the maximum spatial and temporal effect on interference with marine navigation, communications and position fixing equipment.

Potential Hazard	Phase(s)	MDS for Shipping and Navigation	Justification
		▪ Two OSPs/OCP with a maximum surface dimension of 130x80m; ▪ Up to 103nm of array cables; ▪ Up to two offshore export cables with a combined total length of 68nm; and ▪ Minimum spacing of 1,180m between WTGs.	
Reduction of emergency response capability	Construction	▪ Single continuous construction phase of up to two years; ▪ 57 WTGs; ▪ WTGs on jacket foundations of 50x50m at LAT; ▪ Two OSPs; ▪ OSP topside dimensions of 60x40m; ▪ Up to 35 vessels on site at any one time, making up to 2,532 return trips; ▪ Full build out of the array area; and ▪ Buoyed construction area encompassing the maximum extent of the array area including presence of 500m construction Safety Zones and 50m pre-commissioning Safety Zones.	Largest possible extent, greatest number of surface structures, greatest number of simultaneous vessel activities and greatest duration resulting in the maximum spatial and temporal effect on emergency response capability.
	O&M	▪ O&M phase of up to 30 years; ▪ Full build out of the array area; ▪ Up to 57 wind turbines and two OSPs/OCP located as per Figure 6-2; and ▪ Up to 22 vessels at any one time making up to 1,222 return trips per year.	

Potential Hazard	Phase(s)	MDS for Shipping and Navigation	Justification
	Decommissioning	The MDS for the decommissioning phase will be similar to the construction phase noting that from a shipping and navigation perspective the activities during both of these phases will be similar.	

7 Navigational Features

103. Navigational features within and in proximity to the array area and offshore cable corridor are presented throughout this section. Each of the features shown and discussed in the following subsections and have been identified using the most detailed UKHO Admiralty charts (UKHO, 2023), and most recent Sailing Directions (UKHO, 2020).

7.1 Offshore Wind Farms

104. The Project is located adjacent, directly west and south, to the southern arrays of Greater Gabbard and Galloper, noting that the Project is an extension to Greater Gabbard. Greater Gabbard has been operational since 2012, and consists of two arrays, north and south of the Sunk TSS East. Galloper has been fully operational since 2018, and similarly consists of two arrays north and south of the Sunk TSS East. Other offshore wind farms further from the array area, including those yet to enter construction phase (as of January 2023), are presented in Figure 7-1. It is noted that only developments which have been consented through to being operational have been considered within this Section. Any developments which are pre-consent will be considered on a cumulative basis in Section 13.

105. Excluding Greater Gabbard and Galloper, the nearest offshore wind farm to the array area is London Array, located approximately 11nm to the west, and became operational as of 2014. Gunfleet Sand offshore wind farm is located approximately 3nm south of the offshore cable corridor and became operational as of 2010.

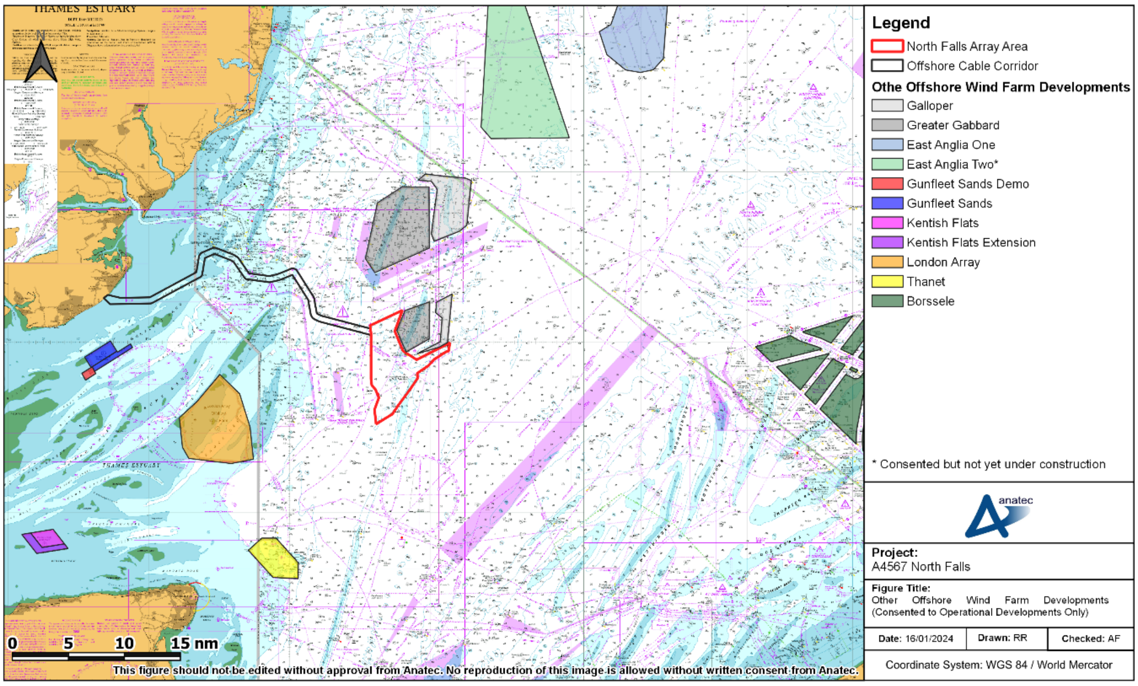

Figure 7-1 Offshore Wind Farms Developments

7.2 Routeing Measures

106. Figure 7-2 presents the routeing measures in proximity to the Project. These are noted to be a key factor behind vessel routeing in the area.

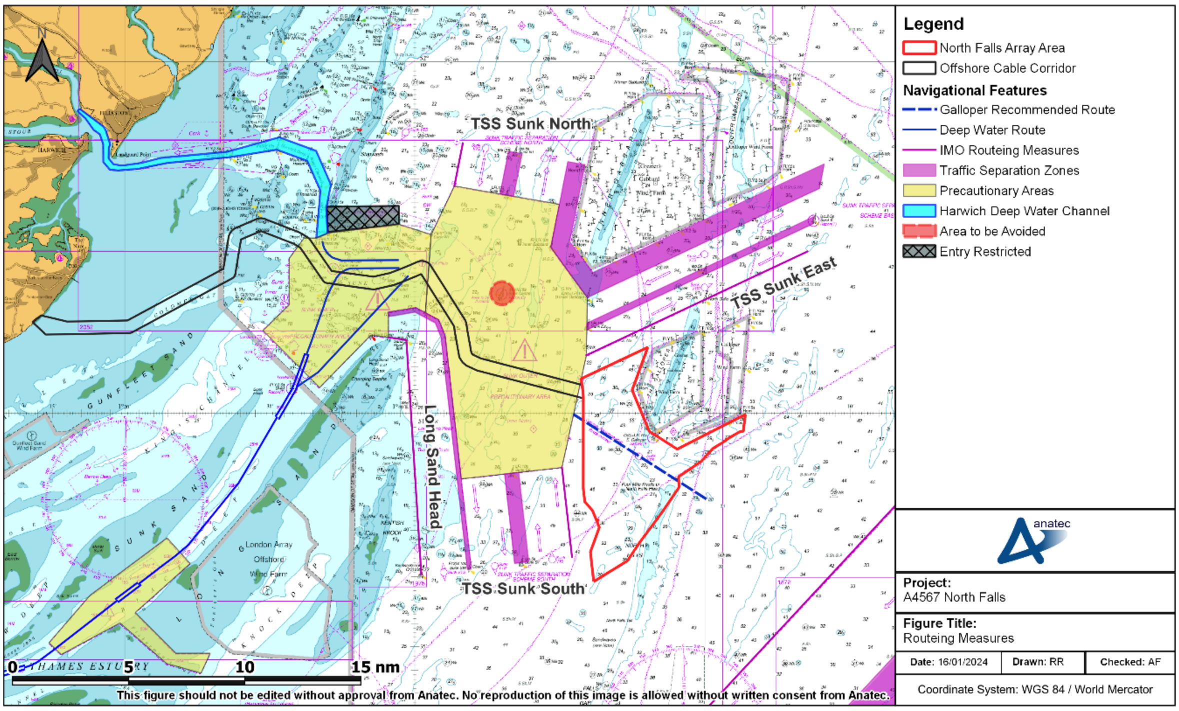

Figure 7-2 Routeing Measures in Proximity to the Project

7.2.1 IMO Routeing Measures

107. The main IMO routeing measures in proximity to the Project are those associated with the Sunk, located directly west and north of the array area, and comprise the following:

- Sunk TSS North, Sunk TSS East (north of the array area) and Sunk TSS South (west of the array area); all major TSSs;
- Sunk Outer Precautionary Area, a precautionary area that lies at the intersection of the three Sunk TSSs and borders the north-west corner of the array area;
- Long Sand Head Two Way Route; and
- Sunk Inner Precautionary Area, a precautionary area adjacent to Sunk Outer Precautionary Area.

108. The offshore cable corridor passes through the Sunk routeing measure; crossing the Sunk Outer and Inner Precautionary Areas and finally making landfall on the north Essex coast.

109. The Long Sand Head Two Way Route is only to be used by vessels entering or leaving the Thames/Medway ports that meet certain pilotage requirements. This route may

also be used by vessels of length less than 20m, any sailing vessel and any vessel engaged in fishing activity or licenced dredger working in designated extraction areas, irrespective of origin/destination. It was noted during consultation (see Section 4) that the Long Sand Head Two Way Route is likely to be amended in the near future to account for shifting sands. This is considered in Section 14.4.1.

110. The Sunk Centre Light AtoN, which is marked with a Radar Beacon (Racon), is located within an Area to be Avoided inside the Sunk Outer Precautionary Area. Vessels are recommended to sail counter clockwise around it; the purpose to separate inbound and outbound traffic at the Sunk Pilot Station, detailed in Section 7.3.

111. The North Hinder South TSS is located approximately 7nm to the south-east of the array area at the closest point and connects to the North Hinder Junction.

112. A south-east/north-west recommended route for ferries that runs through the centre of the southern array area is also charted. This route is known as the Galloper Recommended Route and was originally designed by the IMO to permit regular ferry traffic sailing to and from the port of Ostend to transit the Sunk Outer Precautionary Area without the need to deviate through the eastern or southern TSSs. Analysis of vessel traffic data and consultation indicates that it is no longer used for this purpose, with further details provided in Section 10.3.

113. An Entry Restricted region is charted to the immediate north-east of where the Harwich Deep Water Channel converges with the Sunk Inner Precautionary Area. Only vessels of less that 20m in length, any sailing vessel, any vessel engaged in fishing activity, and vessels meeting certain pilotage requirements are allowed to enter this area.

7.2.2 DW Routes and Channels

114. There are three DW routes located converging within the Sunk Inner Precautionary Area, vicinity of the Sunk Pilot Station. These routes are charted for use by deep-draught vessels entering or leaving the major ports in the area and are designed to avoid the shallowest waters. These DW routes are presented in more detail in Figure 7-3.

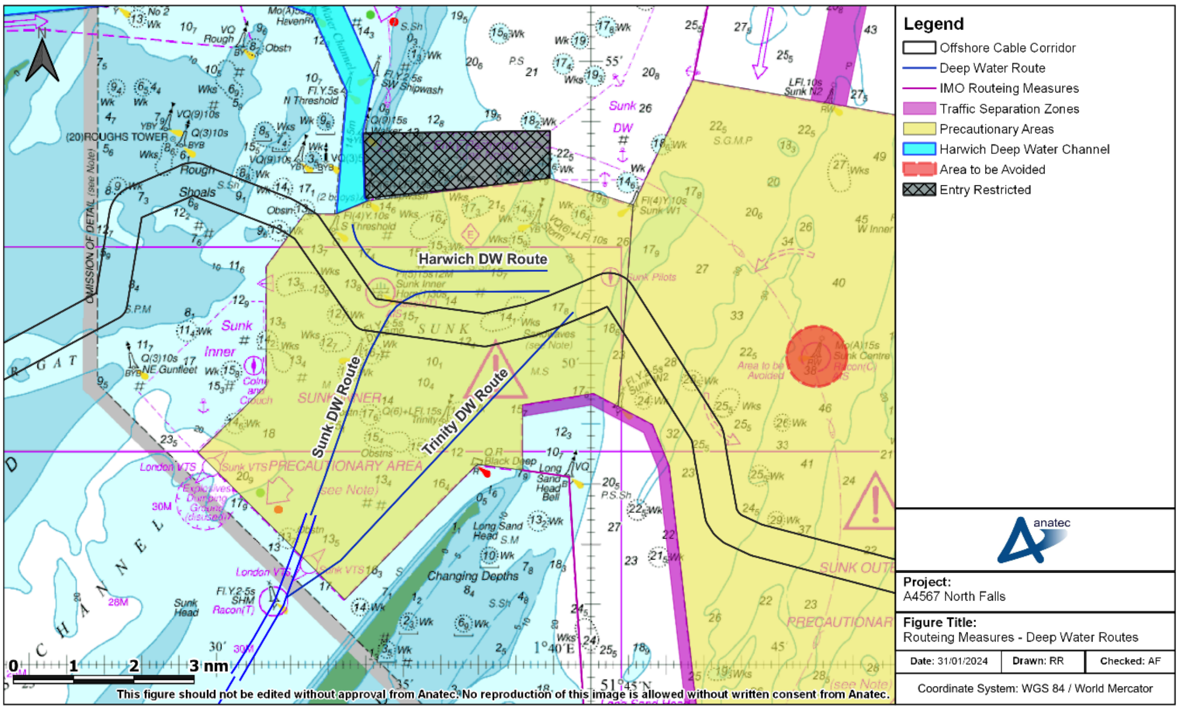

Figure 7-3 Routeing Measures – DW Routes

115. The most northern of these three routes, the Harwich DW route, leads to the entrance of the Harwich Deep Water Channel, which has a maintained depth of 16m, and leads north-west.

116. Both the Trinity and the Sunk DW routes are crossed by the offshore cable corridor, with these routes adjoining further south before heading into ports within the Thames and Medway.

117. Vessel traffic analysis for both these DW routes is provided in Section 10.2.3.2.1.

7.3 Key Ports Related Facilities

118. Figure 7-4 presents the ports, harbours and related facilities (including key pilot boarding stations) in the proximity to the Project.

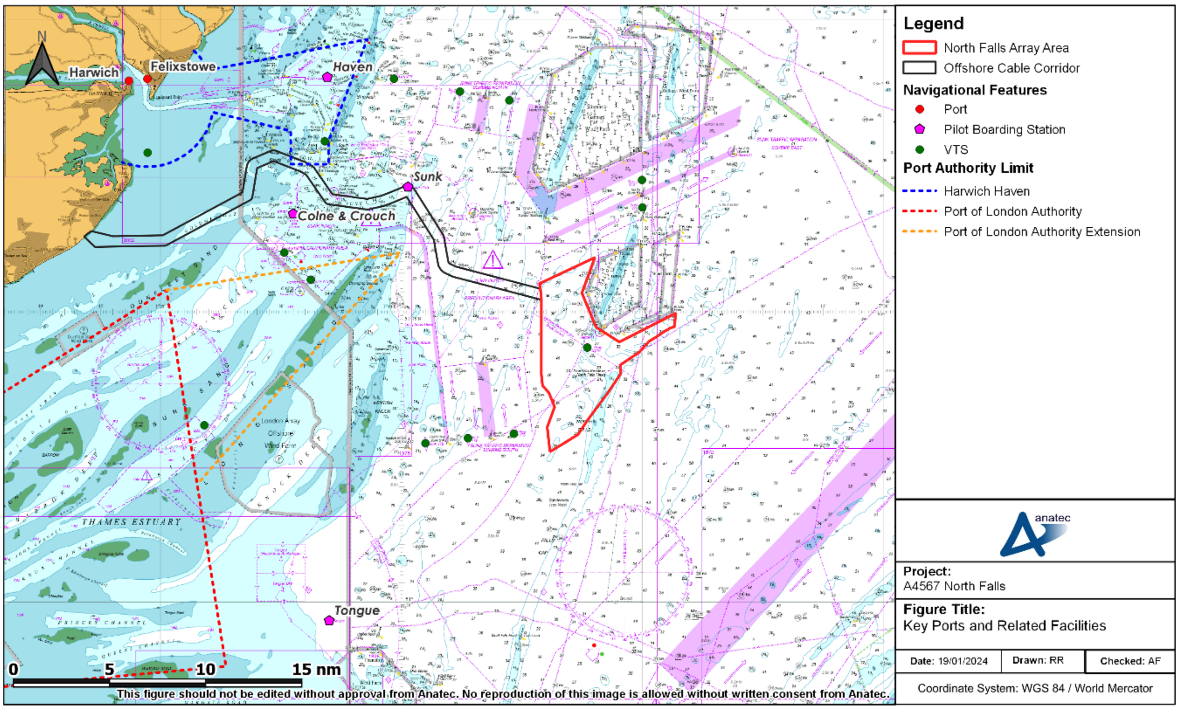

Figure 7-4 Key Ports and Related Facilities

119. The closest ports to the Project are Felixstowe Port and Harwich Port, both located at the mouth of the Stour and Orwell Estuaries, approximately 22nm and 23nm to the west of the array area, respectively.

120. The limits of Harwich Haven Authority are located to the north-west of the array area and intersect the offshore cable corridor. This region also intersects the Harwich Deep Water Channel (see Figure 7-2) and contains the Haven Pilot Boarding Station.

121. The PLA limits are also noted to the south of the offshore cable corridor, with the PLA extension limit approximately 1.8nm south.

122. The Sunk Pilot Boarding Station is located closest to the array area at approximately 8.4nm to the west and is also located within the northern extent of the offshore cable corridor, also within the Sunk Inner Precautionary Area, and is illustrated in Figure 7-5. This is a focal point for shipping and navigation and the Sunk Precautionary Areas were defined on this basis, and are reviewed in further detail in section 7.1). All vessels approaching this pilot station are required to pass through the Sunk Outer Precautionary Area and its associated TSSs where they are required to comply with the rules of Sunk VTS.

123. The Rivers Colne and Crouch Pilot Station is located south of the offshore cable corridor and within the Sunk Inner Anchorage Area. The Tongue Pilot Station is also shown in Figure 7-4, to the south-west of the array area.

124. VTS is in operation in the area 24-hours-a-day managed by the Dover Maritime Rescue Coordination Centre (MRCC) (see Section 9.3). There are radio reporting points located at various locations within proximity to the Project, mainly at the entrances/exits of the precautionary areas (as seen in Figure 7-2).

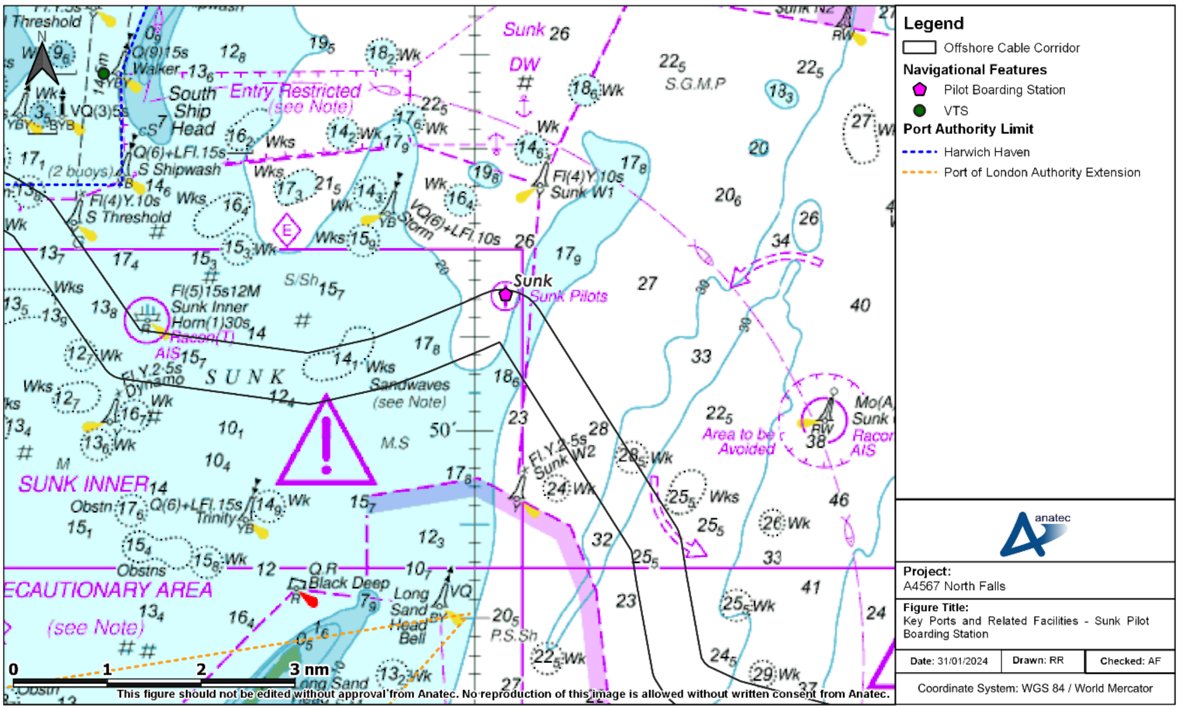

Figure 7-5 Key Ports and Related Facilities – Sunk Pilot Boarding Station

7.4 Marine Aggregate Dredging Areas and Spoil Grounds

125. Figure 7-6 presents the marine aggregate dredging areas in proximity to the Project, coloured-coded by type and labelled by area number. Spoil grounds utilised by marine aggregate dredging are also illustrated but it is noted that the spoil ground bordering the offshore cable corridor to the west is disused.

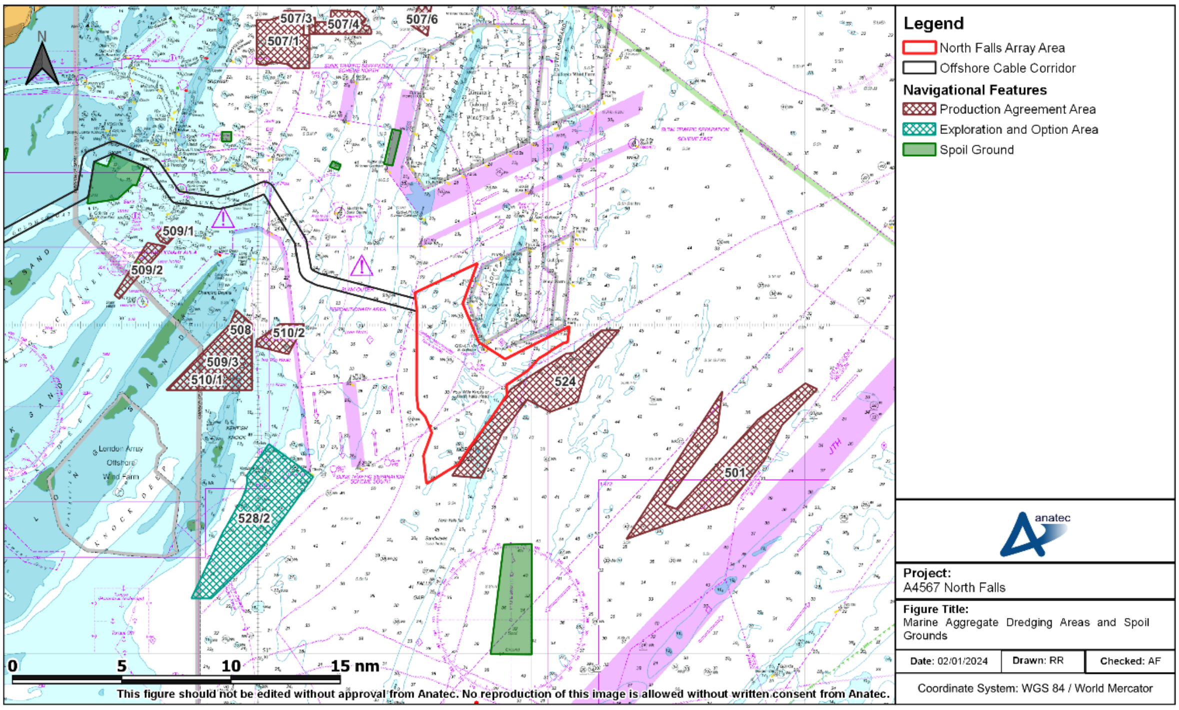

Figure 7-6 Marine Aggregate Dredging Areas and Spoil Grounds

126. The closest marine aggregate dredging area to the array area is immediately south and sharing the south-eastern border of the array area. This area is production agreement area 524 and operated by DEME Building Materials. During engagement with stakeholders at the Hazard Workshop, DEME noted dredging activity in area 524 only commenced in April 2023 and that current activity for the area is 110,000 tonnes equating to 25 minimum visits per year. This is discussed further in Section 10.1.2.5.

127. At approximately 5nm to the south-west of the array area is an exploration and option area (area 528/2) operated by Hanson Aggregates Marine.

128. The closest marine aggregate dredging area to the offshore cable corridor is 1.3nm to the south and is the production agreement area 509/1, operated by Tarmac Marine Ltd.

129. Other operators of dredging areas in proximity to the Project are Britannia Aggregates, CEMEX UK Marine, Volker Dredging and Westminster Gravels.

130. The closest spoil ground to the array area is located approximately 4.5nm south but as can be seen from the vessel activity within the study area during the 56-day period (Section 10.1.2.5) and during the 12 month period (Annex D.3.4.8), no dredging vessels utilised this spoil ground. A spoil ground is noted sharing a boundary with the south of the offshore cable corridor but as UKHO charts depict, the area is disused.

7.5 Charted Anchorage Areas

131. Figure 7-7 presents the charted anchorage areas in proximity to the Project.

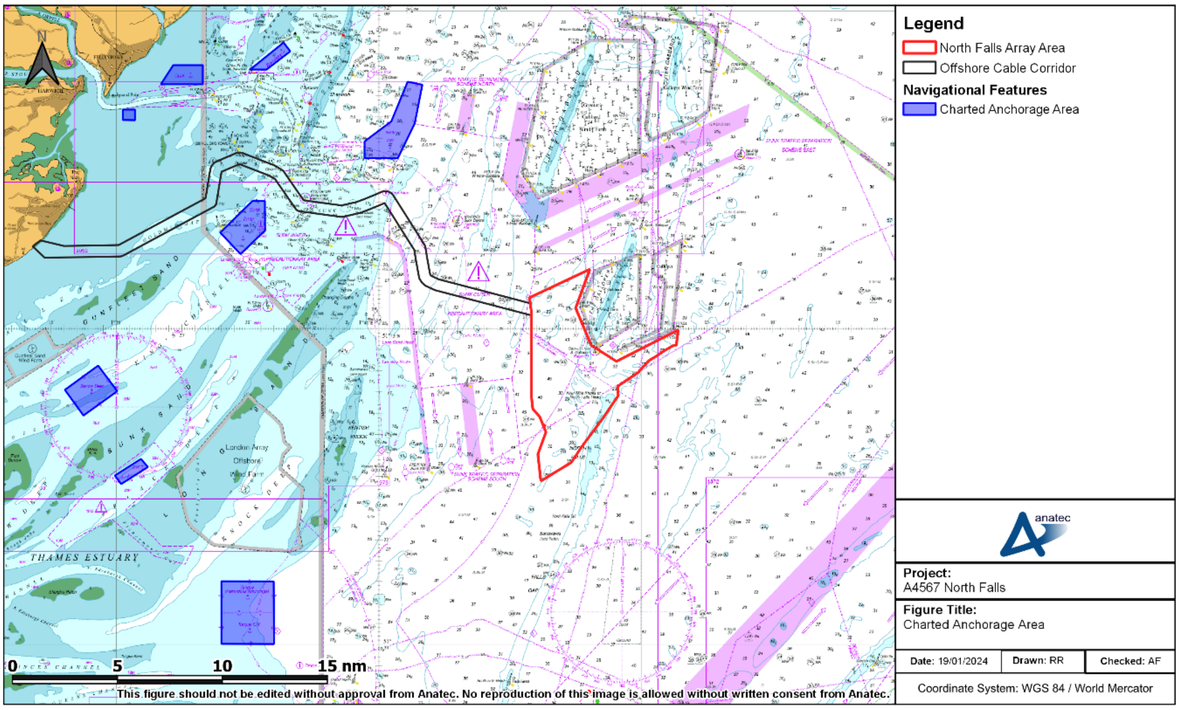

Figure 7-7 Charted Anchorage Areas

132. The closest charted anchorage area to the array area is approximately 9nm to the north-west; the Sunk Deep Water Anchorage. This anchorage is adjacent to the precautionary areas and the Sunk TSS North and approximately 1.6nm north of the offshore cable corridor.

133. There are various additional charted anchorage areas located further to the west, including the Sunk Inner Anchorage Area, which is located south of the offshore cable corridor approximately 0.9nm.

134. Vessels deemed to be at anchor within proximity to the array area during the 56-day period are reviewed in section 10.1.4.

7.6 Aids to Navigation

135. Figure 7-8 presents the AtoNs in proximity to the Project.

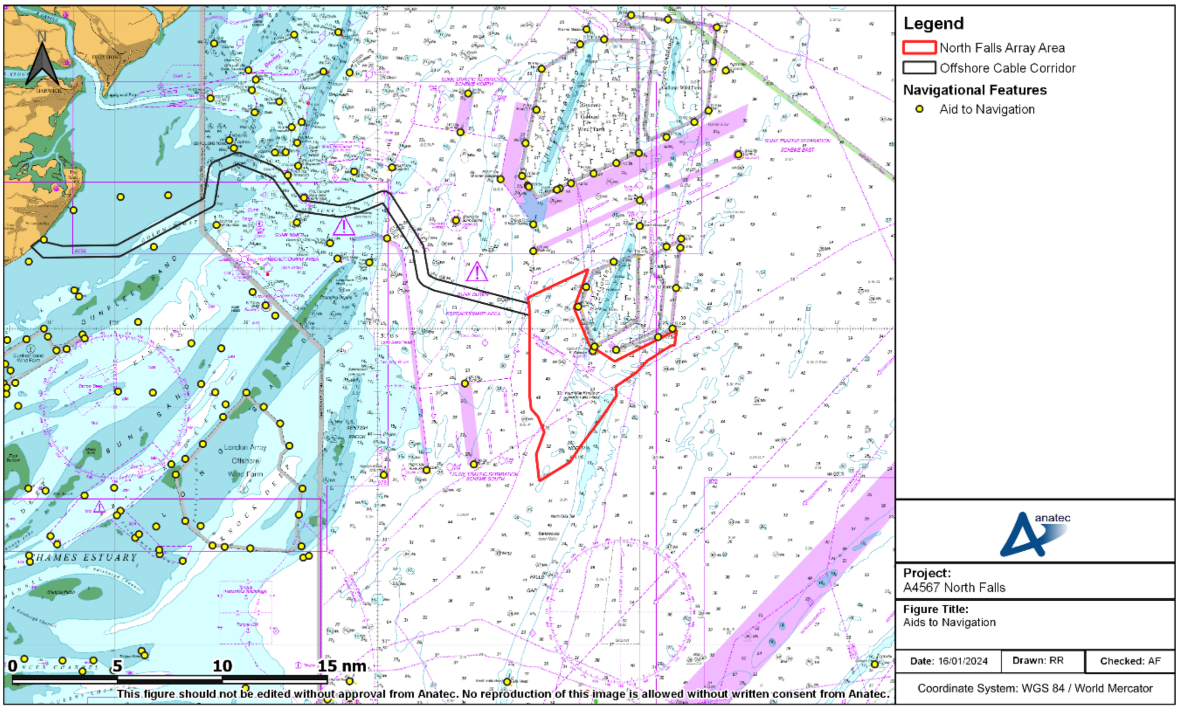

Figure 7-8 Aids to Navigation (AtoNs)

136. Various AtoNs are located in proximity to the array area, as illustrated in Figure 7-8. It is noted that this includes AtoNs around the perimeter of the Greater Gabbard and Galloper offshore wind farms marking Significant Peripheral Structures.

137. Given the sensitivity of the area for shipping and navigation, the local AtoNs are of high importance for navigational safety.

138. One AtoN intersects the east of the array area on the boundary of Greater Gabbard. This AtoN is a quick flashing, south cardinal mark pillar buoy; the *S. Galloper* Racon.

139. Several flashing pillar buoys are located within, and at the ends, of the separation zones of the neighbouring TSSs, the closest approximately 3nm west of the array area at the south of the Sunk TSS South.

140. There are no AtoNs located within the offshore cable corridor, the closest being the *S. Threshold* yellow special lit buoy and the *Sunk Inner* lightvessel at 161m and 243m north, respectively.

7.7 Charted Subsea Cables

141. Figure 7-9 presents the charted subsea cables in proximity to the Project.

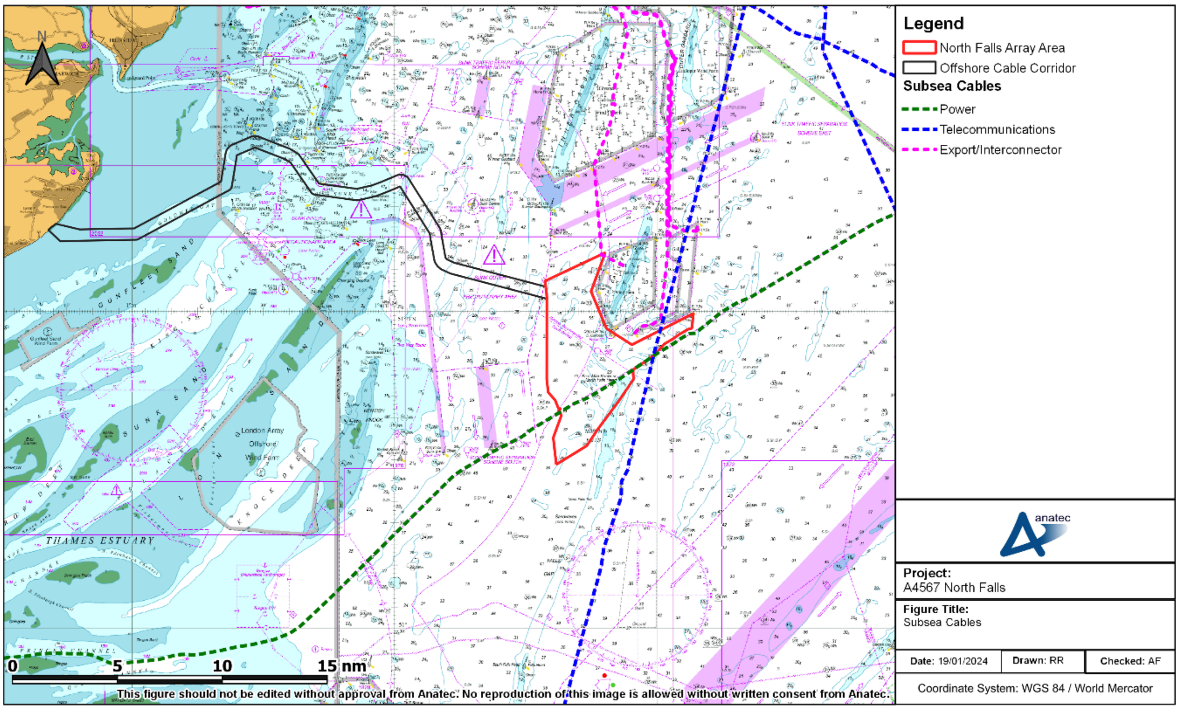

Figure 7-9 Subsea Cables

142. There are a number of subsea cables in the proximity to the array area, including two subsea cables that intersect the array area. These intersecting cables are the *Britned High Voltage Direct Current* (HVDC) (a power cable) and the *Atlantic Crossing 1* (a communications cable).

143. There are also export and interconnector subsea cables to the immediate north-east of the array area associated with the nearby existing Greater Gabbard and Galloper (see Figure 7-1).

144. No subsea cables are in proximity to the offshore cable corridor.

145. Proposed subsea cables have been considered cumulatively (see Section 13).

7.8 Military Practice and Exercise Areas

146. Figure 7-10 presents the military practice and exercise areas (PEXA) in proximity to the Project.

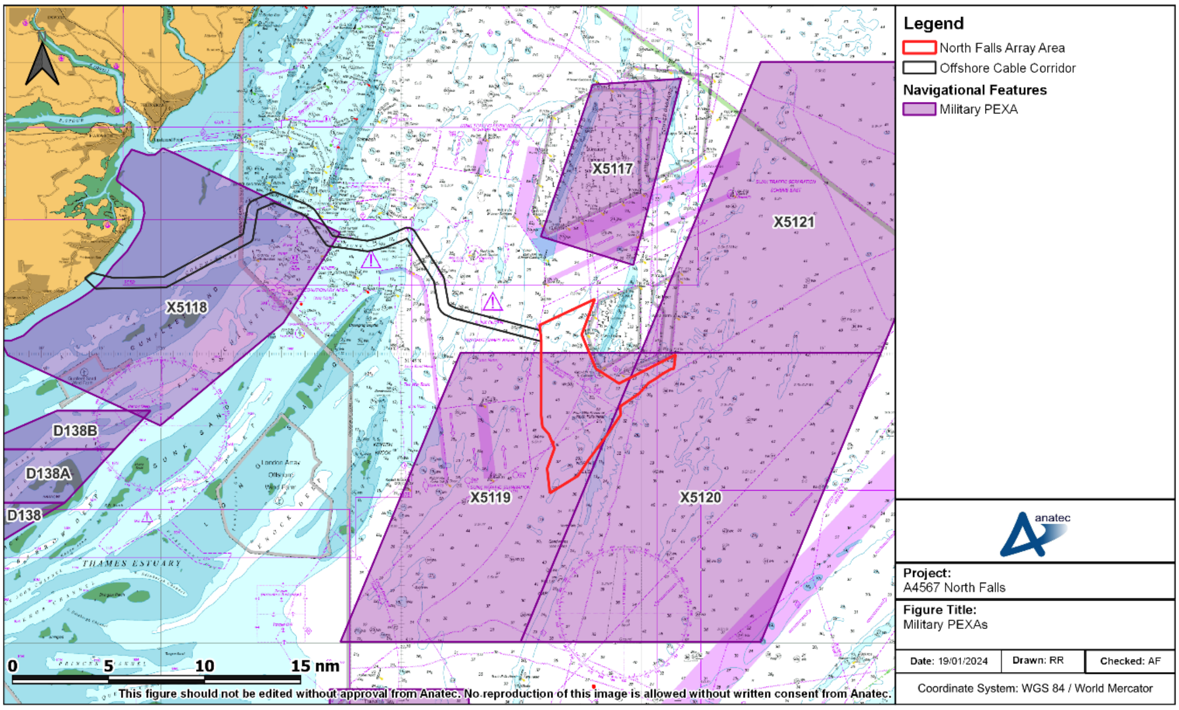

Figure 7-10 Military Practice and Exercise Areas

147. Two military PEXAs are located intersecting the array area; areas X5119 and X5120. No restrictions are placed on the right to transit the firing practice area at any time, with operations conducted using a clear range procedure – exercises and firing only take place when the area is considered to be clear of all shipping. Another military PEXAs is located adjacent the north-east of the array area (X5127) and another approximately 2.3nm north (X5117).

148. One military PEXA intersects the offshore cable corridor at multiple locations, the area X5118.

7.9 Charted Wrecks and Obstructions

149. Figure 7-11 presents the charted wrecks and obstructions within the study area and cable corridor study area. Note that this only includes charted wrecks which may be of relevance to shipping and navigation. Uncharted wrecks and obstructions, which are not considered a danger to safe navigation, are considered in **Chapter 16 Marine Archaeology**.

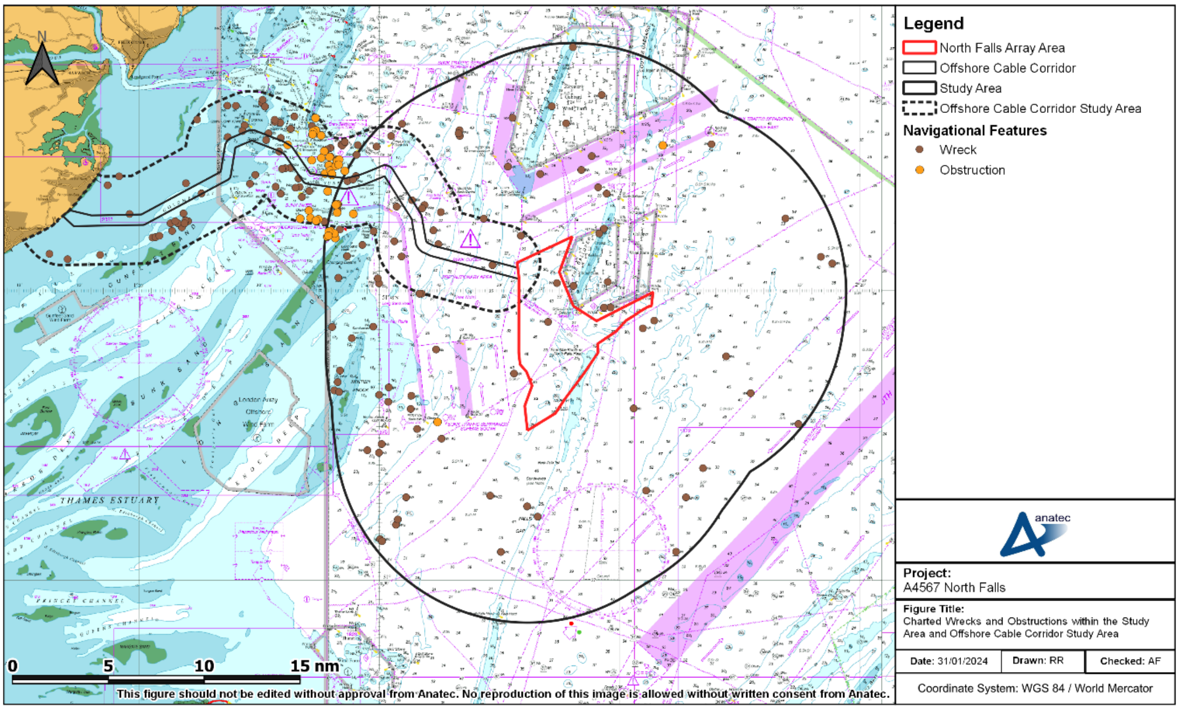

Figure 7-11 Charted Wrecks and Obstructions within the Study Area and Offshore Cable Corridor Study Area

150. There are a total of 302 charted wrecks and 82 charted obstructions recorded within the combined study areas.

151. A total of two charted wrecks and no obstructions are located within the array area, with the shallowest of these at a depth of 30m below CD. There are 14 charted wrecks located within the offshore cable corridor, with the shallowest of these at a depth of 9m below CD. One charted obstruction is located within the offshore cable corridor, at a depth of 13m below CD.

7.10 Other Navigational Features

152. Figure 7-12 presents any other navigational feature in proximity of the Project, deemed of relevance.

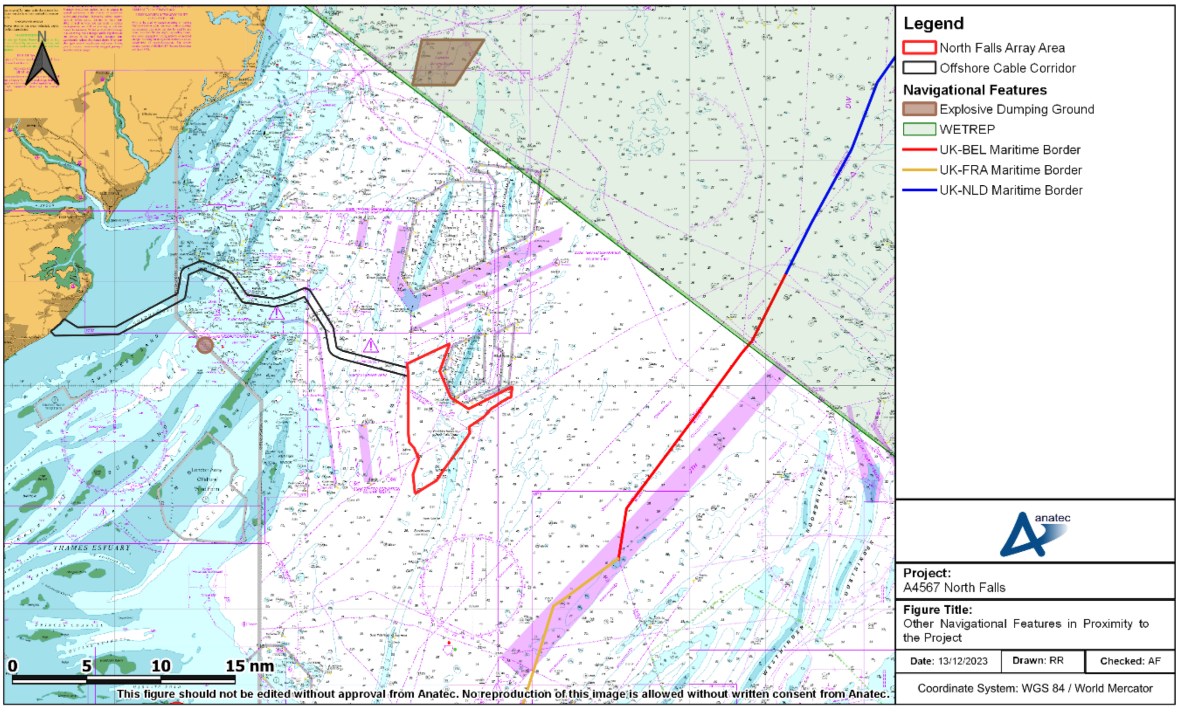

Figure 7-12 Other Navigational Features in Proximity to the Project

153. There is an explosive dumping ground to the south of the offshore cable corridor bordering the Sunk precautionary area, although it is marked on nautical charts as 'disused'. This is also the same for the explosive dumping ground noted to the north of the Project, also 'disused' and so are not deemed as significant navigational features in regard to the Project.

154. The Western European Tanker Reporting System (WETREP) is a mandatory vessel reporting system under the International Convention for the Safety of Life at Sea (SOLAS) regulation V/11 established in the Western European Particularly Sensitive Sea Area, and as noted on nautical charts "*Tankers of more than 600 dead weight tonnage (DWT) carrying heavy crude oil, heavy fuel oil or bitumen and tar and their emulsions are required to participate in the WETREP"* (UKHO, 2023)

155. The maritime border of the UK's EEZ is approximately 11nm to the east of the array area and borders the EEZs of the Netherlands, Belgium and France.

156. It is also noted that there are sandwaves in proximity to the array area which influence navigation in the area. These form in several locations within the area and reach their maximum amplitude after periods of calm, settled weather, resulting in least depths over them at Neap tides. Frequent and rapid changes of depths can occur in the main ship channels.

8 Meteorological Ocean Data

157. This section presents meteorological and oceanographic statistics local to the array area. The data presented in this section had been used as input to the collision and allision risk modelling (see Section 15).

8.1 Wind Direction

158. Based on wind direction data collected from offshore MetOffice station locations (approx. 25nm south of array area) between 2017 and 2022, the distribution of wind direction data within each 30-degree interval is presented in Figure 8-1, in the form of a wind rose for each location.

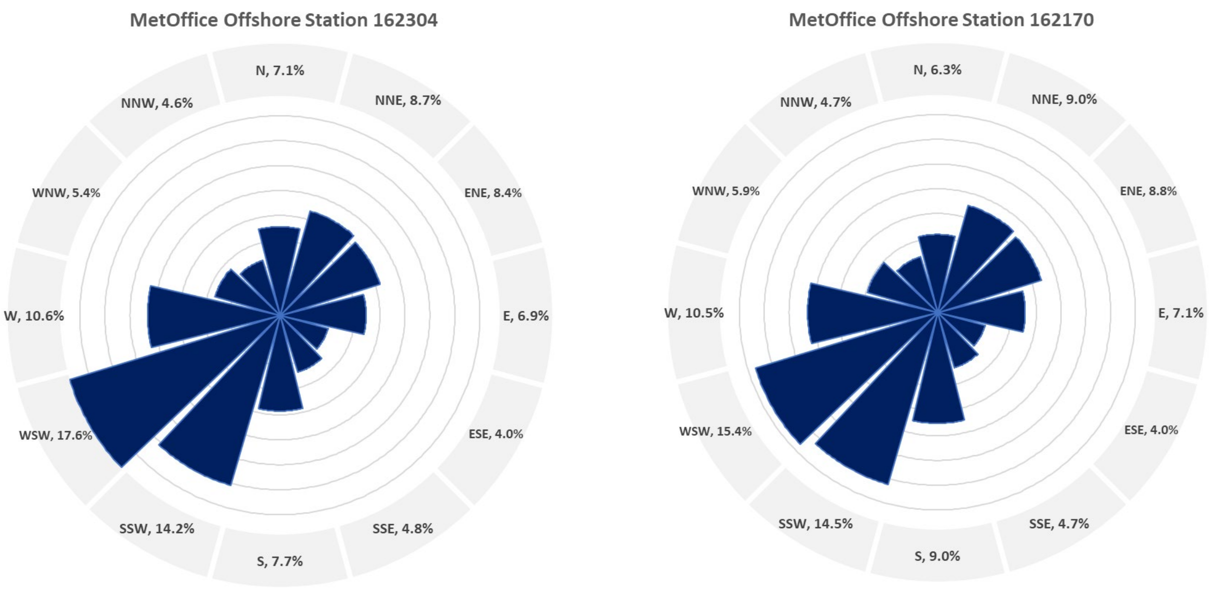

Figure 8-1 Wind Direction Distribution

159. There was a great correlation between both stations and it can be seen that winds are predominantly from the west/south-west and south/south-west.

8.2 Significant Wave Height

160. Significant wave height data calculated from data collected from an offshore MetOffice station location (approx. 25nm south of the array area) between 2017 and 2022 has been analysed. Table 8.1 presents the proportion of the significant wave height within each of three defined ranges which are categorised as calm, moderate and severe sea states.

Table 8.1 Sea State Distribution in Proximity to the Array Area

Significant Wave Height (m)	Sea State	Proportion (%)
<1	Calm	67.8
1 to 5	Moderate	32.1
≥5	Severe	0.1

8.3 Visibility

161. It is assumed that the proportion of poor visibility is 3%. This is based upon information available within the Dover Strait Pilot Book (NP28) (UKHO, 2020).

8.4 Tidal Speed and Direction

162. From UKHO Admiralty Charts 1183, 1610, 1630 and 1975, currents within and in proximity to the Project are set in a generally north to south direction on the flood tide and north to south direction on the ebb tide. The greatest peak flood tidal rate is 2.6 knots (kt), and the greatest peak ebb tidal rate is 2.9 kt. The peak speed and corresponding direction data for the flood and ebb tides for the relevant tidal diamonds on UKHO Admiralty Charts are presented in Table 8.2.

Table 8.2 Peak Flood and Ebb Tidal Data in Proximity to the Project

UKHO Admiralty Chart	Tidal Diamond	Flood		Ebb	
		Direction (°)	Speed (kt)	Direction (°)	Speed (kt)
1183	U	210	2.1	029	2.2
1610	B	207	2.3	032	2.2
	C	205	2.2	026	2.1
	E	213	2.1	036	2.1
	F	199	2.2	022	1.9
	G	211	1.7	039	1.7
	H	204	2.1	030	1.9
	J	215	1.8	037	1.7
	K	217	1.7	044	1.6
1630	B	216	2.0	033	1.8
1975	B	211	2.2	055	2.9
	D	222	2.6	032	1.8

163. Based upon the available data, no hazards are expected at high water that would not also be expected at low water, and vice versa. The wind farm structures are not expected to result in any additional risk to the existing tidal streams in relation to their effect on existing shipping and navigation users.

9 Emergency Response Overview

164. This section summarises the existing emergency response resources (including SAR) and reviews historical maritime incident data to assess baseline incident rates in proximity to the array area.

9.1 Search and Rescue Helicopters

165. 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.

166. There are currently 10 base locations for the SAR helicopter service. The closest SAR helicopter base to the array area is Lydd located approximately 54nm to the south-west of the southernmost point of the array area (not shown in Figure 9-1). This base operates AgustaWestland AW189 helicopters.

167. The SAR helicopter taskings undertaken between April 2015 and March 2023 within the study area are presented in Figure 9-1, colour-coded by tasking type.

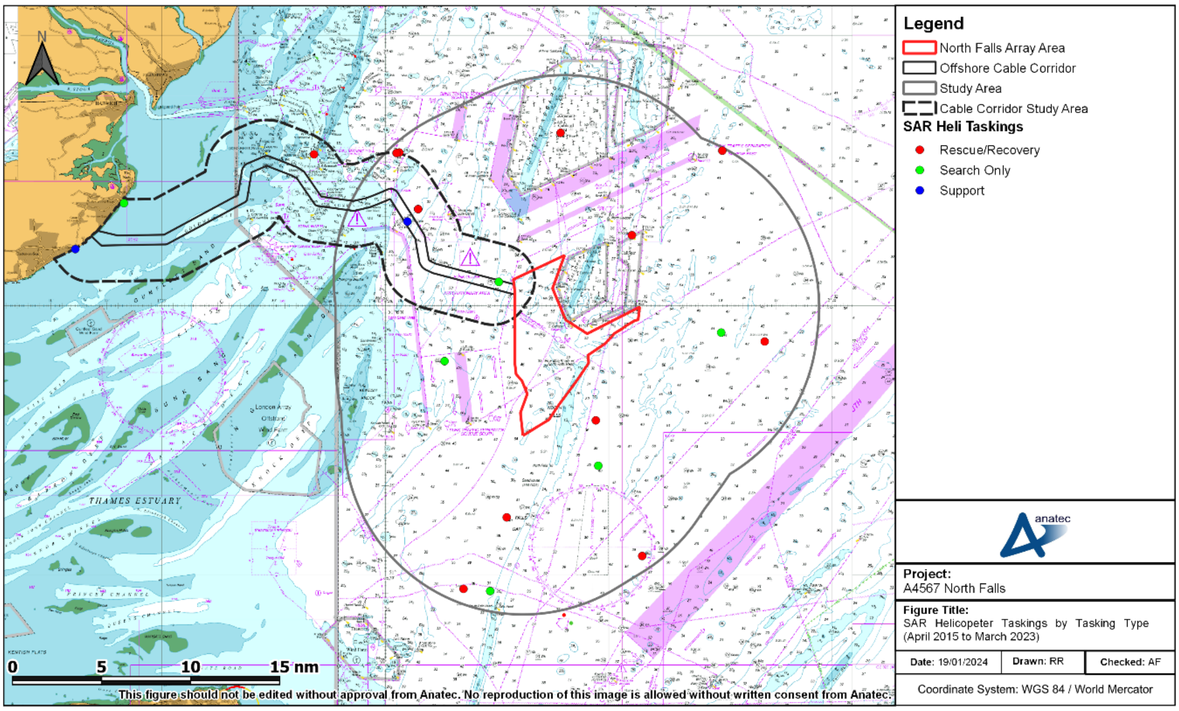

Figure 9-1 SAR Helicopter Taskings Within Study Area by Tasking Type (April 2015 to March 2023)

168. A total of 17 SAR helicopter taskings were undertaken within the study area between April 2015 and March 2023, corresponding to an average of two taskings per year.

The majority of these taskings were "*Rescue/Recovery*" (65%) or "*Search*" (29%), with one "*Support*" also occurring.

169. No taskings were recorded within the array area with the closest, at 0.8nm to the west, a search occurring in 2017. It is noted that a SAR helicopter tasking was undertaken within the operational Greater Gabbard offshore wind farm and another on the perimeter of the Galloper offshore wind farm.

170. A total of six SAR helicopter taskings were undertaken within the cable corridor study area between April 2015 and March 2023, corresponding to an average of one tasking per year. Of these taskings, two were "*Rescue/Recovery*" (33%), two were "*Search*" (33%) and two were "*Support*" (33%).

9.2 Royal National Lifeboat Institution

171. The RNLI is organised into six divisions, with the relevant regions for the Project being the *North and East* and *South East* divisions. Based out of more than 230 stations, there are over 400 active lifeboats across the RNLI fleet, including both All-Weather Lifeboats (ALB) and Inshore Lifeboats (ILB).

172. The closest RNLI station to the array area is Walton and Frinton (approximately 22nm to the north-west and also within the cable corridor study area), which has an ALB. It is noted that the RNLI have a strategic performance standard of reaching casualties up to a maximum of 100nm offshore. Other close-by stations include Margate, Harwich and Clacton-on-Sea.

173. The locations of incidents responded to by the RNLI within both the study area and cable corridor study area between 2013 and 2022 are presented in Figure 9-2, colour-coded by incident type. The same data is presented in Figure 9-3, colour-coded by casualty type. It is noted that hoaxes and false alarms have been excluded from the analysis.

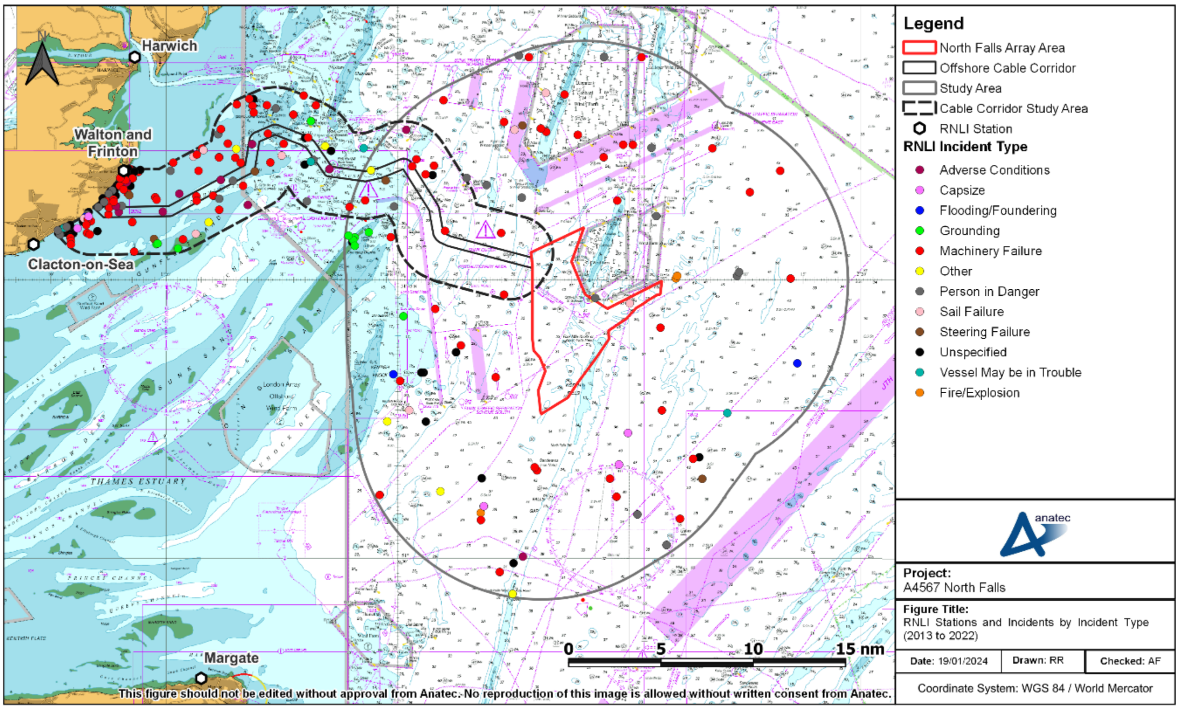

Figure 9-2 RNLI Stations and Incidents by Incident Type (2013 to 2022)

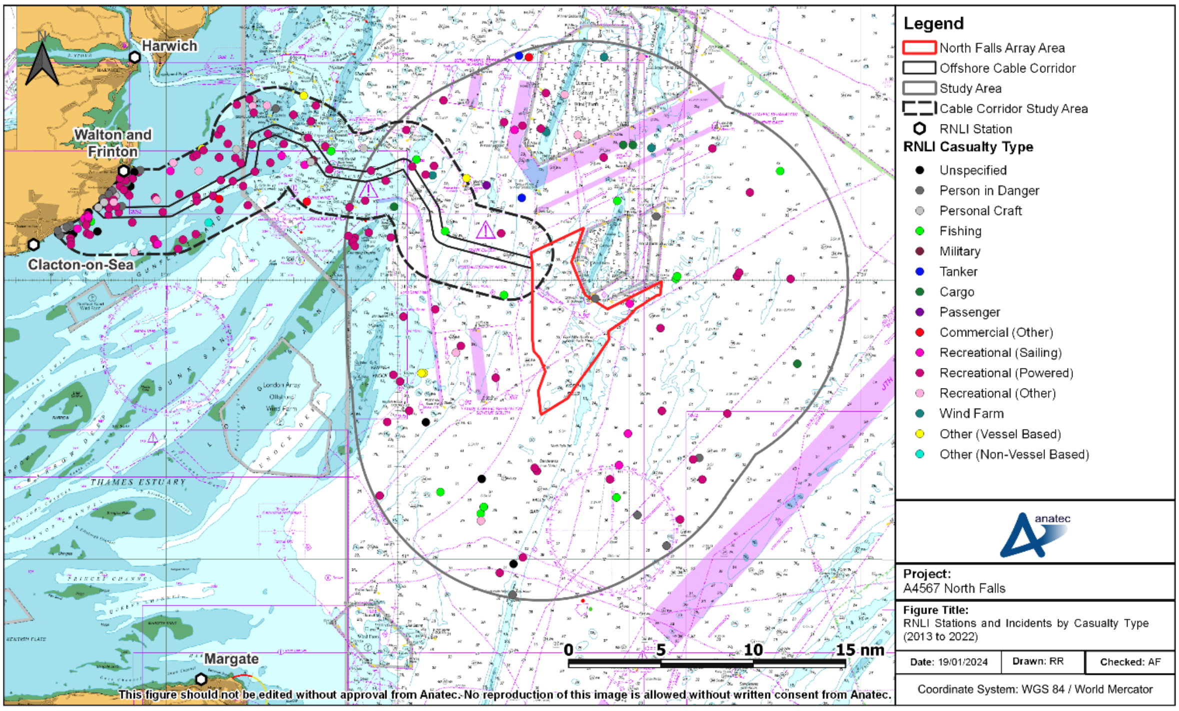

Figure 9-3 RNLI Stations and Incidents by Casualty Type (2013 to 2022)

174. A total of 94 incidents were responded to by the RNLI within the study area between 2013 and 2022. This corresponds to an average of nine to 10 incidents per year.

During the 10-year period, one incident occurred within the array area; a sail failure on a recreational sailing vessel in 2019.

175. The most common incident types recorded were "*machinery failure"* (46%) and "*person in danger*" (14%). Excluding "*person in danger*" and non-vessel based incidents, the most common casualty types recorded were powered recreational vessels (54%) and fishing vessels (14%).

176. A total of 179 incidents were responded to by the RNLI within the cable corridor study area between 2013 and 2022. This corresponds to an average of 18 incidents per year.

177. The most common incident types recorded were "*machinery failure"* (39%), "*unspecified"* (26%) and "*person in danger*" (12%). Excluding "*person in danger*" and non-vessel based incidents, the most common casualty types recorded were powered recreational vessels (55%), unspecified (14%) and personal craft (11%).

9.3 Maritime Rescue Coordination Centres and Joint Rescue Coordination Centres

178. His Majesty's Coastguard (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).

179. The HMCG coordinates SAR operations through a network of 11 MRCC, including a Joint Rescue Coordination Centre based in Hampshire.

180. All of the MCA's operations, including SAR, are divided into 18 geographical regions. Area 7 – "*East Anglia*" – covers the lower east coast of England from the Lincoln–Norfolk border to the Essex–Kent border, and therefore covers the area encompassing the Project. The Dover MRCC is located within Area 8 approximately 36nm south-west of the array area, as illustrated in Figure 9-4 and coordinates the SAR response for maritime and coastal emergencies within the district boundary. Additionally, although not shown in Figure 9-4, the Maritime Rescue Sub-Centre (MRSC) is located in London, approximately 69nm to the west.

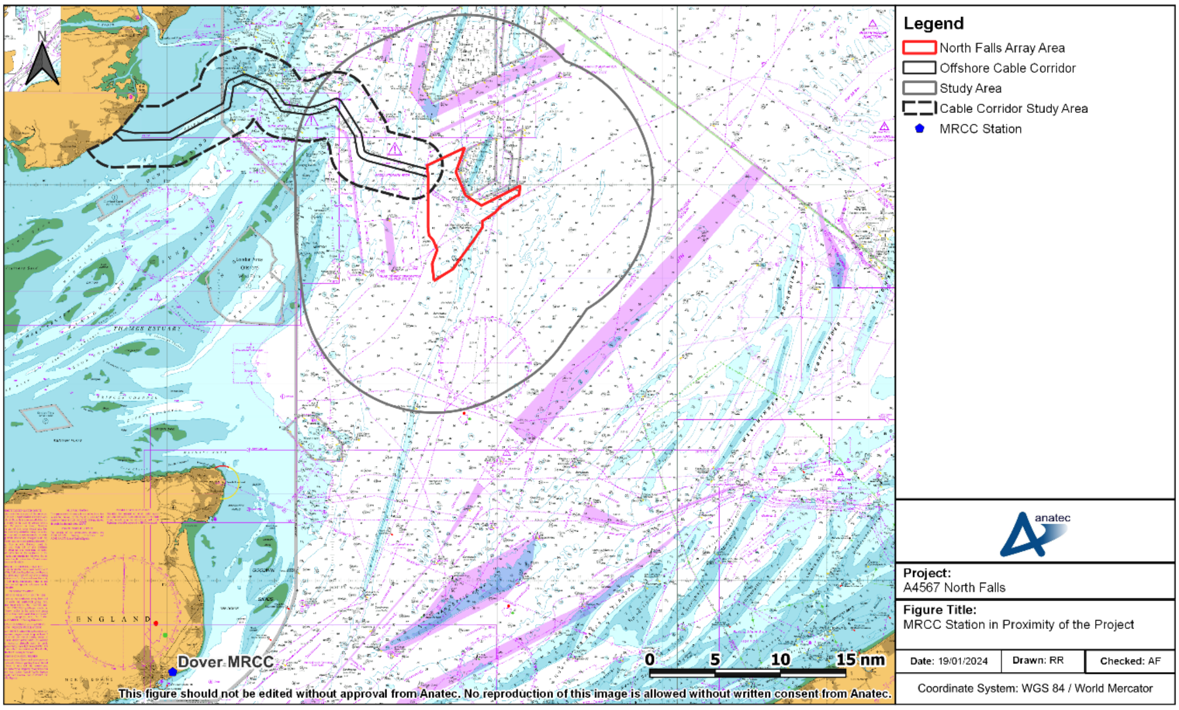

Figure 9-4 MRCC Station in Proximity of the Project

9.4 Global Maritime Distress and Safety System

181. The Global Maritime Distress and Safety System (GMDSS) is a maritime communications system used for emergency and distress messages, vessel to vessel routeing communications and vessel to shore routine communications. It is implemented globally, and vessels engaged in international voyages are obliged to carry GMDSS certified communication equipment.

182. There are four GMDSS sea areas, and in the UK, it is the responsibility of the MCA to ensure Very High Frequency (VHF) coverage from coastal stations within sea area A1. The array area intersect the A1 sea area, as shown in Figure 9-5, and therefore in the event of an emergency any vessel located in proximity to the array area would be able to contact HMCG via VHF.

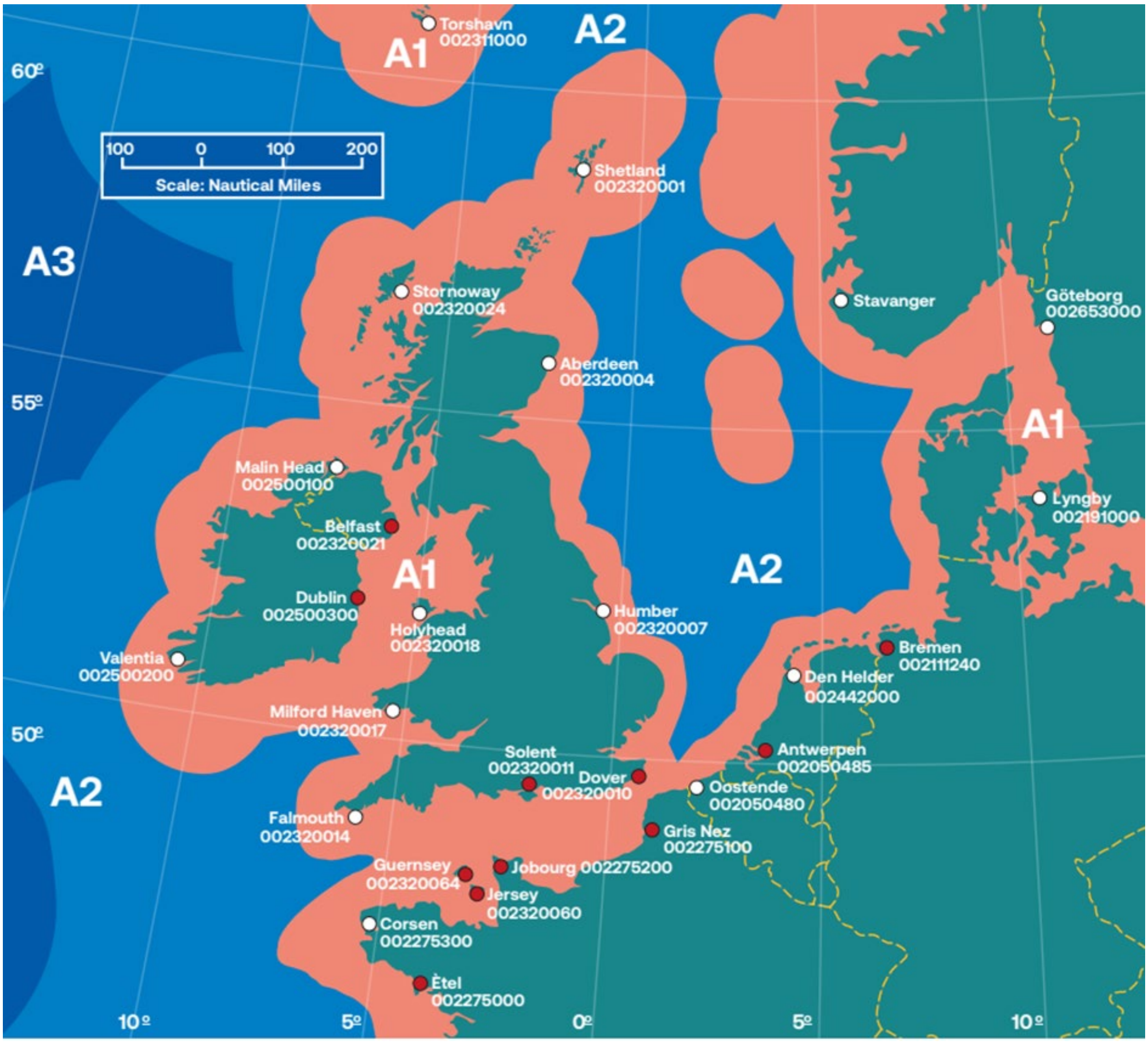

Figure 9-5 GMDSS Sea Areas (MCA, 2021)

9.5 Marine Accident Investigation Branch

183. 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 ten-year period between 2012 and 2021.

184. The incidents recorded by the MAIB between 2012 and 2021 occurring within the study area are presented in Figure 9-6, colour-coded by incident type. Following this, Figure 9-7 shows the same data colour-coded by casualty type.

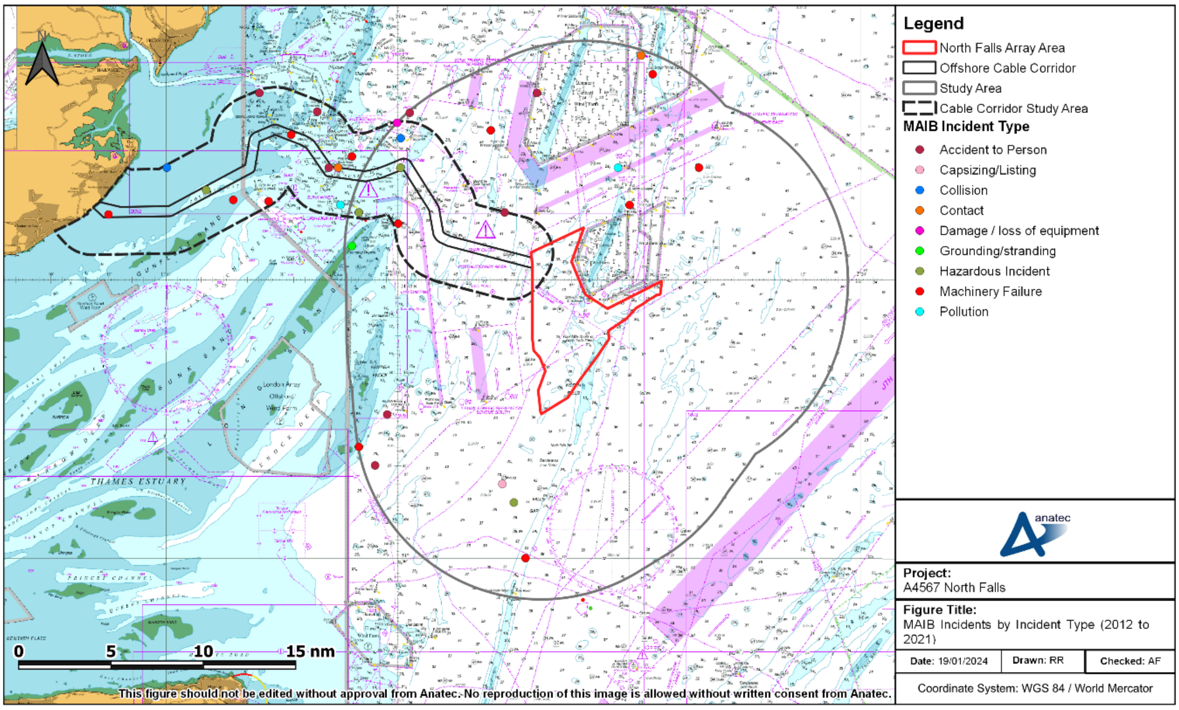

Figure 9-6 MAIB Incidents by Incident Type (2012 to 2021)

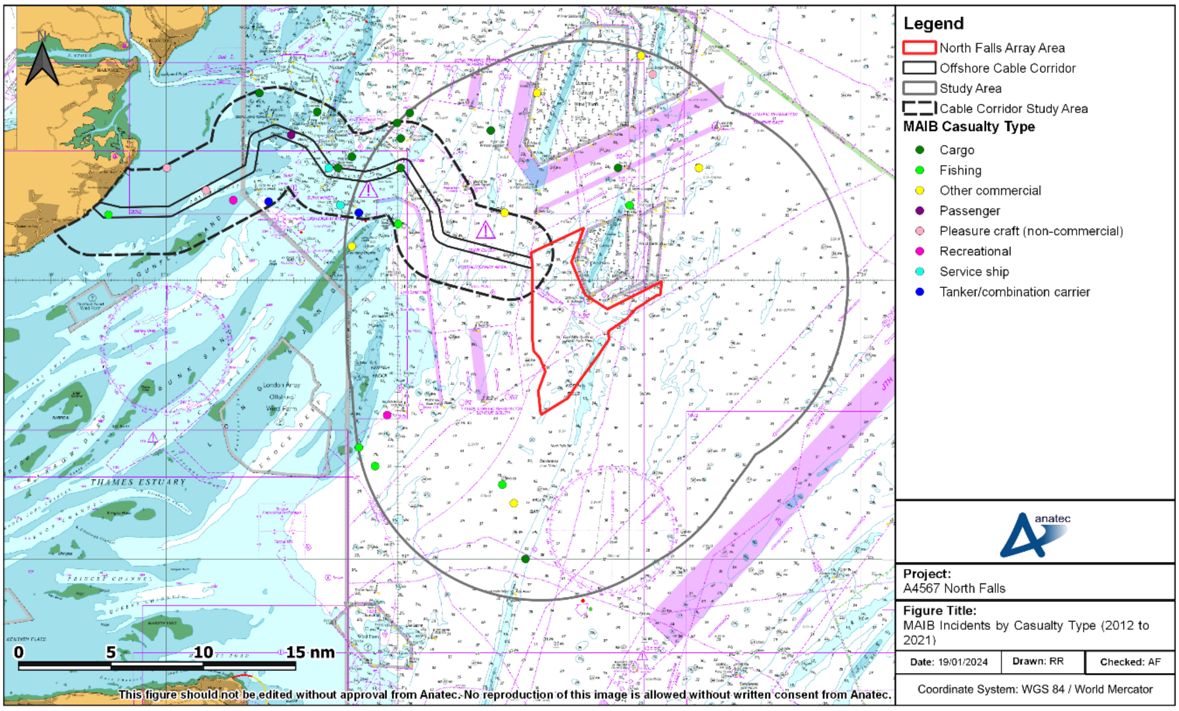

Figure 9-7 MAIB Incidents by Casualty Type (2012 to 2021)

185. A total of 21 incidents were recorded by the MAIB within the study area between 2012 and 2021, which corresponds to an average of two incidents per year. During the 10-year period, no incidents occurred within the array area with the closest

incident 2.5nm to the north-west; an accident to person involving a marine aggregate dredger in 2014.

186. The most common incident types recorded were "*machinery failure*" (33%), *"accident to person"* (24%) and "*hazardous incident*" (14%). The main casualty types involved in incidents were cargo vessels (43%), other commercial vessels (24%) and fishing vessels (24%).

187. A total of 18 incidents were recorded by the MAIB within the cable corridor study area between 2012 and 2021, which corresponds to an average of two incidents per year.

188. The most common incident types recorded were "*machinery failure*" (33%), *"accident to person"* (22%) and "*hazardous incident*" (16%). The main casualty types involved in incidents were cargo vessels (39%). Tankers, service vessels, pleasure craft and fishing vessels all equated to 11% per each type.

189. A review of older MAIB incident data within the study area between 2002 and 2011, presented in Figure 9-8, indicates that the number of incidents has reduced over time, with 36 unique incidents recorded in the previous 10-year period, corresponding to an average of three to four incidents per year within the study area and 33 unique incidents recorded in the 10-year period, corresponding to an average of three incidents per year within the cable corridor study area. Of the recorded incidents, incident types were primarily *"hazardous incident"* (44%), *"machinery failure"* (23%) and "*accident to person*" (14%). Vessel types involved included cargo vessels (32%), other commercial (25%), fishing vessels (23%) and tanker/combination carriers (16%). Three incidents occurred within the array area during this period.

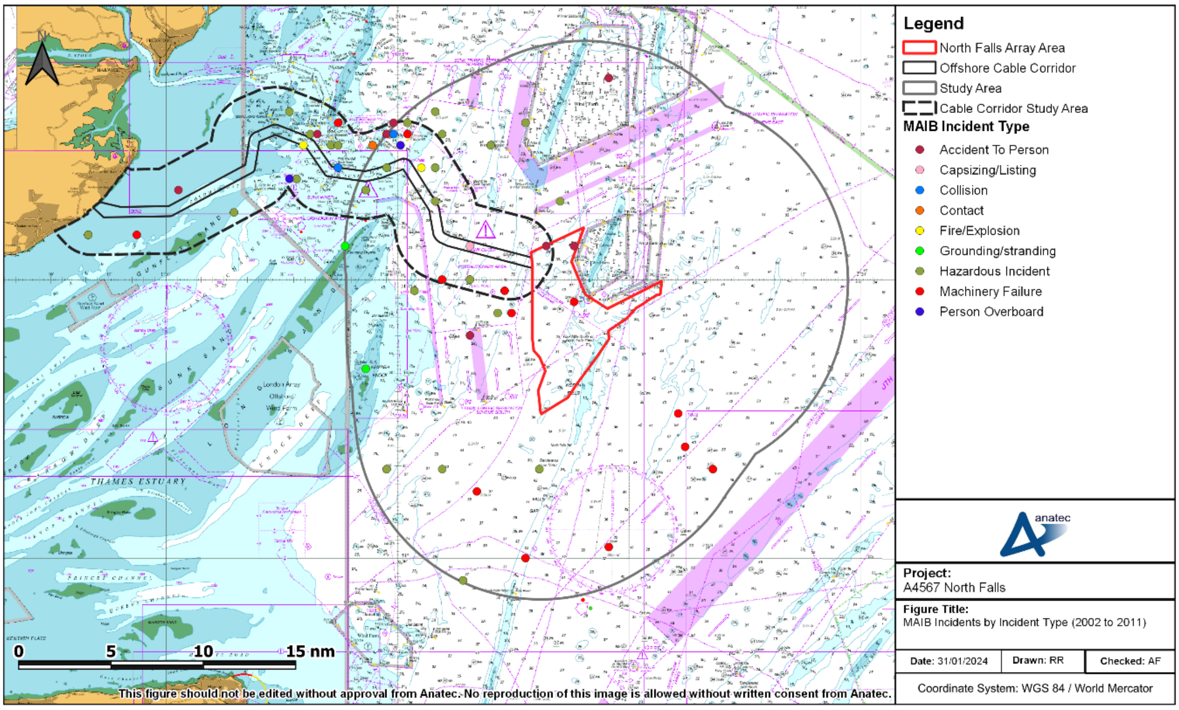

Figure 9-8 MAIB Incidents by Incident Type (2002 to 2011)

9.6 Historical Offshore Wind Farm Incidents

9.6.1 Incidents Involving UK Offshore Wind Farm Developments

190. As of December 2023, there are 42 operational offshore wind farms in the UK, ranging from the North Hoyle Offshore Wind Farm (fully commissioned in 2003) to the Hornsea Project Two Offshore Wind Farm (fully commissioned in 2022). Between them these developments encompass approximately 21,897 fully operational WTG years.

191. MAIB incident data has been used to collate a list of reported historical collision and allision incidents involving UK offshore wind farm developments[4], which is summarised in Table 9.1. Other sources have also been used to produce this list including the UK Confidential Human Factors Incident Reporting Programme (CHIRP) for Aviation and Maritime, International Marine Contractors Association (IMCA) and basic web searches.

[4] Includes only incidents reported to an accident investigation branch or an anonymous reporting service. Unconfirmed incidents have not been considered noting that to date only one further alleged incident has been rumoured but there is no evidence to confirm.

Table 9.1 Summary of Historical Collision and Allision Incidents Involving UK Offshore Wind Farm Developments

Incident Vessel	Incident Type	Date	Description of Incident	Vessel Damage*	Harm to Persons	Source
Project	Allision	7 August 2005	WTG installation vessel allision with WTG base whilst manoeuvring alongside it. Minor damage sustained to a gangway on the vessel, the WTG tower and a WTG blade.	Minor damage to gangway on the vessel	None	MAIB
Project	Allision	29 September 2006	Offshore services vessel allision with rotating WTG blade.	None	None	MAIB
Project	Allision	8 February 2010	Work boat allision with disused pile following human error with throttle controls whilst in proximity. Passenger later diagnosed with injuries and no serious damage sustained by vessel.	Minor	Injury	MAIB
Project/ third-party	Collision	23 April 2011	Third-party catamaran collision with project guard vessel within harbour.	Moderate	None	MAIB
Project	Allision	18 November 2011	Cable-laying vessel allision with WTG foundation following watchkeeping failure. Two hull breaches to vessel.	Major	None	MAIB
Project/ project	Collision	2 June 2012	Crew Transfer Vessel (CTV) allision with flotel. Nine persons safely evacuated and transferred to nearby vessel before being brought back in to port.	Moderate	None	UK CHIRP
Project	Allision	20 October 2012	Project vessel allision with WTG monopile following human error (misjudgement of distance). Minor damage sustained by vessel.	Minor	None	MAIB
Project	Allision	21 November 2012	Passenger transfer catamaran allision with buoy following navigational error. Vessel abandoned by crew of 12 having been holed, causing extensive flooding but no injuries sustained.	Major	None	MAIB
Project	Allision	21 November 2012	Work boat allision with unlit WTG transition piece at moderate speed following navigational error. Vessel able to proceed to port unassisted with no water	Moderate	None	MAIB

Incident Vessel	Incident Type	Date	Description of Incident	Vessel Damage*	Harm to Persons	Source
			ingress but some structural damage sustained.			
Project	Allision	1 July 2013	Service vessel allision with WTG foundation following machinery failure. Minor damage sustained by vessel.	Minor	None	IMCA Safety Flash
Project	Allision	14 August 2014	Standby safety vessel allision with WTG pile. Oil leaked by vessel which moved away from environmentally sensitive areas until leak was stopped.	Minor with pollution	None	UK CHIRP
Third-party	Allision	26 May 2016	Third-party fishing vessel allision with WTG following human error (autopilot). Lifeboat attended the incident.	Moderate	Injury	Web search (RNLI, 2016)
Project	Allision	16 January 2020	Project vessel allision with WTG. Injury sustained by crew member but vessel able to proceed to port unassisted.	None	Injury	Web search (Vessel Tracker, 2020)
Project	Allision	27 January 2020	Project vessel allision with WTG. Minor damage to vessel and WTG sustained, with no personal injuries.	Minor	None	Marine Safety Forum
Third-party	Allision	9 June 2022	Fishing vessel allision with WTG resulting in damage to vessel and two minor injuries for crew members. RNLI lifeboat escorted vessel under its own power to port.	Minor	Injury	Web search (RNLI, 2022)

* As per incident reports.

192. The worst consequences reported for vessels involved in a collision or allision incident involving a UK offshore wind farm development has been flooding, with no life-threatening injuries to persons reported.

193. As of December 2023, there have been no third-party collisions directly as a result of the presence of an offshore wind farm in the UK. The only reported collision incident in relation to a UK offshore wind farm involved a project vessel hitting a third party vessel whilst in harbour.

194. As of December 2023, there have been 13 reported cases of an allision between a vessel and a WTG (under construction, operational or disused) in the UK, with all but two involving a support vessel for the development and the errant vessel in each case under power rather than drifting. Therefore, there has been an average of 1,680

years per WTG allision incident in the UK, noting that this is a conservative calculation given that only operational WTG hours have been included (whereas allision incidents counted include non-operational WTGs).

9.6.2 Incidents Involving Non-UK Offshore Wind Farms

195. There have also been collision and allision incidents involving non-UK offshore wind farm developments. However, it is not possible to maintain a comprehensive list of such incidents and the associated operational hours.

196. One high profile non-UK incident of relevance involved a bulk carrier in January 2022 which broke its anchor chain during a storm in Dutch waters and collided with a nearby anchored vessel. The vessel began to take on water, leading to all crew members being evacuated by helicopter. The vessel then continued to drift towards shore including through an under construction offshore wind farm where it allided with a WTG foundation and a platform foundation before being taken under tow.

9.6.3 Incidents Responded to by Vessels Associated with UK Offshore Wind Farms

197. It is noted that the vessels associated with the Project may be available to assist in emergency response to an offshore incident in liaison with HMCG.

198. From news reports, web searches and experience working with existing offshore wind farm developments, a list has been collated of historical incidents responded to by vessels associated with UK offshore wind farm developments, which is summarised in Table 9.2. The initial cause of these incidents is not related to the offshore wind farm in question.

199. Table 9.2 summarises the known incidents that were responded to by a wind farm vessel. Additional incidents associated with the construction or operation of offshore wind farms are also known to have occurred. These incidents typically involve an accident to person which requires medical attention (including emergency response) but does not affect the operation of the vessel involved. It is noted that these incidents do increase the workload on SAR resources.

Table 9.2 Historical Incidents Responded to by Vessels Associated With UK Offshore Wind Farm Developments

Incident Type	Date	Related Development	Description of Incident	Source
Capsize	21 June 2018	Walney	HMCG issued mayday relay broadcast following trimaran capsize. Support vessel for Walney arrived and recovered two persons from the water who were then winched onboard a Coastguard helicopter.	Web search (4C Offshore, 2018)
Capsize	5 November 2018	Race Bank	Fishing vessel capsized resulting in two persons in the water. Vessel operating at the nearby	Web search (British

Incident Type	Date	Related Development	Description of Incident	Source
			Race Bank reported to have assisted with the rescue which also involved a Belgian military helicopter and the RNLI.	Broadcasting Corporation, 2018)
Vessel in distress	15 May 2019	London Array	Yacht in difficult sought shelter by tying up to a WTG but suffered damage and a person in the water. Support vessel for London Array identified and secured the casualty vessel and recovered the person in the water. The support vessel raised the alarm to the Coastguard. The Coastguard later instructed the support vessel to return to port and seek medical assistance for the casualty vessel's occupant.	Web search (The Isle of Thanet News, 2019)
Drifting	7 July 2019	Gwynt y Môr	Speedboat suffered mechanical failure stranding four persons. Support vessel for Gwynt y Môr responded to an 'all-ships' broadcast from the Coastguard and prevented the casualty vessel drifting into the Gwynt y Môr array. The support vessel later towed the casualty vessel back towards port.	Web search (Renews, 2019)
Machinery failure	28 September 2019	Race Bank	Fishing vessel suffered mechanical failure and launched flares. Guard vessel and SOV for Race Bank both immediately offered assistance until the MCA's arrival on-scene.	Internal daily progress report received by Anatec
Vessel in distress	13 December 2019	Race Bank	Passing vessel got into difficulty and guard vessel for Race Bank was requested to assist. The Coastguard later requested that the guard vessel tow the casualty vessel into port.	Internal daily progress report received by Anatec
Search	21 May 2020	Walney	Coastguard contacted guard vessel for Walney reporting red flare sighting at the wind farm. Guard vessel proceeded to undertake search but did not find anything to report.	Internal daily progress report received by Anatec
Aircraft crash	15 June 2020	Hornsea Project One	United States jet crashed into sea during routine flight. CTVs and SOVs for Hornsea Project One joined the search for the missing pilot.	Web search (4C Offshore, 2020)
Fire/ explosion	15 December 2020	Dudgeon	Fishing vessel experienced explosions on board with crew injured. SOV for Dudgeon deployed its Fast Rescue Boat and evacuated the casualty vessel.	Web search (Offshore WIND, 2020)
Vessel in distress	3 July 2021	Robin Rigg	Wind farm CTV fire alarm sounded, with the engine then shut down. A support vessel for Robin Rigg was able to assist in escorting the vessel to port.	Web search (Vessel Tracker, 2021)

Incident Type	Date	Related Development	Description of Incident	Source
Drifting	17 July 2021	Neart na Gaoithe	Small dinghy with two children aboard drifted offshore due to strong winds. A guard vessel associated with Neart na Gaoithe was able to retrieve the children.	Web search (Edinburgh Evening News, 2021)
Allision	9 June 2022	Westermost Rough	Fishing vessel allided with a WTG at Westermost Rough. A supply vessel was among the responders as an RNLI lifeboat escorted the vessel under its own power to port.	Web search (Vessel Tracker, 2022)

10 Vessel Traffic Movements

10.1 Array Area

200. This section presents an overview of vessel traffic movements within the study area, primarily based upon the findings of the winter and summer vessel traffic surveys undertaken in January to March and June to July 2022, respectively (see Section 5.2). a separate analysis of the AIS only vessel traffic recorded within the offshore cable corridor is presented in 10.2.

201. Unless otherwise specified, wind farm vessels involved in work at Greater Gabbard and Galloper are included in the analysis.

202. A plot of the vessel tracks recorded during the 28-day winter survey period within the study area, colour-coded by vessel type and excluding temporary traffic, is presented in Figure 10-1. Following this, Figure 10-2 presents the same data converted to a density heat map within a 0.5nm x 0.5nm grid.

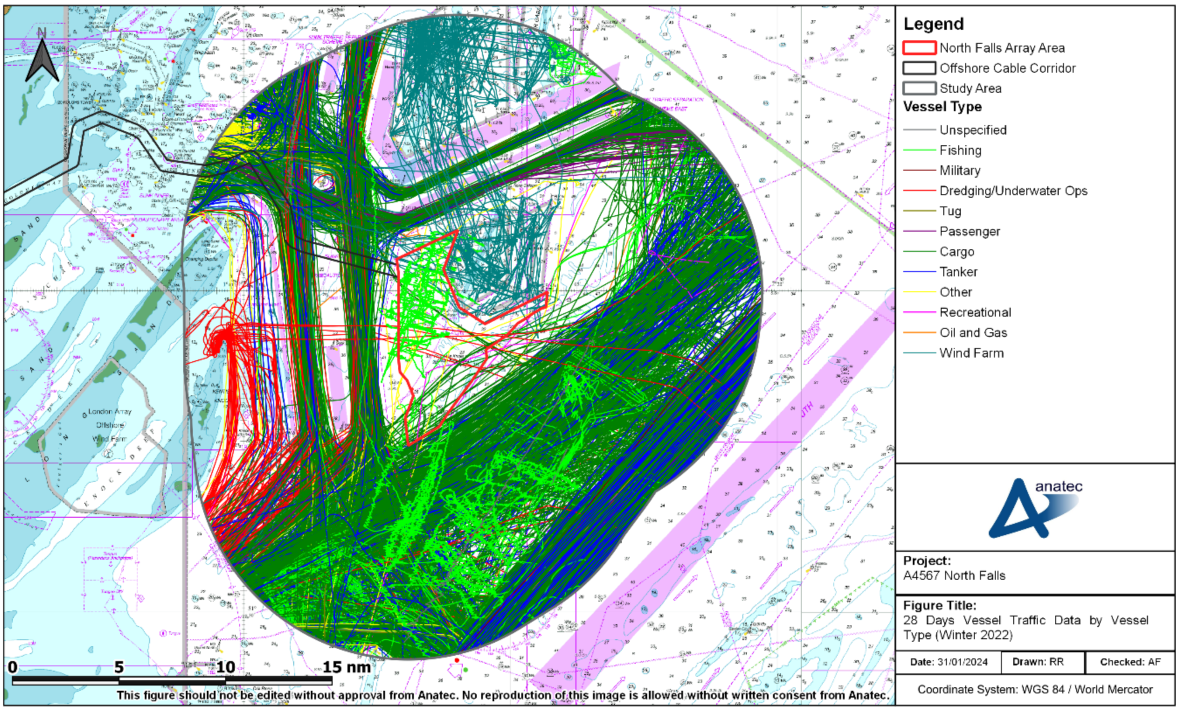

Figure 10-1 Vessel Traffic Survey Data by Vessel Type (28-Days, Winter 2022)

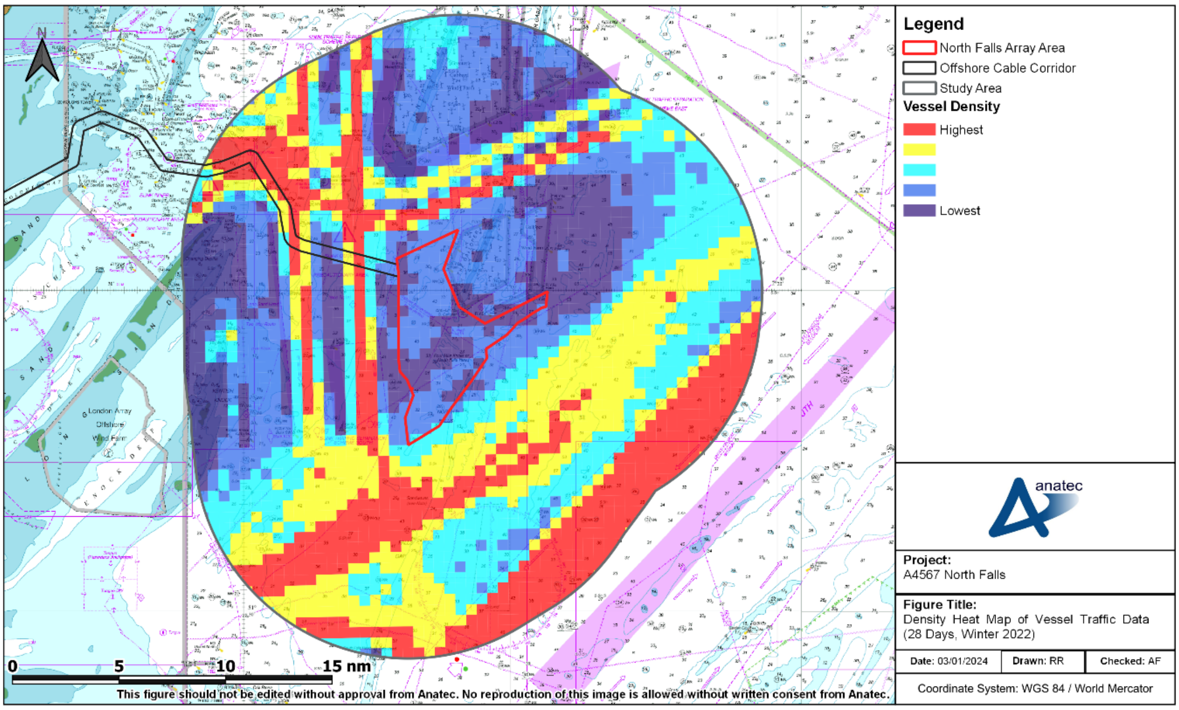

Figure 10-2 Density Heat Map of Vessel Traffic Survey Data (28-Days, Winter 2022)

203. A plot of the vessel tracks recorded during the 28-day summer survey period within the study area, colour-coded by vessel type and excluding temporary traffic, is presented in Figure 10-3. Following this, Figure 10-4 presents the same data converted to a density heat map within a 0.5nm x 0.5nm grid. It is noted that the same density bins were used as per the winter survey period to allow for direct comparison, and these differ from density figures illustrated for the offshore cable corridor in Section 10.2.

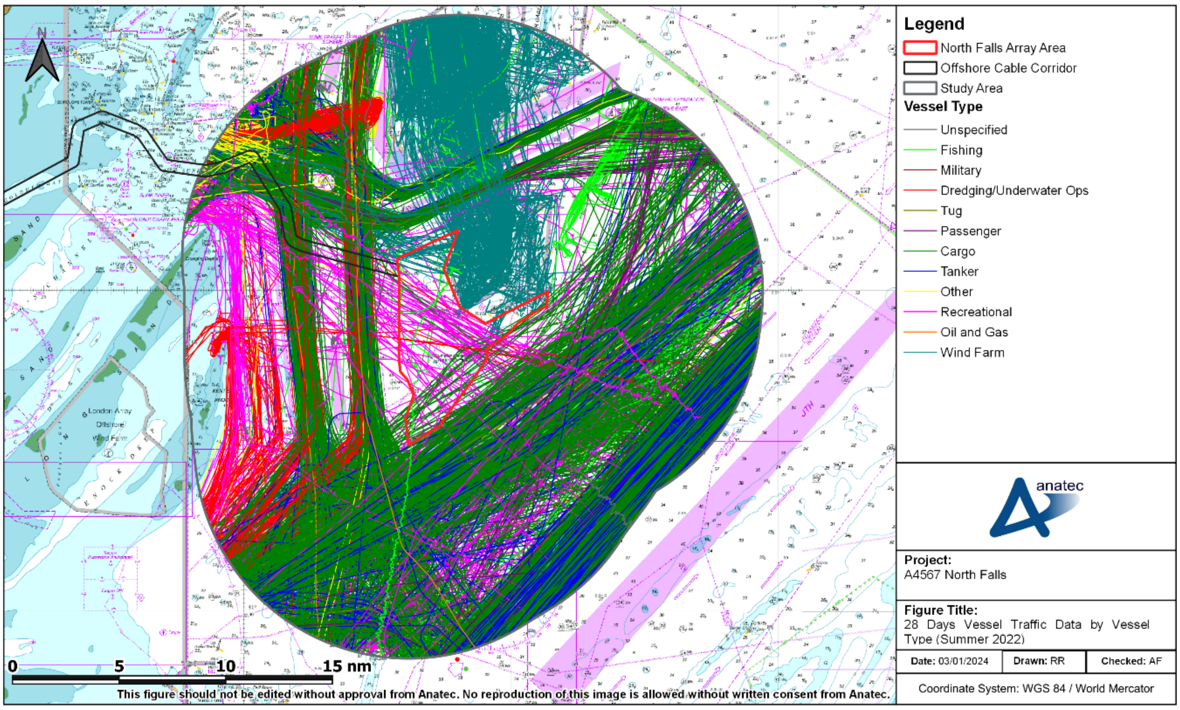

Figure 10-3 Vessel Traffic Survey Data by Vessel Type (28-Days, Summer 2022)

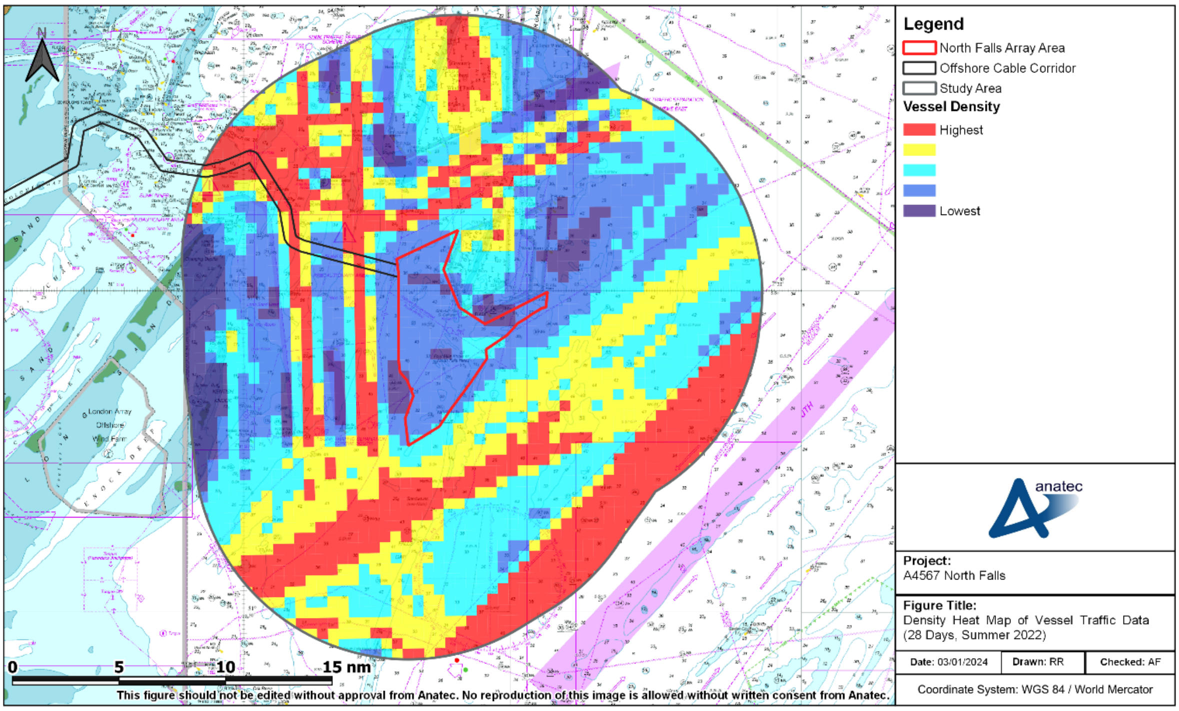

Figure 10-4 Density Heat Map of Vessel Traffic Survey Data (28-Days, Summer 2022)

204. Comparing both survey periods, the areas of higher vessel traffic density are analogous to the routeing measures in the area, in particular the TSS lanes from the Sunk TSS South and Sunk TSS East to the east and north of the array area and within

the south-western bound lane of the North Hinder TSS to the south of the array area (detailed in Section 7.2.1). Areas of high density were also noted at the south of the array area which is between the array area and the North Hinder South. This density of traffic is due to vessels routeing out with the TSS.

205. During the summer survey period, an area of high density was recorded within the Greater Gabbard northern array and could be due to more favourable conditions for maintenance work to be executed.

10.1.1 Vessel Counts

206. Figure 10-5 illustrates the daily number of unique vessels recorded within the study area during the winter survey period. It should be noted that partial survey days, as detailed in Section 5.2, have been represented by a shaded count. Days have also been coloured based on whether the vessel was within the northern or southern arrays assessed at PEIR Stage (see Section 1.3).

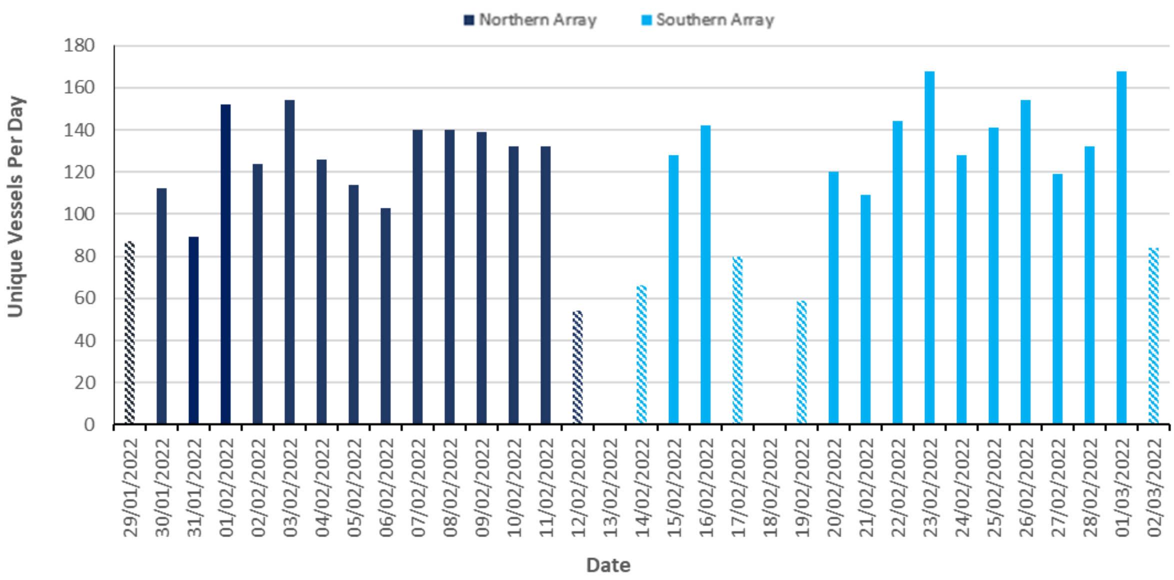

Figure 10-5 Unique Vessels Counts per Day within Study Area (28-Days Winter, 2022)

207. An average of 134 unique vessels per day were recorded within the study area during the winter survey period. Approximately 2% of all vessels recorded during the winter survey period within the study area intersected the array area, or an average of two vessels per day.

208. The busiest full day[5] recorded within the study area during the winter survey period was the 23rd February 2022, during which 168 unique vessels were recorded. The

[5] Noting the first and last days were partial days, as were the 12th, 14th, 17th, and 19th February. The survey vessel was off site during the 13th and 18th February.

busiest day for vessels intersecting the array area was the 1st March 2022 when five unique vessels were recorded.

209. The quietest full day recorded within the study area during the winter survey period was the 31st January 2022, during which 89 unique vessels were recorded. Three full days during the winter survey recorded no vessels intersecting the array area.

210. As for Radar coverage, while the survey vessel was positioned within the PEIR Stage northern array at the first 14-days of the winter survey, approximately 0.04% of all tracks recorded within the array area were via Radar. While the survey vessel was positioned within the PEIR Stage southern array at the final 14-days of the winter survey, approximately 1.9% of all tracks recorded within the array area were via Radar.

211. Figure 10-6 illustrates the daily number of unique vessels recorded within the study area during the summer survey period. It should be noted that partial survey days, as detailed in Section 5.2, have been represented by a shaded count. Days have also been coloured based on whether the vessel was within the northern or southern arrays assessed at PEIR Stage (see Section 1.3).

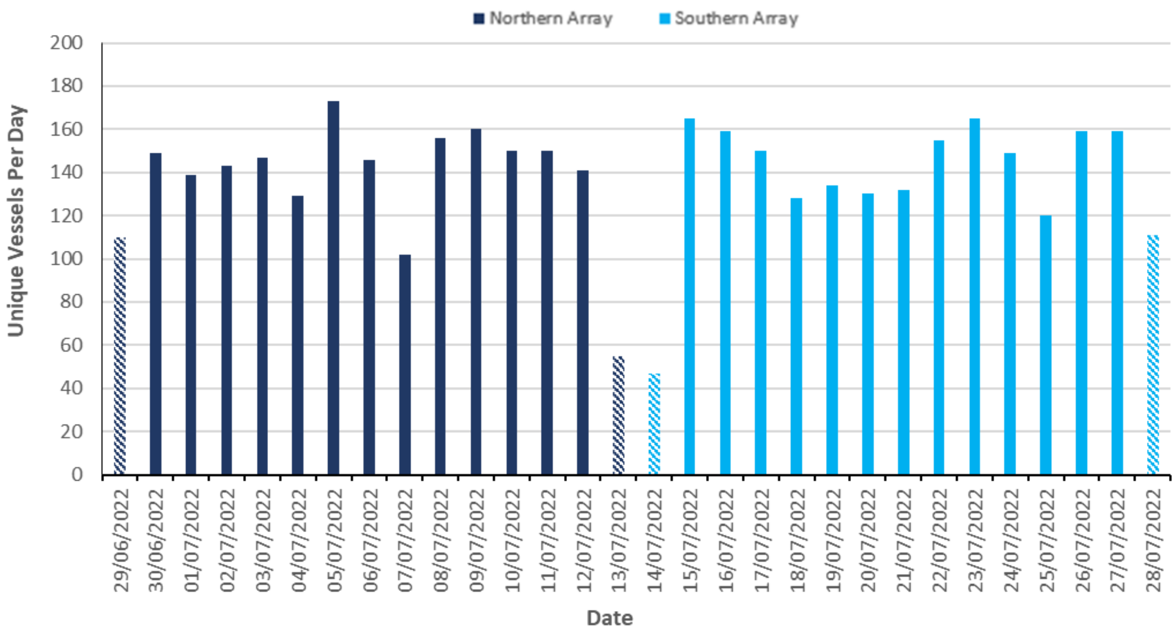

Figure 10-6 Unique Vessels Counts per Day within Study Area (28-Days Summer, 2022)

212. An average of 147 unique vessels per day were recorded within the study area during the summer survey period. Approximately 3% of all vessels recorded during the summer survey period within the study area intersected the array area, or an average of five vessels per day.

213. The busiest full day[6] recorded within the study area during the summer survey period was the 5th July 2022, during which 173 unique vessels were recorded. The busiest day for vessels intersecting the array area was the 22nd and 27th July 2022 when ten unique vessels were recorded each day.

214. The quietest full day recorded within the study area during the summer survey period was the 7th July 2022, during which 102 unique vessels were recorded. The quietest full days during the summer survey recorded one unique vessel intersecting the array area and this occurred on three sperate days.

215. As for Radar coverage, while the survey vessel was positioned within the PEIR Stage northern array at the first 14-days of the summer survey, approximately 0.28% of all tracks recorded within the array area were via Radar. While the survey vessel was positioned within the PEIR Stage southern array at the final 14-days of the summer survey, approximately 0.49% of all tracks recorded within the array area were via Radar.

10.1.2 Vessel Type

216. The percentage distribution of the main vessel types recorded within the study area during the winter survey period is presented in Figure 10-7. The same distribution for vessels recorded during the summer survey period is presented in Figure 10-8.

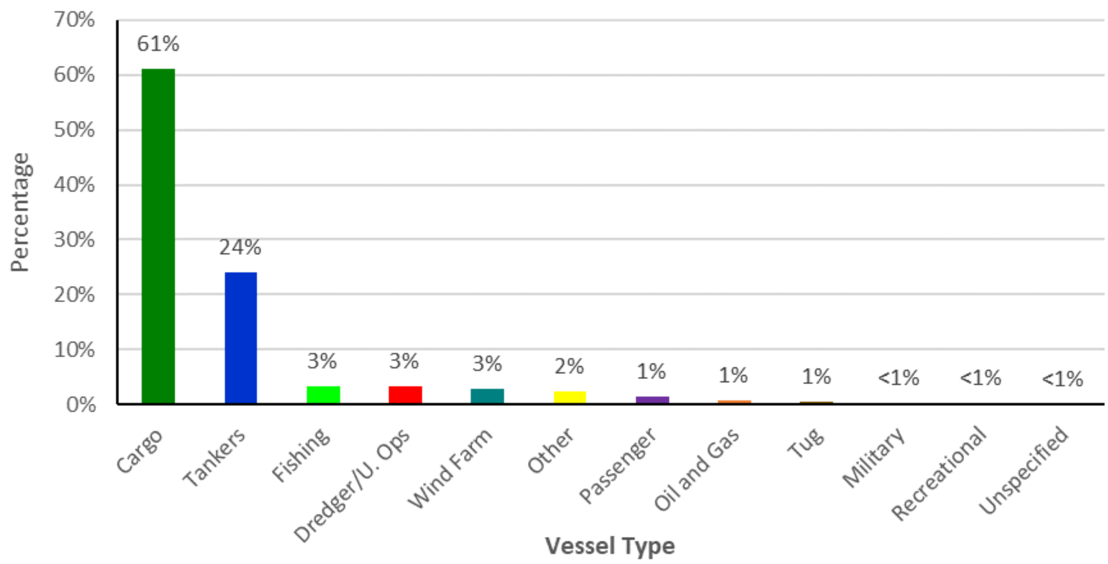

Figure 10-7 Vessel Type Distribution within Study Area (28-Days, Winter 2022)

[6] Noting the first and last days were partial days, as were the 13th and 14th of July.

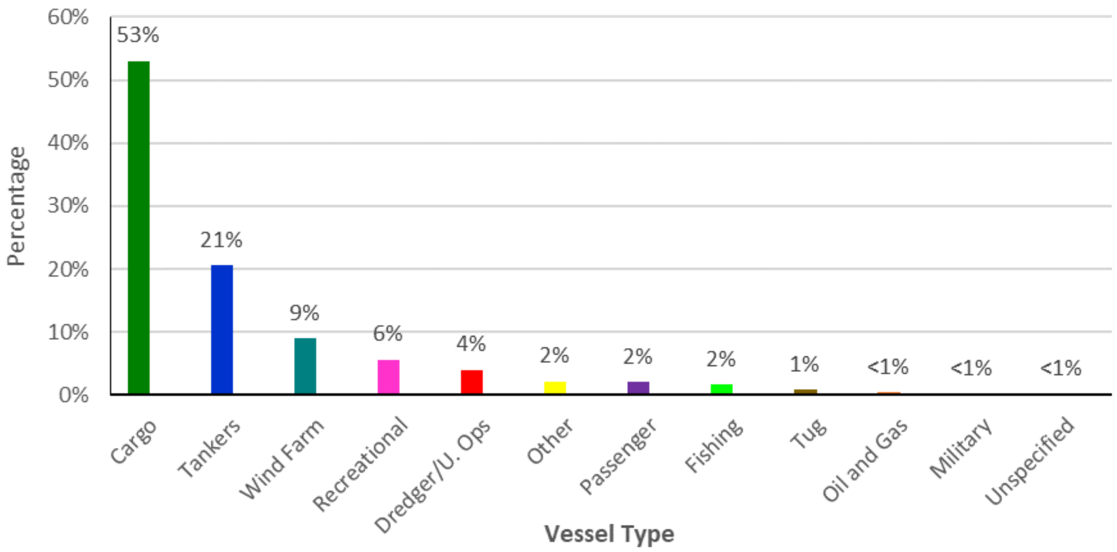

Figure 10-8 Vessel Type Distribution within Study Area (28-Days, Summer 2022)

217. Throughout the winter survey period, the main vessel types within the study area were cargo vessels (61%) and tankers (24%). No other vessel type equated to more than 5% of all vessels recorded.

218. Throughout the summer survey period, the main vessel types were cargo vessels (53%), tankers (21%), wind farm vessels (9%) and recreational vessels (9%).

219. The following subsections consider each of the main vessel types individually.

10.1.2.1 Cargo Vessels

220. Figure 10-9 presents the cargo vessels recorded within the study area during the combined winter and summer survey periods, colour-coded by cargo sub type.

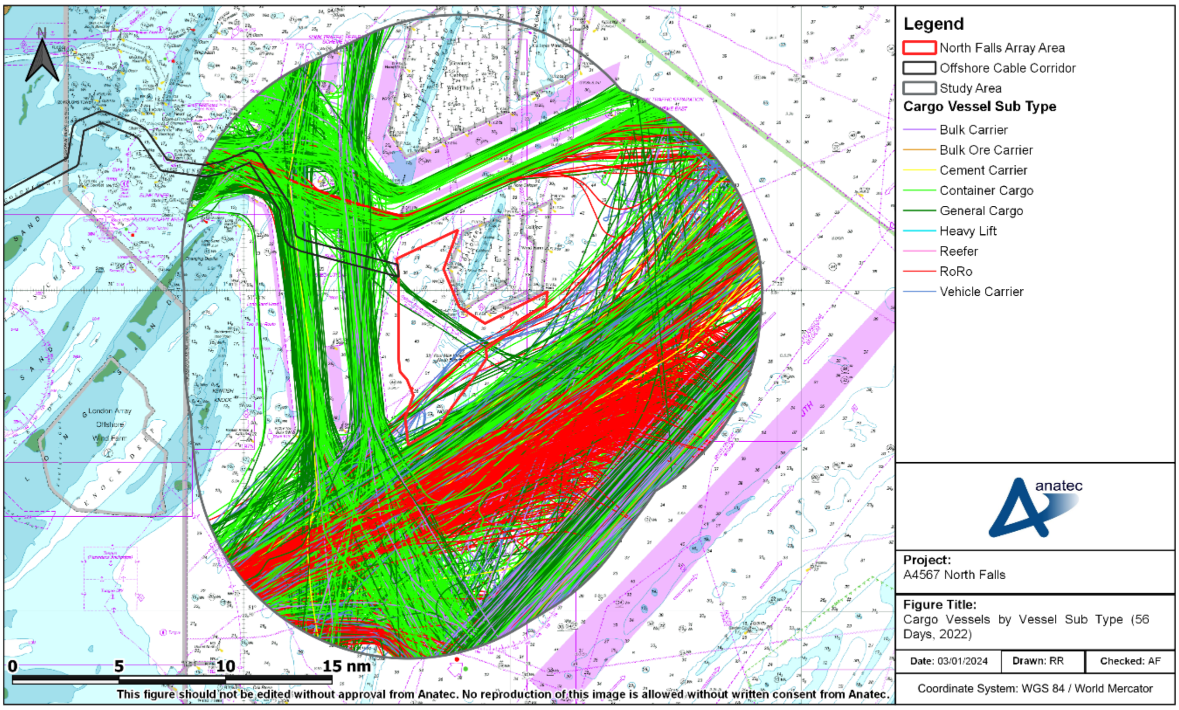

Figure 10-9 Cargo Vessels by Sub Type (56-Days, 2022)

221. An average of 80 unique cargo vessels per day were recorded within the study area during the 56-day period.

222. Container cargos were the most common sub type of cargo vessel recorded within the study area during the 56-day period, accounting for 27% of all cargo vessels recorded. This was followed by part-containerised vessels (19%), general cargo (18%) and Roll-On/Roll-Off cargo (RoRo) vessels (15%).

223. The majority of container cargo vessels, and all other cargo sub types, were recorded making use of the Sunk and North Hinder South TSSs. RoRo vessels were primarily recorded to the south of the array area and are detailed further in Section 10.1.2.1.1 below.

224. There was a total of 58 intersections of the array area by cargo vessels during the 56-day period, all of which were either on the Galloper Recommended Ferry Route (detailed in Section 10.3) or on routes north-east south-west at the south of the array area. These vessels intersecting the array area were mainly general cargo vessels (34%), part containerised vessels (24%) and vehicle carriers (16%).

10.1.2.1.1 *RoRo Vessels*

225. RoRo vessels accounted for 15% of all cargo vessels recorded within the study area across the 56-day survey periods. Of these vessels, 88% were operated by five top operators, with the remaining operators not accounting for more than 2% of all RoRo recorded. The main RoRo operators include CLdN which operated 58% of all RoRo

recorded within the study area. P&O Ferries operated 17% of RoRo recorded, DFDS Seaways accounted for 7% and both Grimaldi Lines and Stena Line accounted for 3% each.

226. Figure 10-10 presents the RoRo vessels recorded within the study area during the combined winter and summer survey periods, colour-coded by the main vessel operators, the remaining 12% were grouped together under 'All Other'.

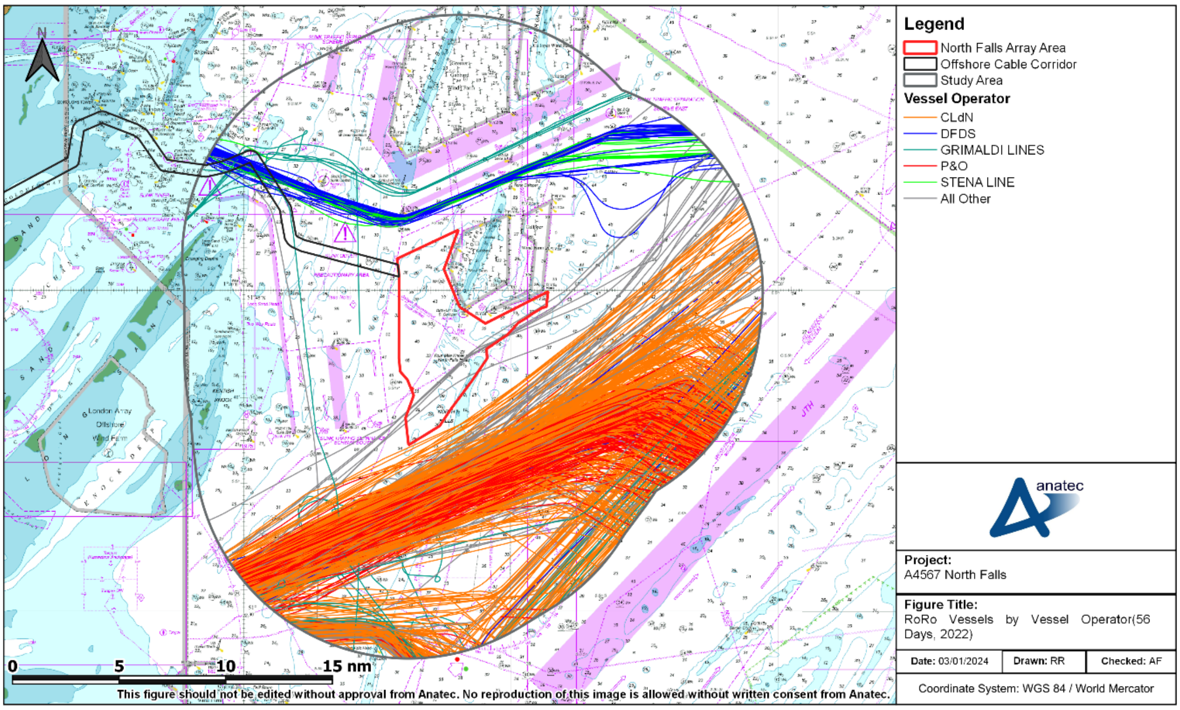

Figure 10-10 RoRo Vessels by Vessel Operator (56-Days, 2022)

227. As aforementioned, CLdN were the main RoRo operator recorded within the study area across the combined winter and summer survey periods. Vessels operated by CLdN were recorded routeing to the south of the array area either utilising the south North Hinder TSS lane, crossing the TSS at a right angle, or transiting to the south of the southern TSS entrance/exit. These vessels were on routes between:

- Dagenham (UK) – Vlissingen (the Netherlands);
- Purfleet (UK) – Zeebrugge (Belgium);
- Purfleet (UK) – Rotterdam (the Netherlands); and
- Purfleet (UK) – Dublin (Ireland).

228. P&O Ferries operated RoRo vessels were all recorded to the south of the array area with most vessels routeing at a right angle across the North Hinder TSS with other vessels also routeing below the southern entrance/exit of the TSS. All P&O Ferries vessels were routeing between Tilbury (UK) and Zeebrugge (Belgium).

229. DFDS Seaways operated RoRo vessels were primarily utilising the east bound lane of the Sunk TSS East with vessels routeing to ports in the Netherlands (Vlaardingen and Rotterdam) from Felixstowe (UK). Three instances of a DFDS vessel routeing to the south of the array area were recorded with two vessels routeing to Sheerness (UK) and the other to Tuzla (Türkiye).

230. Several vessels operated by Grimaldi Lines were recorded utilising the west bound lane of the Sunk TSS East routeing to Tilbury (UK) from Hamburg (Germany). Other vessels were noted utilising the southbound lane of the North Hinder TSS routeing form Hamburg (Germany) to ports in mainland Europe and vessels routeing from Tilbury (UK) to Antwerp (Belgium) noted in the south-west of the study area.

231. Two vessels were recorded operated by Stena Line and both were routeing to Rotterdam (The Netherlands) via the east bound land of the Sunk TSS East. This route was more common in the winter survey period with an average of one vessel every two days while in the summer survey period, only four transits were recorded across the 28 days.

10.1.2.2 Tankers

232. Figure 10-11 presents a plot of tankers recorded within the study area during the combined winter and summer survey periods, colour-coded by sub type.

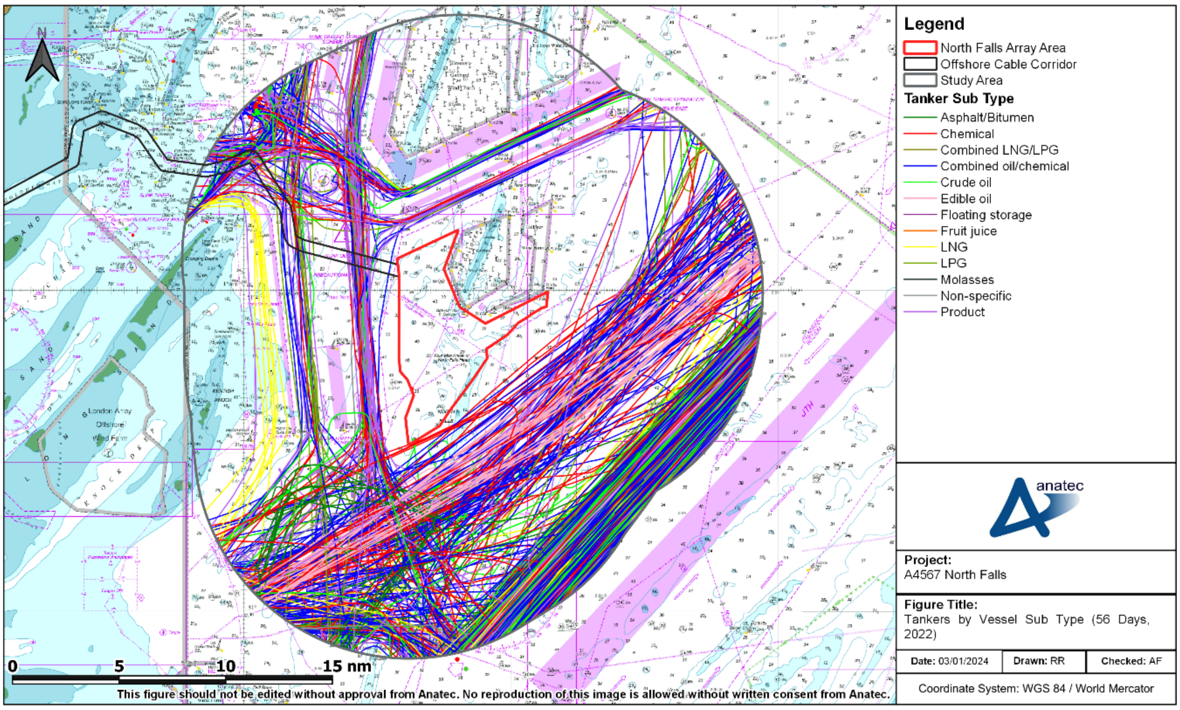

Figure 10-11 Tankers by Sub Type (56 Days, 2022)

233. An average of 31 unique tankers per day were recorded within the study area during the 56-day period.

234. Combined oil/chemical tankers were the most common sub type recorded within the study area during the 56-day period, accounting for 33% of all tankers recorded. This was followed by chemical tankers (19%), product tankers (17%) and crude oil tankers (13%).

235. The majority of tankers (approximately 74% of all tankers recorded within the study area) were noted utilising the southbound lane of the North Hinder TSS. These vessels routeing to many ports in Europe, Africa and the United States of America.

236. It is noted that Liquid Natural Gas (LNG) tankers were observed utilised the Long Sand Head Two Way Route to the west of the Sunk TSS South.

237. There were two intersections of the array area by a tankers during the 56-day period. These were recorded by one crude oil tanker which, from information broadcast via AIS, was waiting in the area 'for orders' and had intersected the southern boundary when turning, and the other a chemical tanker on route intersecting the southern point of the array area. Both intersections were during the winter data period.

10.1.2.3 Passenger Vessels

238. Figure 10-12 presents the passenger vessels recorded within the study area during the combined winter and summer survey periods, colour-coded by sub type.

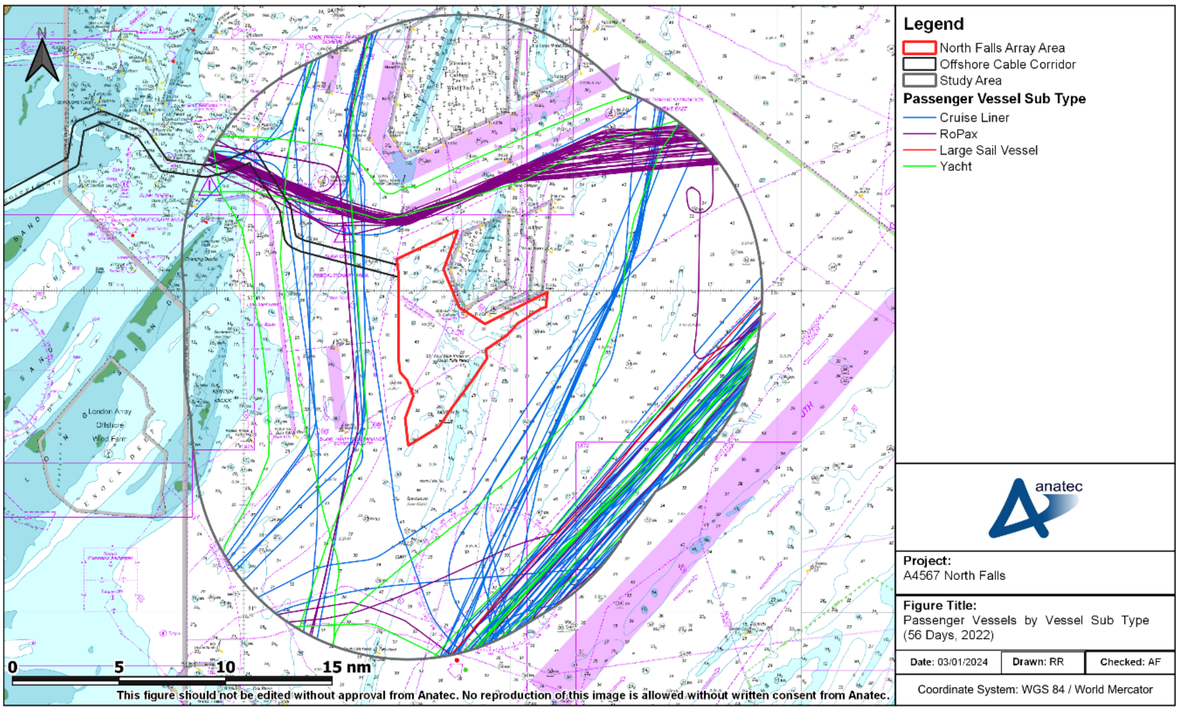

Figure 10-12 Passenger Vessels by Sub Type (56-Days, 2022)

239. An average of two unique passenger vessels per day were recorded within the study area during the 56-day period.

240. Cruise liners were the main passenger vessel sub type recorded within the study area accounting for 46% of all passenger vessels recorded. Roll-On/Roll-Off passenger (RoPax) vessels were also recorded in high numbers (41%) with yachts (13%) following. Only one large sailing vessel was recorded.

241. The majority of passenger vessels, and all other cargo sub types, were recorded making use of the west bound lane of the Sunk TSS East and the southbound lane of the North Hinder TSS. RoPax vessels were primarily recorded to the north of the array area and are detailed further in Section 10.1.2.3.110.1.2.1.1 below.

242. No passenger vessels intersected the array area during the 56-days of survey data.

10.1.2.3.1 *RoPax Vessels*

243. RoPax vessels accounted for 41% of all passenger vessels recorded within the study area across the 56-day periods. Of these vessels, 81% were operated by Stena Line with Hurtigruten operating 10% and P&O Ferries operating 4%. Three other unique vessels all operated by different operators were also recorded.

244. Stena Line was the most prominent RoPax operator recorded, as aforementioned, operating 81% of all RoPax recorded. Stena Line vessels were all utilising the westbound lane of the Sunk TSS East routeing from Harwich to the Hook of Holland (the Netherlands).

245. Figure 10-13 presents the RoPax vessels recorded within the study area during the combined winter and summer survey periods, colour-coded by vessel operators.

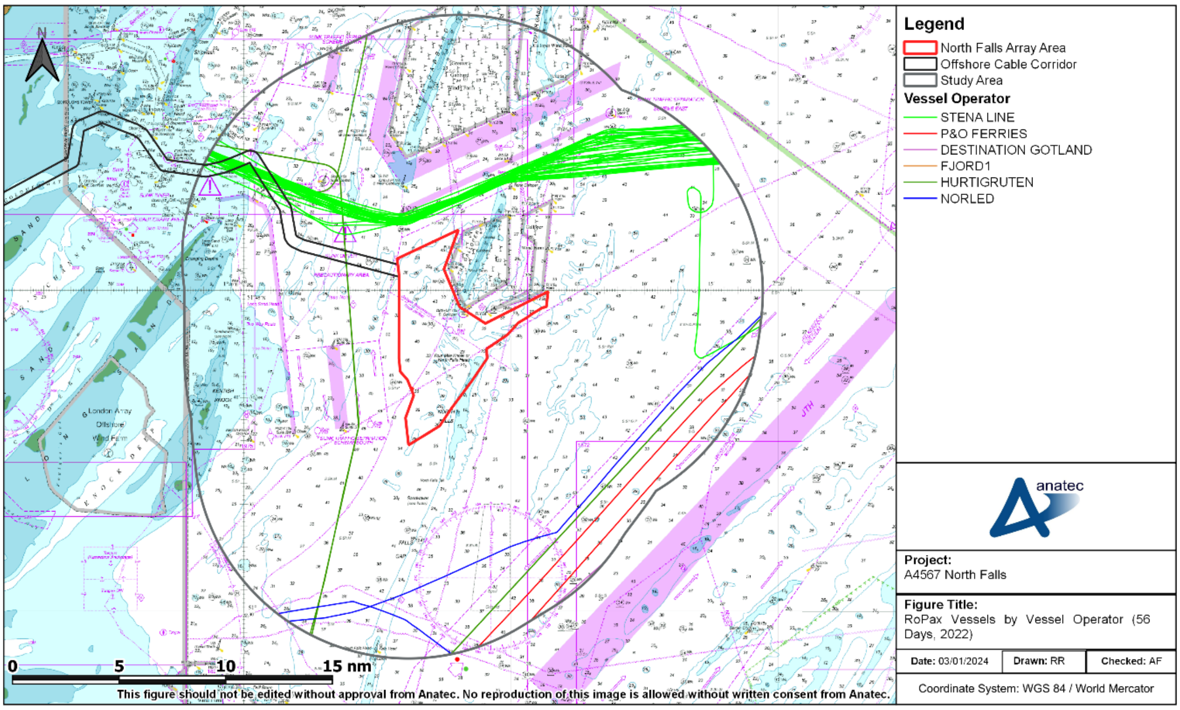

Figure 10-13 RoPax Vessels by Vessel Operator (56-Days, 2022)

10.1.2.4 Wind Farm Vessels

246. Figure 10-14 presents the wind farm vessels recorded within the study area during the combined winter and summer survey periods.

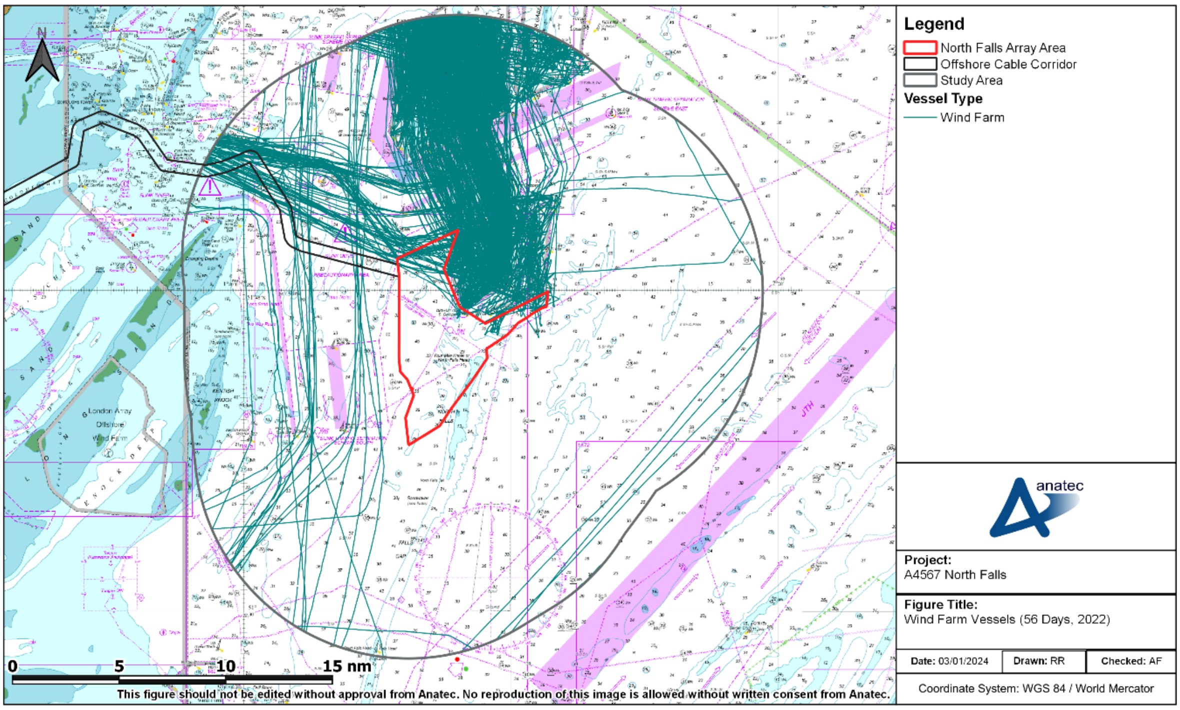

Figure 10-14 Wind Farm Vessels (56-Days, 2022)

247. An average of nine unique wind farm vessels per day were recorded within the study area during the 56-day period. Approximately 80% of these vessels were recorded during the summer survey period.

248. Wind farm vessels were primarily attending the Greater Galloper and Gabbard sites to the north and north-east of the array area. These vessels were mainly coming from Lowestoft and Harwich (both UK). Several vessels were also utilising the north and south bound lanes of the Sunk TSS South routeing mainly to London Array and Ramsgate (UK) to the south and to Harwich (UK) to the north.

249. An average of one unique wind farm vessel intersected the array area every one to two days across the 56-day survey periods. All intersecting vessels were vessels routeing to/from the Greater Galloper and Gabbard to the east of the array and intersecting traffic occurred within the northern permitter of the array area.

10.1.2.5 Marine Aggregate Dredgers

250. As identified in Section 10.2.2, marine aggregate dredgers/underwater operation vessels equated to 4% of all vessel traffic recorded within the study area. Of these vessels, >99% were marine aggregate dredgers with the remaining vessels cable layers in transit. This section focuses only on the marine aggregate dredgers.

251. Figure 10-15 presents the marine aggregate dredgers recorded within the study area during the combined winter and summer survey periods along with the licensed marine aggregate dredging areas identified in Section 7.4.

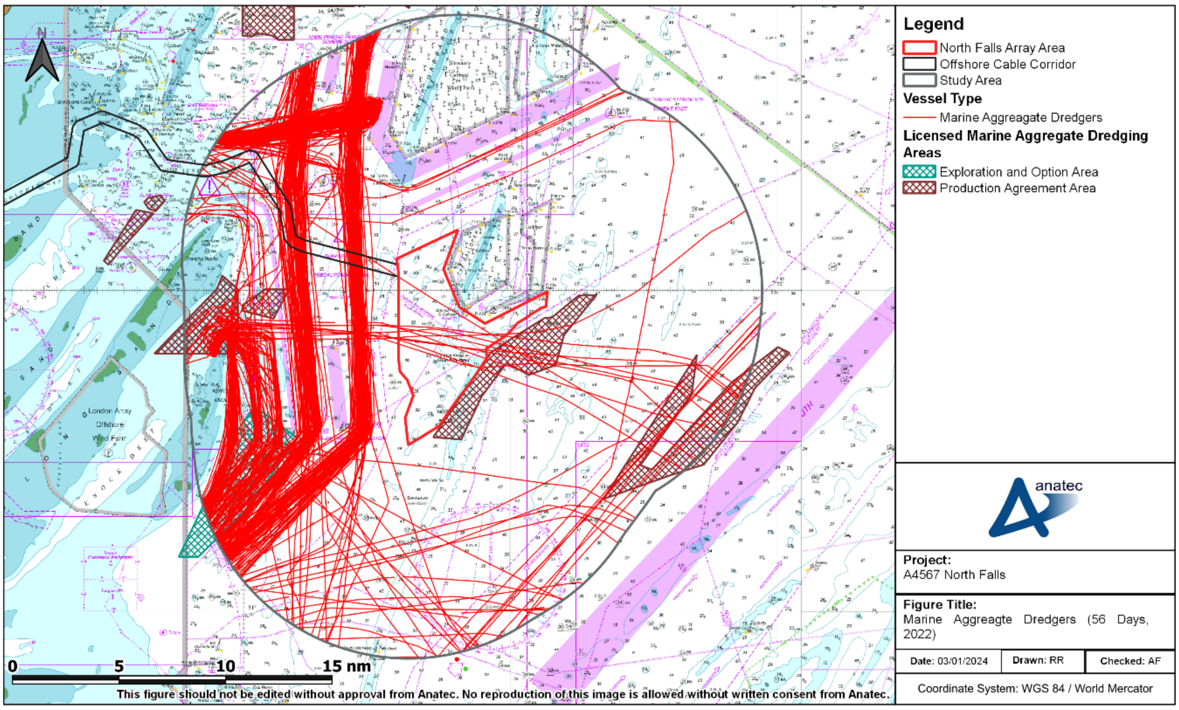

Figure 10-15 Marine Aggregate Dredgers (56-Days, 2022)

252. An average of five unique marine aggregate dredgers per day were recorded within the study area during the 56-day period. Approximately 80% of these vessels were recorded during the summer survey period.

253. Marine aggregate dredgers were concentrated to the west of the array area, with dredgers commonly utilising of Sunk TSS South north and southbound lanes. Active dredging was also recorded to the west of the array area (within areas 508, 509/3 and 510/1, collectively part of the 'Long Sand Dredge Area'). It is noted that maintenance dredging of the Harwich Deep Water Channel was taking place during the summer survey and the associated vessels were recorded visiting the spoil ground at the north of the array area.

254. Routes provided by the BMAPA are presented in Figure 10-16.

255. Overall, there was considered to be broad correlation between the BMAPA transit routes, the vessel traffic survey data (seen in Figure 10-15) and the long-term data (seen in Figure D.22). The main points of agreement are that dredger activity is generally concentrated towards the western half of the study area and that there is a generally east/west route through the array area.

256. During the Hazard Workshop, DEME noted that dredging activity in area 524 (immediately south-east of the array area) is not noted in the survey data due to activity only commencing in April 2023 and that current activity for the area is 110,000 tonnes equating at 25 minimum visits per year.

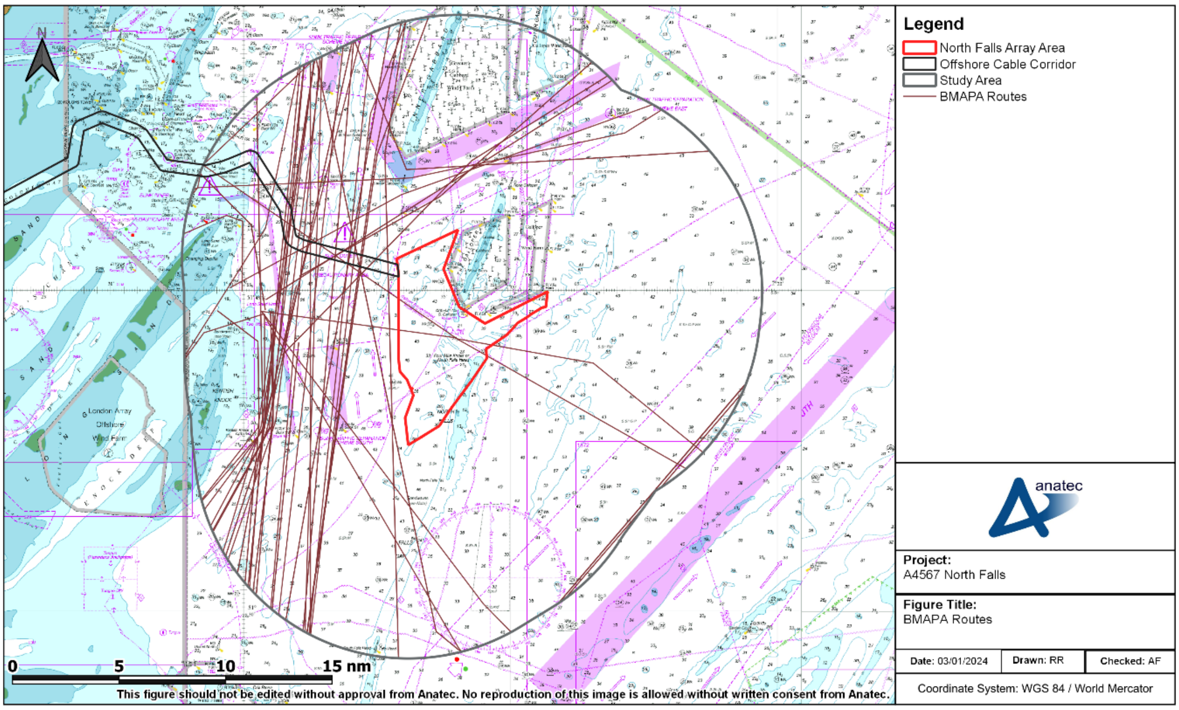

Figure 10-16 BMAPA Routeing Within the Study Area

10.1.2.6 Recreational Vessels

10.1.2.6.1 *Vessel Traffic Survey Data*

257. Figure 10-17 presents the recreational vessels recorded within the study area during the combined winter and summer survey periods.

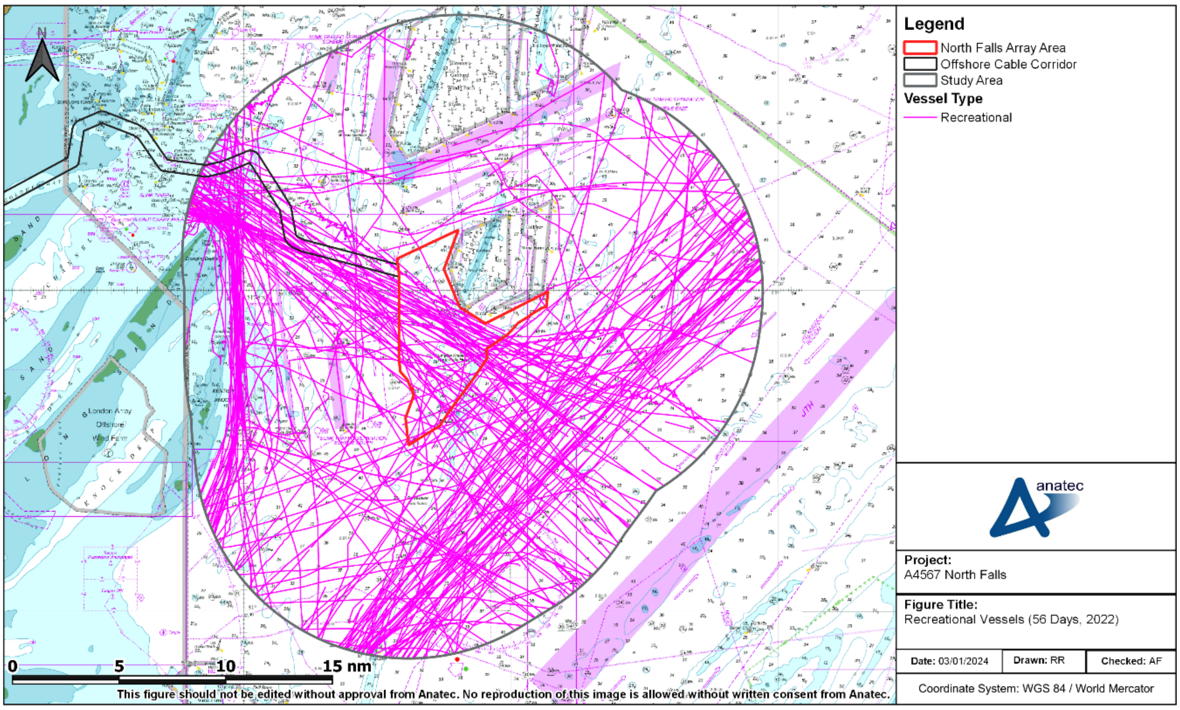

Figure 10-17 Recreational Vessels (56-Days, 2022)

258. An average of four unique recreational vessels per day were recorded within the study area during the 56-day period. Overall, approximately 97% of recreational vessels were recorded during the summer survey period, equating to an average of eight unique recreational vessels per day during the summer survey period and one unique recreational vessel every four to five days during the winter survey period.

259. Recreational traffic is therefore deemed to be seasonal in the area and this is also supported by the additional, long-term AIS data detailing recreational vessels in D.3.4.7.

260. As highlighted in Section 10.1.1, Radar coverage is likely to only be comprehensive when the survey vessel was stationed at the southern array area. However, Radar coverage as a percentage of total vessel tracks recorded is less than <1% and so overall vessel representation is unlikely to be underestimated.

261. The vast majority of recreational vessels within the study area were noted to not be utilising any of the TSS lanes in proximity to the Project and this is likely due to smaller recreational vessels avoiding busy shipping lanes made for primarily larger commercial vessels, and so transiting parallel to the TSS lanes instead, or crossing at right angles.

262. A number of recreational vessels were utilising the Galloper Recommended Ferry Route through the array area and also transiting in the same north-west south-east bearing to the south of the array area. Only two vessels intersected the array area

during the winter survey period and an average of one unique vessel per day intersected the array area during the summer survey period.

10.1.2.6.2 *RYA Coastal Atlas of Recreational Boating*

263. The RYA Coastal Atlas can 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" (RYA, 2019). The RYA Coastal Atlas includes a heat map indicating the density of recreational activity around the UK coast.

264. Figure 10-18 presents the RYA Coastal Atlas heat map relative to the array area.

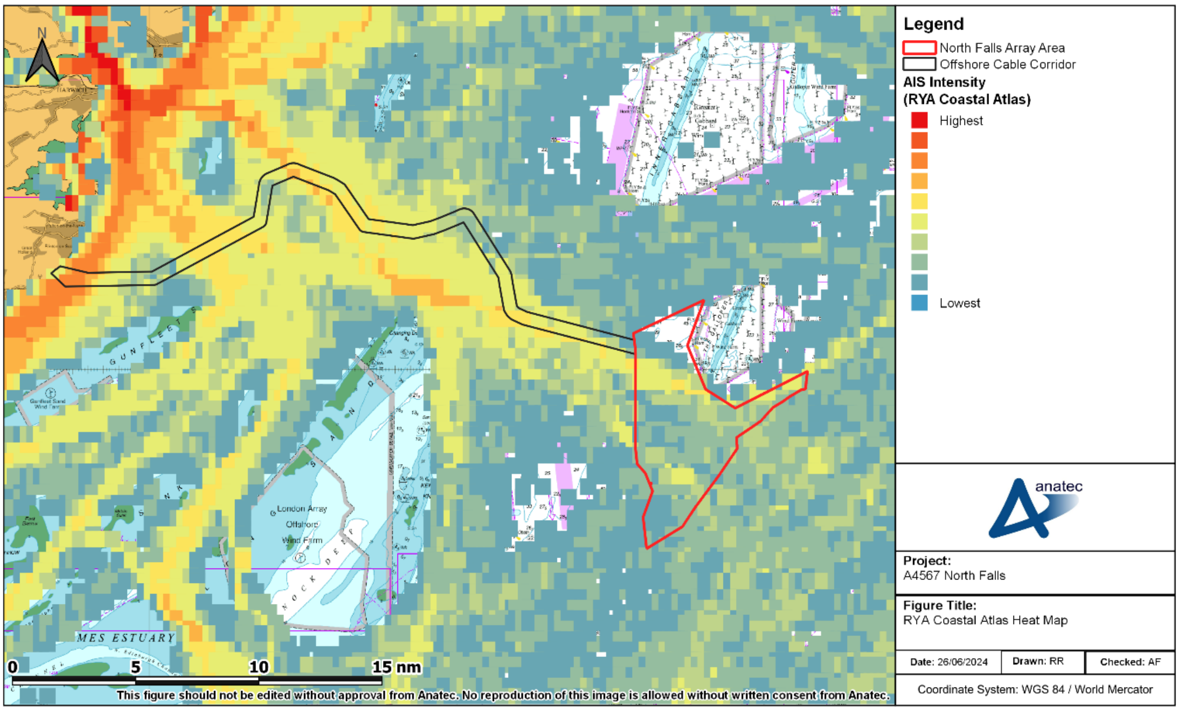

Figure 10-18 RYA Coastal Atlas Heat Map

265. The density of recreational activity within and in proximity to the array area is consistent with the patterns displayed by the vessel traffic survey data. Some areas lack any recorded data while some moderately used routeing is observed, primarily at the north of the array area, which passes around the existing Greater Gabbard. Density within the TSS lanes was observed to be low.

10.1.2.7 Fishing Vessels

266. Figure 10-19 presents the fishing vessels recorded within the study area during the combined winter and summer survey periods, colour-coded by survey period to display any seasonality.

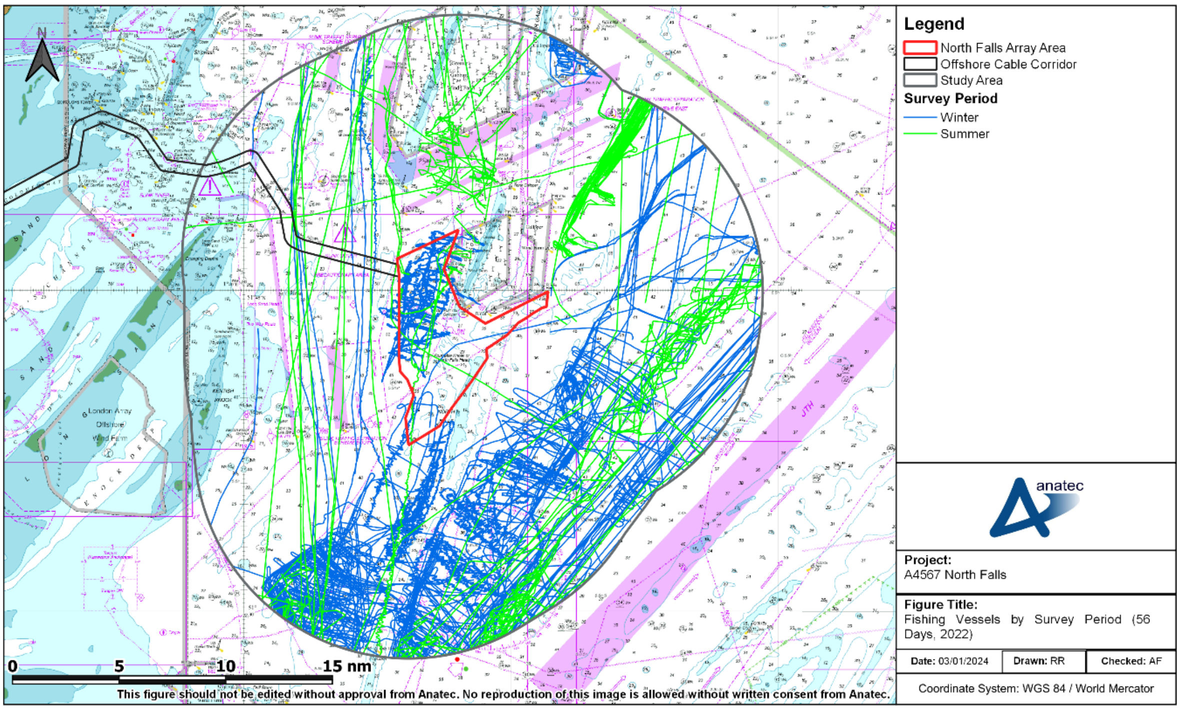

Figure 10-19 Fishing Vessels by Survey Period (56-Days, 2022)

267. An average of three unique fishing vessels per day were recorded within the study area during the 56-day period. Overall, approximately 58% of fishing vessels were recorded during the winter survey period and the remaining 42% during the summer survey period.

268. Active fishing behaviours can be identified by vessel speed, track behaviour, and by information broadcast via AIS. Likely active fishing was recorded within the study area, and array area, across both survey periods. The most notable area for likely fishing was between the array area and the North Hinder TSS which was present in both winter and summer and were all beam trawlers and pelagic trawlers. Active fishing was also recorded within the north of the array area by one static gill netter fishing vessel in both the summer and winter periods.

269. Only nine unique intersections of vessels within the array area occurred over the 56-day survey periods, or one fishing vessels every six days.

270. As highlighted in Section 10.1.1, Radar coverage is likely to only be comprehensive when the survey vessel was stationed at the southern array area. However, Radar coverage as a percentage of total vessel tracks recorded is less than <1% and so overall vessel representation is unlikely to be underestimated.

10.1.2.8 Pilot Vessels

271. Figure 10-20 presents the pilot vessels recorded within the study area during the two combined winter and summer survey periods.

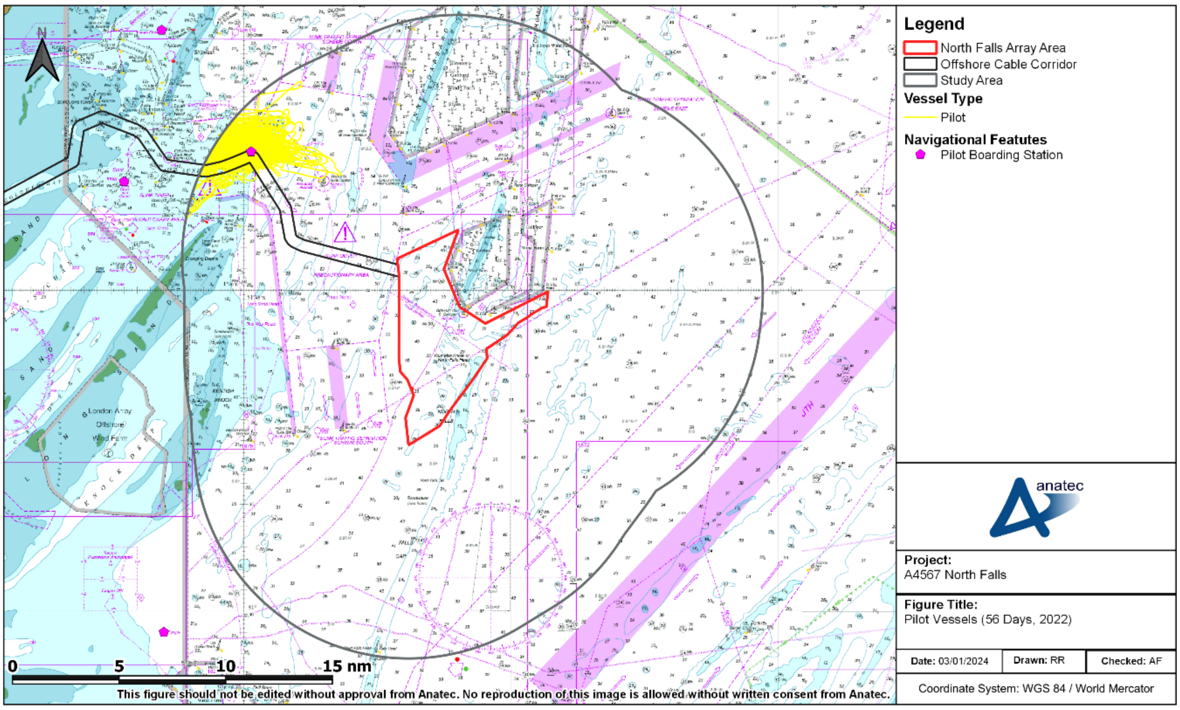

Figure 10-20 Pilot Vessels (56-Days, 2022)

272. Pilot vessels were heavily concentrated in the vicinity of the Sunk Pilot Station (which is introduced in Section 7.3). Four pilot vessels were recorded during the survey period with an average of two unique vessels recorded per day across the 56-day period, noting this is only based on counting each vessel once per day and so does not account for vessels doing multiple trips per day. No pilot vessels were recorded intersecting the array area.

10.1.3 Vessel Size

273. This section provides analysis of the sizes of vessels recorded within the study area during the two 28-day periods, in terms of vessel length and draught.

10.1.3.1 Vessel Length

274. Vessel LOA was available for over 99% of vessels recorded during the combined winter and summer survey periods. Of those vessels with unspecified LOA, 85% were recorded via Radar. Those unspecified LOA recorded via AIS were all recreational vessels. Figure 10-22 presents a plot of the vessel tracks recorded during the combined survey periods, colour-coded by vessel LOA. Following this, Figure 10-23 illustrates the same data by distribution of vessel LOA.

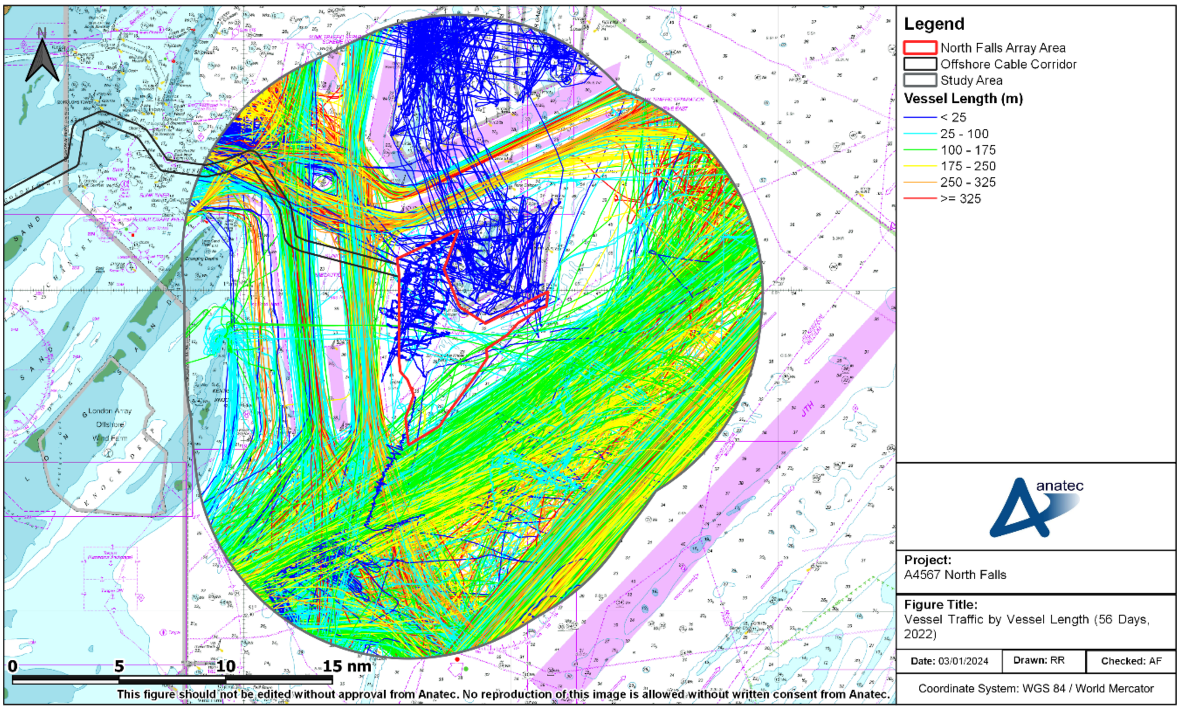

Figure 10-21 Vessels by Length (56-Days, 2022)

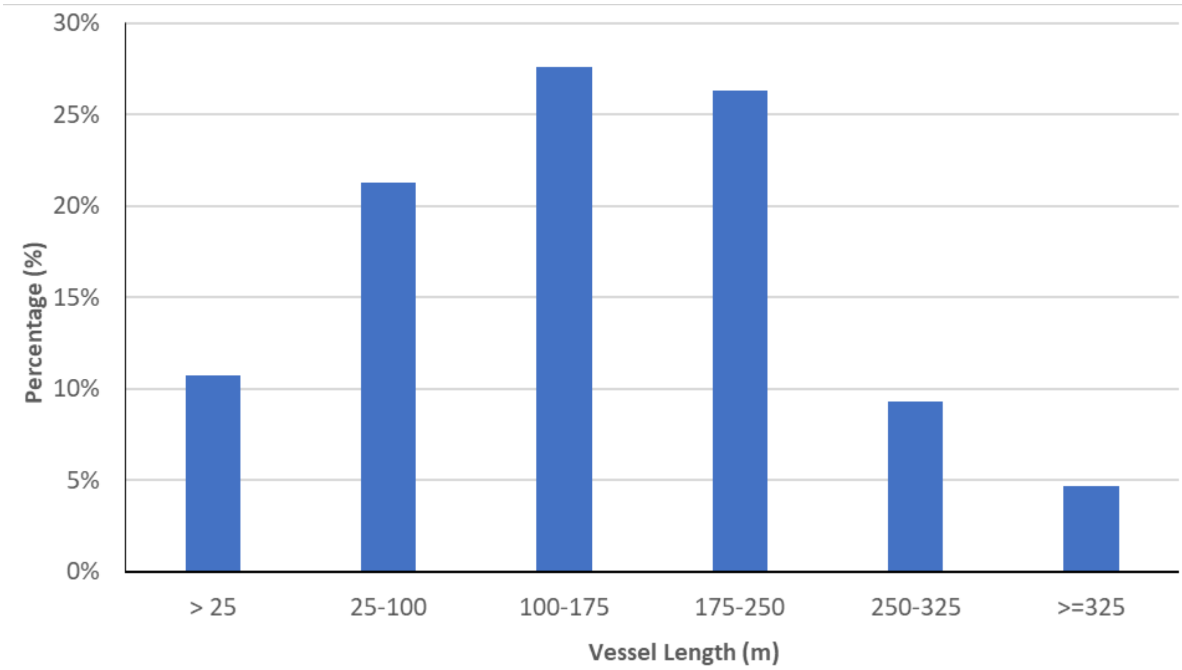

Figure 10-22 Vessel Length Distribution (56-Days, 2022)

275. Excluding the proportion of vessels for which LOA was not available, the average LOA of vessels within the study area during the combined winter and summer survey periods was 152m. The average vessel LOA in the summer survey period (144m) was observed to be lower than in winter (161m), which is likely attributed to the greater

number of recreational vessels present during more favourable sailing conditions during summer months.

276. Larger vessels were commercial vessels typically recorded in the nearby TSS lanes (associated with Sunk and North Hinder South). Some of these vessels were also recorded anchored within the Sunk Deep Water Anchorage (as seen in section 7.5). The largest vessels were 400m in length and were all container cargo vessels (24 unique vessels).

277. Smaller vessels were typically seen in the vicinity of the array area and Greater Gabbard and Galloper, and were mainly wind farm, pilot vessels, and small fishing vessels.

10.1.3.2 Vessel Draught

278. Vessel draught was available for approximately 89% of vessels recorded during the combined winter and summer survey periods. All vessels recorded via Radar were included in those vessels with unspecified draughts. Those unspecified recorded via AIS were primarily recreational vessels, cargo vessels and fishing vessels. Figure 10-23 presents a plot of the vessel tracks recorded during the combined survey periods, colour-coded by vessel draught. Following this, Figure 10-24 illustrates the same data by distribution of vessel draughts.

279. It is noted that vessel draught and the potential for underkeel interaction has been raised as a key concern by stakeholders given the sensitivity of the local area for navigation. Additional refined assessment of vessel draught in the vicinity of the offshore export cable corridor is provided in Section 10.2.3.2, and future case considerations i.e., the potential for vessels to get larger including in terms of draught is provided in Section 14.

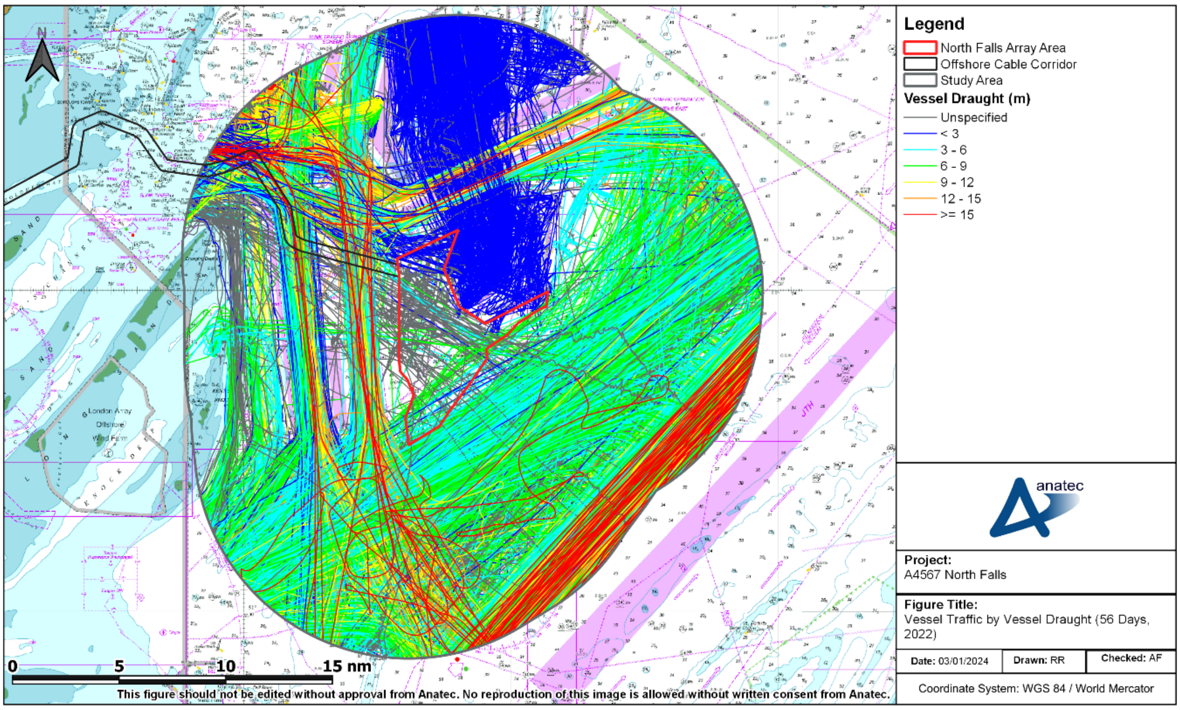

Figure 10-23 Vessels by Draught (56-Days, 2022)

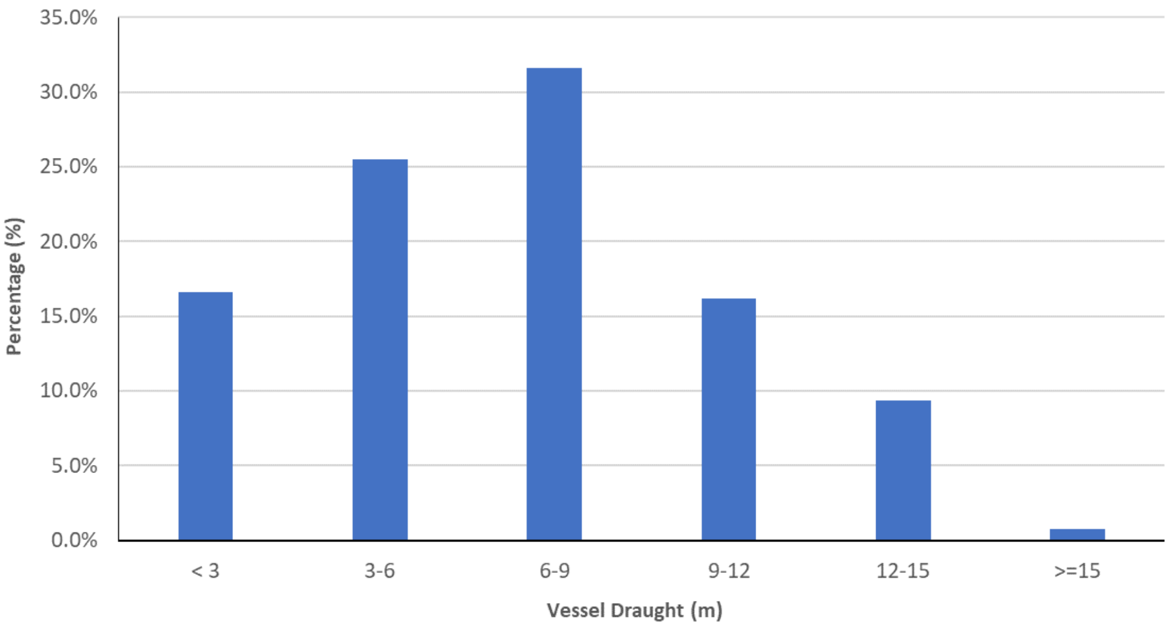

Figure 10-24 Vessel Draught Distribution (56-Days, 2022)

280. Excluding the proportion of vessels for which a draught was not available, the average draught of vessels within the study area during the combined winter and summer survey periods was 6.8m. The vessels with greatest draught had a recorded draught of 20.7m. This was recorded for two unique crude oil tankers both of which were located within the North Hinder TSS southbound lane.

281. It is noted that within the Sunk TSS South the greatest vessel draught recorded was 15.7m and within the Sunk TSS East the greatest vessel draught recorded was 15.6m.

282. Similar to the vessel length distribution, the largest vessels by draught were typically commercial vessels utilising nearby TSSs and the smaller vessels were typically wind farm or recreational vessels seen in the proximity to the array area and Greater Gabbard and Galloper. Pilot vessels to the west of the study area were also among the vessels with smallest draught.

10.1.4 Anchored Vessels

283. Anchored vessels can be identified based upon the AIS navigational status which is programmed on the AIS transmitter on board a vessel. However, information is manually entered into the AIS, and therefore it is common for vessels not to update their navigational status if only at anchor for a short period of time.

284. For this reason, those vessels which travelled at a speed of less than one knot (kt) for more than 30 minutes had their corresponding vessel tracks individually checked for patterns characteristic of anchoring activity.

285. After applying these criteria, 81 unique instances of a vessel anchoring were identified within the study area, corresponding to an average of one to two vessels anchoring each day. The majority of these vessels were at anchor over the course of more than one day with the longest instance occurring for approximately nine days. Of the anchored vessels identified, 98% broadcast an AIS navigational status of “at anchor”. Figure 10-25 presents an overview of vessels deemed to be at anchor within the study area during the 56-day period.

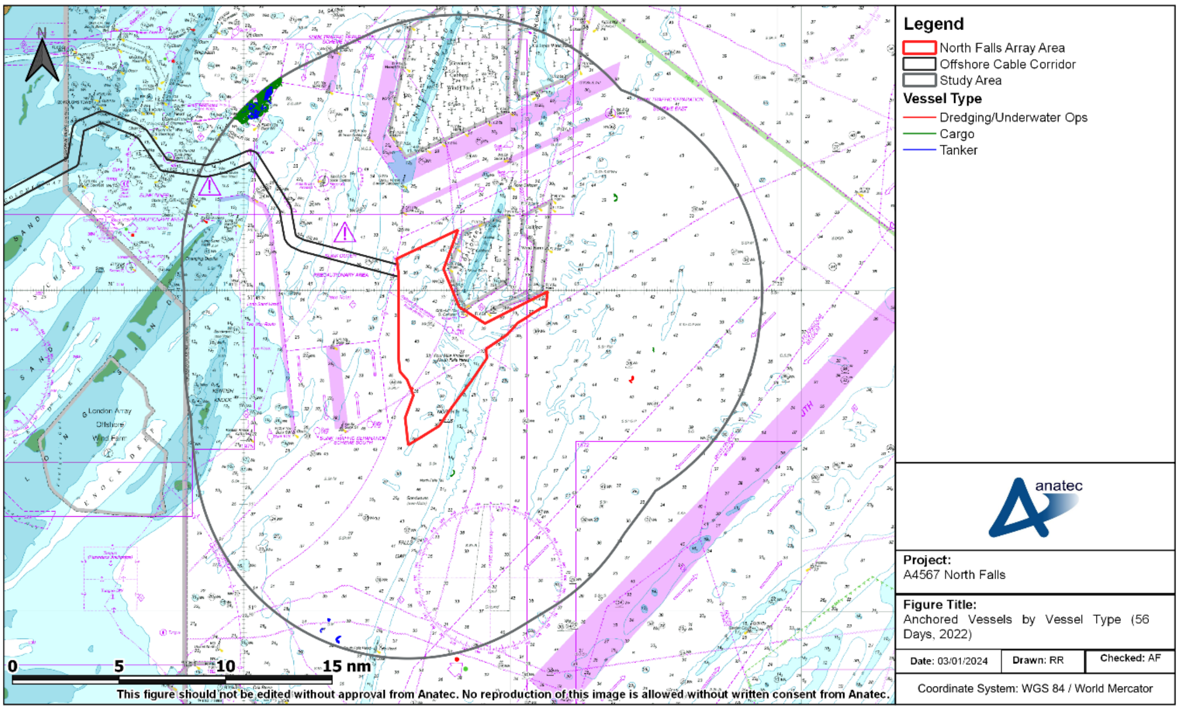

Figure 10-25 Anchored Vessels by Vessel Type (56-Days, 2022)

286. The majority of anchored vessels (92%) were at anchor within the Sunk Deep Water Anchorage Area (see section 7.5) at the north-west of the study area. Within these vessels, only cargo vessels and tankers were recorded vessel types. Several tankers were also recorded at anchor within the south of the study area as well as two cargo vessels and one marine aggregate dredger to the south-east of the study area.