NORTH FALLS

Offshore Wind Farm

ENVIRONMENTAL STATEMENT

Chapter 15 Shipping and Navigation

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NORTH FALLS
Offshore Wind Farm

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Appendix 15.1 Navigational Risk Assessment

Glossary of Acronyms

AIS	Automatic Identification System
ALARP	As Low As Reasonably Practicable
BMAPA	British Marine Aggregate Producers Association
CEA	Cumulative Effects Assessment
COLREGS	Convention on International Regulations for Preventing Collisions at Sea
CoS	Chamber of Shipping
DCO	Development Consent Order
DECC	Department of Energy and Climate Change
DESNZ	Department of Energy Security & Net Zero
DfT	Department for Transport
dML	deemed Marine Licence
DW	Deep Water
EIA	Environmental Impact Assessment
ERCoP	Emergency Response Co-operation Plan
ES	Environmental Statement
FSA	Formal Safety Assessment
GLA	General Lighthouse Authority
HEO	Harbour Empowerment Order
HHA	Harwich Haven Authority
HMCG	His Majesty's Coast Guard
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IMO	International Maritime Organization
ITF	International Transport Forum
km	Kilometre
LAT	Lowest Astronomical Tide
m	Metre
MAIB	Maritime Accident Investigation Branch
MCA	Maritime and Coastguard Agency
MGN	Marine Guidance Note
MHWS	Mean High Water Springs
MMO	Marine Management Organisation
MST	Maritime Security Team
NFOW	North Falls Offshore Wind Farm Limited
NIP	Navigation and Installation Plan
nm	Nautical Mile
NPS	National Policy Statement
NRA	Navigational Risk Assessment
NRW	Natural Resources Wales

NUC	Not Under Command
O&M	Operation and Maintenance
OCP	Offshore Convertor Platform
OECD	Organisation for Economic Cooperation and Development
OREI	Offshore Renewable Energy Installation
OSP	Offshore Substation Platform
OWF	Offshore Wind Farm
PDE	Project Design Envelope
PEIR	Preliminary Environmental Information Report
PLA	Port of London Authority
PLL	Potential Loss of Life
Radar	Radio Detection and Ranging
RNLI	Royal National Lifeboat Institution
RoPax	Roll-On /Roll-Off passenger
RYA	Royal Yachting Association
SAR	Search and Rescue
SLoO	Single Line of Orientation
SOLAS	International Convention for the Safety of Life at Sea
TSS	Traffic Separation Scheme
UK	United Kingdom
UKHO	United Kingdom Hydrographic Office
UNCLOS	The 1982 United Nations Convention on the Law of the Sea
VHF	Very High Frequency
VTS	Vessel Traffic Service
WTG	Wind Turbine Generator

Glossary of Terminology

Allision	The act of striking or collision of a moving vessel against a stationary object.
Array area	The offshore wind farm area, within which the wind turbine generators, array cables, platform interconnector cable, offshore substation platform(s) and/or offshore converter platform will be located.
Array cables	Cables which link the wind turbine generators with each other, the offshore substation platform(s) and/or the offshore converter platform.
Automatic Identification System (AIS)	A system by which vessels automatically broadcast their identity, key statistics including location, destination, length, speed and current status, e.g. “under power”. Most commercial vessels and United Kingdom (UK)/European Union (EU) fishing vessels over 15 m length are required to carry AIS.
Collision	The act or process of colliding (contact) between two moving objects.
Formal Safety Assessment (FSA)	A structured and systematic process for assessing the risks and costs (if applicable) associated with shipping activity.
Former array areas	The two distinct offshore wind farm areas (including the ‘northern array area’ and ‘southern array area’) which comprised the North Falls offshore wind farm at scoping and PEIR stage.

Future Case	The assessment of risk based on the predicted growth in future shipping densities and traffic types as well as foreseeable changes in the marine environment.
Landfall	The location where the offshore cables come ashore.
Marine Guidance Note (MGN)	A system of guidance notes issued by the Maritime and Coastguard Agency (MCA) which provide significant advice relating to the improvement of the safety of shipping at sea, and to prevent or minimise pollution from shipping.
National grid connection point	The grid connection location for the Project. National Grid are proposing to construct new electrical infrastructure (a new substation) to allow the Project to connect to the grid, and this new infrastructure will be located at the National Grid connection point.
Navigational Risk Assessment (NRA)	A document which assesses the hazards to shipping and navigation of a proposed Offshore Renewable Energy Installation (OREI) based upon the FSA.
Offshore cable corridor	The corridor of seabed from array area to the landfall within which the offshore export cables will be located.
Offshore converter platform	Should an offshore connection to a third party HVDC cable be selected, an offshore converter platform would be required. This is a fixed structure located within the array area, containing HVAC and HVDC electrical equipment to aggregate the power from the wind turbine generators, increase the voltage to a more suitable level for export and convert the HVAC power generated by the wind turbine generators into HVDC power for export to shore via a third party HVDC cable.
Offshore export cables	The cables which bring electricity from the offshore substation platform(s) to the landfall, as well as auxiliary cables.
Offshore project area	The overall area of the array area and the offshore cable corridor.
Offshore Renewable Energy Installation (OREI)	As defined by Marine Guidance Note 654 (Merchant and Fishing) Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response (Maritime and Coastguard Agency (MCA), 2021). For the purposes of this report and in keeping with the consistency of the Environmental Impact Assessment (EIA), OREI can mean offshore wind turbines and the associated electrical infrastructure including offshore substations.
Offshore substation platform(s)	Fixed structure(s) located within the array area, containing HVAC electrical equipment to aggregate the power from the wind turbine generators and increase the voltage to a more suitable level for export to shore via offshore export cables.
Platform interconnector cable	Cable connecting the offshore substation platforms (OSP); or the OSP and offshore converter platform (OCP).
Radio Detection and Ranging (Radar)	An object-detection system which uses radio waves to determine the range, altitude, direction or speed of objects.
Regular Operator	Commercial operator whose vessel(s) are observed to transit through a particular region on a regular basis.
The Applicant	North Falls Offshore Wind Farm Limited (NFOW).
The Project or 'North Falls'	North Falls Offshore Wind Farm, including all onshore and offshore infrastructure.
Traffic Separation Scheme (TSS)	A traffic-management route-system ruled by the International Maritime Organization (IMO). The traffic-lanes (or clearways) indicate the general direction of the vessels in that zone; vessels navigating within a TSS all sail in the same direction or they cross the lane in an angle as close to 90 degrees (°) as possible.
Unique Vessel	An individual vessel identified on any particular calendar day, irrespective of how many tracks were recorded for that vessel on that day. This prevents vessels being over counted. Individual vessels are identified using their Maritime Mobile Service Identity (MMSI).

Vessel Traffic Service (VTS)	A service implemented by a Competent Authority designed to improve the safety and efficiency of vessel traffic and to protect the environment. The service should have the capability to interact with the traffic and to respond to traffic situations developing in the VTS area.
Wind turbine generator (WTG)	Power generating device that is driven by the kinetic energy of the wind.

15 Shipping and Navigation

15.1 Introduction

1. This chapter of the Environmental Statement (ES) considers the likely significant effects of the North Falls Offshore Wind Farm (hereafter "North Falls" or "the Project") on shipping and navigation. The chapter provides an overview of the existing environment, followed by an assessment of the likely significant effects and associated mitigation for the construction, operation, maintenance and decommissioning phases of the Project.

2. This chapter has been written by Anatec Ltd., with the assessment undertaken with specific reference to the relevant legislation and guidance, of which the primary sources are the National Policy Statements (NPS) and the Maritime and Coastguard Agency (MCA) Marine Guidance Note (MGN) 654 (MCA, 2021). It is noted that under MGN 654, the MCA have specific requirements on how impacts to shipping and navigation are assessed. Details of these requirements and the overarching methodology used for the Environmental Impact Assessment (EIA) and Cumulative Effects Assessment (CEA) are presented in Section 15.4.

3. The assessment should be read in conjunction with following linked chapters noting that the Navigational Risk Assessment (NRA) (ES Appendix 15.1 (Document Reference: 3.3.16)) and this chapter focus on impacts to navigational safety of vessels in transit:

   - ES Chapter 14 Commercial Fisheries (shipping and navigation captures navigational safety impacts to fishing vessels in transit) (Document Reference: 3.1.16);
   - ES Chapter 18 Infrastructure and Other Users (shipping and navigation captures navigational safety impacts to dredgers, and oil and gas vessels in transit) (Document Reference: 3.1.20); and
   - ES Chapter 32 Tourism and Recreation (shipping and navigation captures navigational safety impacts to recreational vessels) (Document Reference: 3.1.34).

4. In line with MCA requirements, the shipping and navigation assessment has been informed by an NRA (ES Appendix 15.1 (Document Reference: 3.3.16)). The NRA has captured the relevant baseline aspects and is fully MGN 654 (MCA, 2021) compliant. This is evidenced via the completion of an MGN 654 checklist appended to the NRA (Annex A of ES Appendix 15.1 (Document Reference: 3.3.16)).

15.2 Consultation

5. Consultation with regard to shipping and navigation has been undertaken in line with the general process described in ES Chapter 6 EIA Methodology (Document Reference: 3.1.8). The key elements to date have included scoping and engagement with a range of stakeholders including the MCA and Trinity House who are the key national consultees for shipping and navigation. The feedback received has been considered in preparing the ES. Table 15.1

provides a summary of how the consultation responses received to date have influenced the approach that has been taken. Full detail of the consultation process is presented in the Consultation Report (Document Reference: 4.1), which has been submitted as part of the Development Consent Order (DCO) application.

6. Relevant responses received under Section 42 as part of the Preliminary Environmental Information Report (PEIR) process are included.

Table 15.1 Consultation responses

Consultee	Date / document	Comment	Response / where addressed in the ES
Planning Inspectorate	August 2021, Scoping Opinion (Document Reference: 7.25)	A study area of 10 nautical miles (nm) around the array areas has been considered in order to characterise maritime activity that may potentially be affected by the Project. The application should explain the rationale behind the choice of study area and the approach should be discussed with the relevant consultation bodies.	The study area has been agreed with both MCA and Trinity House. Justification of the chosen study area is provided in Section 15.3.1.
Planning Inspectorate	August 2021, Scoping Opinion (Document Reference: 7.25)	With reference to the Shipping and Navigation chapter of NPS for Renewable Energy Infrastructure (EN-3), the application should demonstrate how the project has been designed (e.g., the location/ extent of the proposed array boundary) and managed (e.g., navigational management measures, including use of marine navigation marking) to ensure that vessels can continue to make safe passage without significant large-scale deviations.	Vessel displacement has been considered in Section 15.6.1.2.
Planning Inspectorate	August 2021, Scoping Opinion (Document Reference: 7.25)	The Applicant should make effort to agree the approach to the assessment of safety with respect to shipping and navigation with relevant consultation bodies, such as the MCA and Trinity House. The application should explain how the views of the consultation bodies have informed the assessment including the identification of any likely significant effects and any mitigation required.	The MCA and Trinity House have been consulted on the Project, and the input has fed into the ES. Section 42 feedback and further liaison has been used to refine the Project Design Envelope (PDE) including the array area.
Planning Inspectorate	August 2021, Scoping Opinion (Document Reference: 7.25)	The Applicant should ensure that any structures, such as met masts, which would be placed outside the array areas are included in the assessment of effects. If cable protection is likely to be required, then the assessment should use a worst-case scenario based on the maximum extent of	No surface piercing structures will be placed outside of the array area. The worst case scenario for cable protection is provided in Table 15.2. The NRA (ES Appendix 15.1 (Document Reference: 3.3.16)) includes an allision modelling process which considered all offshore surface piercing elements. An assessment of underkeel clearance has been provided in Section 15.6.2.7.

Consultee	Date / document	Comment	Response / where addressed in the ES
		cable protection expected to be used.	
Planning Inspectorate	August 2021, Scoping Opinion (Document Reference: 7.25)	In addition to the data sources listed, paragraph 323 states that other data, information, and consultation on fishing will be available via the Commercial Fisheries assessment. This should include consideration of, and cross-reference to, up-to-date fishing data.	The NRA (ES Appendix 15.1 (Document Reference: 3.3.16)) has included the fishing data captured in the vessel traffic survey data which includes Radio Detection and Ranging (Radar) and visual recording of vessels not broadcasting on Automatic Identification System (AIS). Assessment of longer term AIS data has also been undertaken. Further assessment of fishing vessel activity is provided in ES Chapter 14 Commercial Fisheries (Document Reference: 3.1.16).
Planning Inspectorate	August 2021, Scoping Opinion (Document Reference: 7.25)	Cumulative effects on shipping routes and patterns should be adequately assessed in the NRA and presented in the application	The NRA (ES Appendix 15.1 (Document Reference: 3.3.16)) includes a full cumulative routeing assessment.
Planning Inspectorate	August 2021, Scoping Opinion (Document Reference: 7.25)	This aspect chapter should cross-refer to the relevant assessments of the ES, including assessments that assess the potential for vessel movements and the introduction of new substrate to facilitate the spread of INNS [invasive non-native species] (e.g. via ballast water and through accidents and spillages).	Spread of invasive non-native species via vessels is considered in ES Chapter 9 Marine Water and Sediment Quality (Document Reference: 3.1.11) and ES Chapter 10 Benthic and Intertidal Ecology (Document Reference: 3.1.12).
MCA	August 2021, Scoping Opinion (Document Reference: 7.25)	Detail on the possible impact on navigational issues for both commercial and recreational craft must be included, specifically: • Collision Risk • Navigational Safety • Visual intrusion and noise • Risk Management and Emergency response • Marking and lighting of site and information to mariners • Effect on small craft navigational and communication equipment • The risk to drifting recreational craft in adverse weather or tidal conditions • The likely squeeze of small craft into the routes of larger commercial vessels	An impact assessment has been undertaken as per Section 15.6. Impacts are assessed in full within the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)) which includes a completed MGN 654 checklist to demonstrate compliance in terms of navigational issues which must be assessed.
MCA	August 2021, Scoping Opinion (Document Reference: 7.25)	An NRA will need to be submitted in accordance with MGN 654 and Annex 1: Methodology for Assessing the Marine Navigation Safety & Emergency Response Risks of Offshore Renewable Energy Installations (OREIs). This NRA should be accompanied by a detailed MGN 654 Checklist.	The NRA (ES Appendix 15.1 (Document Reference: 3.3.16)) has been used to inform the ES and includes a completed MGN 654 checklist to demonstrate compliance.

Consultee	Date / document	Comment	Response / where addressed in the ES
MCA	August 2021, Scoping Opinion (Document Reference: 7.25)	Noted that a vessel traffic survey will be undertaken to the standard of MGN 654 i.e. at least 28 days which is to include seasonal data (two x 14-day surveys) collected from a vessel-based survey using AIS, Radar and visual observations to capture all vessels navigating in the study area, supplemented by 12 months of AIS data and other data sources from United Kingdom Hydrographic Office (UKHO), Royal Yachting Association (RYA), The Crown Estate (TCE) and British Marine Aggregate Producers Association. MCA would also suggest collection/obtaining up to date fishing data.	MGN 654 compliant vessel traffic surveys have been undertaken noting the survey data methodology was agreed with both MCA and Trinity House.
MCA	August 2021, Scoping Opinion (Document Reference: 7.25)	The development area carries a significant amount of through traffic in the Sunk Vessel Traffic Service (VTS) Area and to major ports. Attention needs to be paid to routing for ensuring shipping can continue to make safe passage without significant large scale deviations. We are very concerned over the Potential Impacts highlighted in paragraph 326 and the safety of commercial vessels which were identified in a meeting with the applicant held on 28 April 2021. Interactive boundary guidance within MGN654 and other sources such as the World Association for Waterborne Transport Infrastructure should be addressed to assess safe sea room concerns in the areas where the wind farm boundary is adjacent to the International Maritime Organization (IMO) Routing Measures. It is difficult to see at this stage how the wind farm boundary would comply with the Shipping and Navigation chapter of NPS for Renewable Energy Infrastructure (EN-3), starting at 2.6.147	Multiple key shipping and navigation stakeholders including the MCA, Trinity House, Chamber of Shipping, vessel operators and the Sunk Users Group have been consulted on the Project including in relation to specific concerns over the former array areas, and the input has fed into the ES. Section 42 feedback and further liaison has been used to refine the PDE including the array area. Deviations of routeing vessel traffic has been assessed within the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)).
MCA	August 2021, Scoping Opinion (Document Reference: 7.25)	Particular attention should be paid to cabling routes and where appropriate burial depth for which a Burial Protection Index study should be completed and, subject to the traffic volumes, an anchor penetration study may be necessary. If cable protection are required e.g. rock bags, concrete mattresses, the MCA would be willing to accept a 5% reduction in	The Applicant will be fully compliant with MGN 654 as per Section 15.3.4 including the provisions on underkeel clearance. Consultation has been undertaken with Harwich Haven Authority (HHA), Port of London Authority (PLA), and London Gateway including via the Sunk User Group in relation to the offshore cable corridor including in relation to underkeel clearance.

Consultee	Date / document	Comment	Response / where addressed in the ES
		surrounding depths referenced to Chart Datum. This will be particularly relevant where depths are decreasing towards shore and potential impacts on navigable water increase.	
MCA	August 2021, Scoping Opinion (Document Reference: 7.25)	Particular consideration will need to be given to the implications of the site size and location on Search and Rescue (SAR) resources and Emergency Response Co-operation Plans (ERCoP). Attention should be paid to the level of Radar surveillance, AIS and shore-based Very High Frequency (VHF) radio coverage and give due consideration for appropriate mitigation such as Radar, AIS receivers and in-field, Marine Band VHF radio communications aerial(s) (VHF voice with Digital Selective Calling) that can cover the entire wind farm sites and their surrounding areas.	The Applicant will be fully compliant with MGN 654 as per Section 15.3.4 including the completion of an Emergency Response Co-operation Plan (ERCoP) and a Search and Rescue (SAR) checklist.
MCA	August 2021, Scoping Opinion (Document Reference: 7.25)	MGN 654 requires that hydrographic surveys should fulfil the requirements of the International Hydrographic Organization Order 1a standard, with the final data supplied as a digital full density data set, and survey report to the MCA Hydrography Manager. Failure to report the survey or conduct it to Order 1a might invalidate the NRA if it was deemed not fit for purpose.	The Applicant will be fully compliant with MGN 654 as per Section 15.3.4, including the hydrographic survey requirements.
Trinity House	August 2021, Scoping Opinion (Document Reference: 7.25)	The NRA should include comprehensive vessel traffic analysis in accordance with MGN 654.	MGN 654 compliant vessel traffic surveys have been undertaken noting the survey data methodology was agreed with both MCA and Trinity House. The NRA (ES Appendix 15.1 (Document Reference: 3.3.16)) also includes assessment of long term AIS data.
Trinity House	August 2021, Scoping Opinion (Document Reference: 7.25)	The possible cumulative and in-combination effects on shipping routes and patterns should be adequately assessed.	The NRA (ES Appendix 15.1 (Document Reference: 3.3.16)) includes a full cumulative routeing assessment.
Trinity House	August 2021, Scoping Opinion (Document Reference: 7.25)	Proposed layouts should conform to MGN 654 and significant consideration should be given to the layout of the current Greater Gabbard Offshore Wind Farm (OWF) in this regard. The North Falls project layout should align with the current operational site.	The Applicant will be fully compliant with MGN 654 as per Section 15.3.4 including ensuring suitable SAR access. The final layout will be agreed with the MCA and Trinity House and will consider the existing infrastructure.
Trinity House	August 2021, Scoping Opinion	We consider that this development will need to be marked with marine aids to	As per Section 15.3.4, lighting and marking will be agreed with Trinity

Consultee	Date / document	Comment	Response / where addressed in the ES
	(Document Reference: 7.25)	navigation by the developer/operator in accordance with the general principles outlined in IALA (International Association of Marine Aids to Navigation and Lighthouse Authorities) Recommendation O-139 on the Marking of Man-Made Offshore Structures (IALA, 2021) as a risk mitigation measure. In addition to the marking of the structures themselves, it should be borne in mind that additional aids to navigation such as buoys may be necessary to mitigate the risk posed to the mariner, particularly during the construction phase. All marine navigational marking, which will be required to be provided and thereafter maintained by the developer, will need to be addressed and agreed with Trinity House. This will include the necessity for the aids to navigation to meet the internationally recognised standards of availability and the reporting thereof.	House and will be IALA G1162/R139 (IALA, 2021) compliant.
Trinity House	August 2021, Scoping Opinion (Document Reference: 7.25)	A decommissioning plan, which includes a scenario where on decommissioning and on completion of removal operations an obstruction is left on site (attributable to the wind farm) which is considered to be a danger to navigation and which it has not proved possible to remove, should be considered. Such an obstruction may require to be marked until such time as it is either removed or no longer considered a danger to navigation, the continuing cost of which would need to be met by the developer/operator.	The Applicant will comply with its decommissioning obligations under Chapter 3 (Decommissioning of Offshore Installations) of the Energy Act 2004 which require the Applicant to prepare a decommissioning programme following notice from the Secretary of State
Trinity House	August 2021, Scoping Opinion (Document Reference: 7.25)	The possible requirement for navigational marking of the offshore export cables and the vessels laying them. If it is necessary for the offshore export cables to be protected by rock armour, concrete mattresses or similar protection which lies clear of the surrounding seabed, the impact on navigation and the requirement for appropriate risk mitigation measures needs to be assessed.	As per Section 15.3.4, lighting and marking will be agreed with Trinity House and will be IALA G1162/R139 (IALA, 2021) compliant. The Applicant will also be MGN 654 compliant including in terms of underkeel clearance provisions i.e. depth will not be reduced by more than 5% unless otherwise agreed with the MCA. Consultation has been undertaken with HHA, PLA and London Gateway including via the Sunk User Group in relation to the offshore cable corridor including in relation to underkeel clearance.
MCA &Trinity House	Meeting, 28th April 2021	MCA and Trinity House raised concern over site boundaries	The MCA and Trinity House have been consulted on the Project including in

Consultee	Date / document	Comment	Response / where addressed in the ES
		relative to the Sunk routeing measures.	relation to specific concerns over the former array areas, and the input has fed into the ES. Section 42 feedback and further liaison has been used to refine the PDE including the array area.
CEMEX	Meeting, 28th September 2021	Dredging within southern section of Area 507/6 will be restricted during flood tides given size of area and fast tides.	Concern was focused on the previous northern array which has now been removed. Impacts on marine aggregate dredging are considered in Section 15.6.1.5.
CEMEX	Meeting, 28th September 2021	Noted a drifting dredging vessel may interact with cables.	Impacts on marine aggregate dredging are considered in Section 15.6.1.5.
CEMEX	Meeting, 28th September 2021	Noted dredgers in transit could re-route around the wind farm via the Sunk Traffic Separation Scheme (TSS) South without difficulty.	Impacts on marine aggregate dredging are considered in Section 15.6.1.5.
MCA	Meeting, 11th November 2021	MCA confirmed content with maritime vessel traffic survey strategy including separate surveys of the north and south array areas to ensure full coverage.	Vessel traffic survey data was collected as per the agreed methodology (see Section 15.4.2).
Stena Line	Meeting, 3rd December 2021	Noted that Stena were recorded using the recommended ferry route very occasionally in strong southerly winds and high swell for comfort of passengers and safety of cargo. The Sunk TSS South could be used as a safe alternative however this would lead to increased transit time.	Impacts on vessel displacement have been considered in Section 15.6.1.2.
Stena Line	Meeting, 3rd December 2021	Noted that the array areas may limit collision avoidance options.	Impacts on vessel to vessel collision and displacement have been considered in Sections 15.6.1.2 and 15.6.1.3.
Stena Line	Meeting, 3rd December 2021	Stated that any radar interference from existing wind farms was not an issue in practise as any effects can be mitigated via use of appropriate radar settings.	This has been assessed within the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)).
MCA & Trinity House	Meeting, 9th June 2022	MCA and Trinity House confirmed content with a 10nm study area for the NRA	The study area used is as agreed (see Section 15.3.1).
MCA & Trinity House	Meeting, 9th June 2022	MCA stated the southwest section of the north array area was of major concern and would likely need to be removed because of the impact on northbound vessels exiting the Sunk TSS North traffic lane. Overlap of the south array area with the Sunk precautionary area was seen as unacceptable by both the MCA and Trinity House.	The MCA and Trinity House have been consulted on the Project including in relation to specific concerns over the array area, and the input has fed into the ES. Section 42 feedback and further liaison has been used to refine the PDE including the array area detailed in Section 15.3.2.

Consultee	Date / document	Comment	Response / where addressed in the ES
		A buffer is also seen as essential between the south array and the Sunk TSS South.	
MCA & Trinity House	Meeting, 9th June 2022	The MCA would support an application to IMO to remove the recommended ferry route in the South array area (noting consultation needed), but this could be a long process and would not take effect until after the project is consented. MCA indicated consultation should be undertaken with the Belgian authorities as the route was originally intended for use by ferries to/from Ostend.	This process will be progressed at the appropriate time with the IMO in consultation with the relevant stakeholders as the Project moves forward.
Sunk VTS User Group	Meeting, 7th July 2022	HHA stated concern over the cable route and deep draughted vessels navigating through the area, with low under keel clearances. PLA stated they would be against any reduction in water depth.	An assessment of underkeel clearance has been provided in Section 15.6.2.7.
Sunk VTS User Group	Meeting, 7th July 2022	PLA noted that the impact of the installation vessels will also need to be considered.	Collision risk and impact from project vessels is considered in Sections 15.6.1.4 and 15.6.1.6.
Sunk VTS User Group	Meeting, 7th July 2022	HHA noted concern over cable routeing intersecting the pilot boarding area.	Collision risk and disruption from project vessels is considered in Sections 15.6.1.4 and 15.6.1.6.
Sunk VTS User Group	Meeting, 14th October 2022	HHA stated concern over export cable route refinement in proximity to the Sunk Pilot boarding area and Sunk Inner Light buoy with regards to pilotage for larger vessels.	Impact from project vessels on pilotage is considered in Section 15.6.1.6.
RYA	Section 42 Response, 25th May 2023	RYA is content to note that there are no plans to apply for operational safety zones other than those for construction, major maintenance and decommissioning and that the Applicant will also be MGN 654 compliant including in terms of underkeel clearance provisions i.e., depth will not be reduced by more than 5% unless otherwise agreed with the MCA. Consultation is ongoing with HHA, PLA, and Sunk User Group in relation to the offshore cable corridor including in relation to underkeel clearance.	The Applicant will be fully compliant with MGN 654 as per Section 15.3.3. This will include the provisions on underkeel clearance i.e. depth will not be reduced by more than 5% unless otherwise agreed with the MCA. An assessment of underkeel clearance has been provided in Section 15.6.2.7. Further consultation in noted in Section 15.2.
HHA	Section 42 Response, 11th July 2023	Due to draught of vessels and future dredging, consider a maximum draught of 20m plus 10% UKC, as such minimum depth required above the cables is 22m below Chart Datum.	Compliance with MGN 654 including in relation to reduction in under keel clearance is included as mitigation in Section 15.3.3 and this requirement is considered in the impact assessment in Section 15.6.

Consultee	Date / document	Comment	Response / where addressed in the ES
		5% in not acceptable in the Sunk area as vessel navigation with only 10% UKC.	
HHA	Section 42 Response, 11th July 2023	Construction operations must not impede vessel traffic movements within the Sunk area or normal operations such as pilot boarding.	Collision risk and disruption from project vessels during construction is considered in Sections 15.6.1.4 and 15.6.1.6. This includes consideration of the Outline Navigation and Installation Plan (NIP) (Document Reference: 7.24).
HHA	Section 42 Response, 11th July 2023	Maintenance operations must not impede vessel traffic movements within the Sunk area or normal operations such as pilot boarding.	Collision risk and disruption from project vessels during operational is considered in Sections 15.6.2.4 and 15.6.2.6. This includes consideration of the Outline NIP (Document Reference: 7.24).
HHA	Section 42 Response, 11th July 2023	Not in agreement with the impact on port access and pilotage operations being assessed as tolerable. It is not currently tolerable or tolerable with mitigation proposed.	Further consultation has been undertaken with HHA, PLA, and London Gateway including via the Sunk User Group in relation to impacts on port access and pilot operation. Impact on vessels transiting to / from local ports in the area, including use of approach channels, port operations and pilotage is assessed in Section 15.6.2.6. This includes consideration of the Outline NIP (Document Reference: 7.24).
HHA	Section 42 Response, 11th July 2023	Vessel may anchor in any area in an emergency, this may include dredging their anchor.	Interaction with subsea cables is assessed in Section 15.6.2.7.
HHA	Section 42 Response, 11th July 2023	Additional VTS coverage may be required in regard to increased vessel numbers.	Additional resourcing is discussed in the Outline NIP (Document Reference: 7.24).
HHA	Section 42 Response, 11th July 2023	The AIS study area within the NRA should have included the area to the west of the study area used, so that it include vessels on the Harwich DW Route into the Harwich DW Channel.	A 10nm study area for the array area and a 2nm study area for the offshore cable corridor is standard for shipping and navigation assessments and was discussed with MCA and Trinity House prior to the assessment. The offshore cable corridor study area covers the approach to the Harwich DW Channel, and traffic using the Sunk and Trinity DW routes. Detailed analysis of vessel traffic within this study area is included in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)).
HHA	Section 42 Response, 11th July 2023	In regard to sand waves in the area, if there is a significant change in the channel depth / location, shipping channels may be moved to take advantage of the deepest available depth of water.	Sand waves are noted in Navigational Features detailed in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)) and water depth changes are discussed in Section 15.6.2.7.
HHA	Section 42 Response, 11th July 2023	Vessel length analysis within the NRA does not represent the number of Ultra Large Container Vessels using the area. There is a significant difference between a 200m vessel and a 400m vessel.	A detailed vessel length analysis has been undertaken in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)).

Consultee	Date / document	Comment	Response / where addressed in the ES
		Please can this table be extended to show/ represent the other sizes of ships in the area. The average vessel length recorded has no relevance as it is not representative in any way for the vessels using the area.	
HHA	Section 42 Response, 11th July 2023	Vessel draught analysis needs breaking down. currently receive vessels up to 16m draught, this is a stark difference from a 9m draught vessel. As such the image and text are not representative. It is worth noting that pilot vessel are attending vessels of all draughts, and so their own draught is not relevant.	A detailed vessel draught analysis has been undertaken in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)).
HHA	Section 42 Response, 11th July 2023	In regard to the offshore cable corridor impacts in the Risk Control Log, there is currently not enough project detail for the cable route to assess this. Additionally, control measures have not be discussed. As such Risk cannot be stated as tolerable.	Impacts have been assessed via the Formal Safety Assessment (FSA) in Section 15.6.
Trinity House	Section 42 Response, 13th July 2023	Trinity House considers two areas within the red line boundary to be undevelopable. These areas would significantly compromise the safety of vessels using these internationally recognised shipping routes and are therefore deemed unacceptable.	The areas of concern have since been removed during the refinement of the array area post PEIR as per Section 15.3.2. Distances from the structures to the local routeing measures is assessed and considered in Section 15.6.
Trinity House	Section 42 Response, 13th July 2023	Trinity House welcome your earliest possible consultation regarding proposed turbine layouts, as well as the locations of any other infrastructure, as this matter may well require significant work to reach agreement.	The worst case layout for shipping and navigation has been used throughout the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)) and this Chapter. The final layout will be agreed with MCA and Trinity House post consent as per Section 15.3.4.
MCA	Section 42 Response, 14th July 2023	Recommend that representatives from the Belgian Maritime Administration are invited to the Hazard Workshop.	Hazard Workshop details are provided in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)) noting the Belgian National Authority for Maritime Safety was in attendance.
MCA	Section 42 Response, 14th July 2023	Residual Impacts are not accepted at this stage since the assessment is incomplete, no risk controls are proposed, and it is an assessment on 'impacts', not navigational hazards.	Impacts have been assessed via the FSA in Section 15.6.
MCA	Section 42 Response, 14th July 2023	The proposed southern array area encroaches into the SUNK TSS Precautionary Area and is adjacent to two TSSs. The encroachment into the Precautionary Area is unacceptable to MCA as it would	The refinement of the array area post PEIR (as per Section 15.3.2) has removed the overlap with the Outer Precautionary Area. Distances from the structures to the local routeing measures is assessed and considered in Section 15.6.

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		interfere with the use of recognised sea lanes essential to international navigation. The distance between the SUNK TSS South and the wind farm boundary is approximately 120m which does not meet MCA expectations of a 2nm separation distance as per MGN654 Annex 2. The distance between the SUNK TSS East and the boundary is less than half a nautical mile which also does not meet MCA expectations and guidance.	
MCA	Section 42 Response, 14th July 2023	The southern array area is proposed over an international Recommended Route (Galloper route) for ferries between UK and Belgium. It would require agreement, at least in principle, with relevant operators, ports and IMO members, in particular the Belgian maritime administration, to remove the ferry route from the routeing measure. If agreement cannot be reached MCA would not be able to support a proposal to remove the Galloper Recommended Ferry Route and, in all likelihood, it will result in objections to the proposed development.	Consultation has been undertaken with the Belgian Authorities to discuss the Galloper Recommended Ferry Route. This process will be progressed at the appropriate time with the IMO in consultation with the relevant stakeholders as the Project moves forward. Detailed assessment of the Galloper Recommended Ferry Route is provided in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)).
MCA	Section 42 Response, 14th July 2023	The proposed northern array is located at the end of the SUNK TSS North and encroaches into the route where vessels exit the TSS. This western section of the northern array, located at the end of the TSS Separation Zone, would force vessels further west and restrict the available sea room. It would remove the safety clearance between the traffic exiting the TSS and Greater Gabbard wind farm. This section of the northern array is unacceptable to MCA as it would interfere with the use of a recognised sea lane essential to international navigation.	Section 42 feedback and further liaison has been used to refine the PDE including the complete removal of the northern array (Section 15.3.2). Distances from the structures to the local routeing measures is assessed and considered in Section 15.6.
Chamber of Shipping	Section 42 Response, 14th July 2023	Amendments to the PDE and Red Line Boundary post PEIR are welcomed and are necessary. As the information is out of date at PEIR then this reduces feedback submitted by stakeholders.	The PDE has been refined post PEIR including using input from consultation as detailed in Section 15.3.2. The final layout will be agreed with the MCA and Trinity House post consent as per Section 15.3.4.
Chamber of Shipping	Section 42 Response, 14th July 2023	The Chamber has very strong concerns for the proposed encroachment into IMO Traffic Separation Scheme areas and firmly supports the comments	The Chamber of Shipping along with the MCA and Trinity House have been consulted on the Project including in relation to specific concerns over the former array areas, and the preliminary

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		raised by the MCA and Trinity House in their meeting with the developer on 9 June 2022.	input has fed into the ES. Section 42 feedback and further liaison has been used to refine the PDE including a set back of the array area from the TSS (Section 15.3.2). Distances from the structures to the local routeing measures is assessed and considered in Section 15.6.
Chamber of Shipping	Section 42 Response, 14th July 2023	The southwest section of the north array area is unacceptable from a navigation standpoint and need removal because of the impact on northbound vessels exiting the Sunk TSS North traffic lane. The overlap of the south array area with the Sunk Precautionary Area is unacceptable for navigational safety. The south array area abuts directly to the Sunk TSS South which is unacceptable for navigational safety and a greater buffer will be required.	The PDE has been refined using input from consultation including the array area to ensure it is safe from a shipping and navigation perspective including removal of the northern array and reduction of the southern array as detailed in Section 15.3.2. Distances from the structures to the local routeing measures is assessed and considered in Section 15.6.
Chamber of Shipping	Section 42 Response, 14th July 2023	The proposed south array would block and prevent usage of an international recommended route for ferries (the Galloper recommended ferry route) between UK and Ostend, Belgium. Whilst the Chamber acknowledges that the route is not in regular current use, some adverse weather routeing, it also is aware that the port of Ostend is looking to establish a green corridor between it and the UK, which may well see the regular reopening of the route. It would require agreement, at least in principle, with relevant operators, ports and IMO members, in particular the Belgian maritime administration, to remove the Galloper recommended ferry route from the routeing measure. The Chamber does not find any meaningful analysis of this route nor consultation with Belgian administration in the PEIR documentation which is again a concern that need addressing post PEIR.	Consultation has been undertaken with the Belgian Authorities to discuss the Galloper Recommended Ferry Route. This process will be progressed at the appropriate time with the IMO in consultation with the relevant stakeholders as the Project moves forward. Assessment of the Galloper recommended ferry route is included within the NRA including adverse weather routeing and the establishment of a green corridor (ES Appendix 15.1 (Document Reference: 3.3.16)).
Chamber of Shipping	Section 42 Response, 14th July 2023	The Chamber recommends examination of set entry/exit points into the array areas for project vessels in particular for those entering from the Sunk TSS area as an additional risk	Embedded mitigation measures detailed in Section 15.3.3, which include entry / exit points for project vessels.

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		mitigation and means to reduce collision risk between project vessels and third party. Whilst all vessels should be abiding by Collision Regulations, such an additional mitigation would provide assistance to commercial shipping in recognising where project vessels may be entering the TSS	
Chamber of Shipping	Section 42 Response, 14th July 2023	The Chamber has safety concerns with the cable route corridor in particular for Under Keel Clearance and cable burial depth.	An assessment of underkeel clearance has been provided in Section 15.6.2.7. There will be a cable burial risk assessment process as per Section 15.3.4.
Chamber of Shipping	Section 42 Response, 14th July 2023	A cable route which crosses IMO traffic routeing measures and designated DW routes specifically designed for deep draught vessels with restricted manoeuvrability there must be very careful consideration to cable burial depth so as not to impinge on navigational safety, restrict future access to ports. The Chamber has strong concern and objection where a target burial depth of 0-1m is stated as this would provide no opportunity for dredging necessary to maintain the future accessibility of key ports.	The Applicant will be fully compliant with MGN 654 as per Section 15.3.4 including the provisions on underkeel clearance. Consultation has been undertaken with HHA, PLA, and London Gateway including via the Sunk User Group in relation to the offshore cable corridor including in relation to underkeel clearance. An assessment of underkeel clearance has been provided in Section 15.6.2.7 and the impact on vessels transiting to / from local ports in the area, including use of approach channels, port operations and pilotage is assessed in Section 15.6.2.6.
Chamber of Shipping	Section 42 Response, 14th July 2023	The Chamber recommends that fuller analysis of vessels with large draught be undertaken, suggests that analysis be carried out with additional categorisation for aid granularity.	Detailed vessel draught analysis is included within the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)) including a focus on greater vessel draughts within the offshore cable corridor and DW routes.
Chamber of Shipping	Section 42 Response, 14th July 2023	The Chamber wishes this to include careful consideration of interaction with other cables in the area in particular: Five Estuaries, NeuConnect, and Sea Link, and how cumulatively these may significantly reduce the ability for vessels to undertake emergency anchoring	Cumulative assessment is included in Section 15.7 which includes cable developments.
Chamber of Shipping	Section 42 Response, 14th July 2023	The Chamber recommends an additional scenario of 30% increase in overall vessel numbers is modelled.	Consultation with Chamber of Shipping has provided input into future case scenarios for assessment in traffic volumes and scenarios have been detailed within the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)). This includes a 30% traffic growth scenario.
Chamber of Shipping	Section 42 Response, 14th July 2023	The Chamber objects to the preferred decommissioning assumption of leaving cabling and other infrastructure in situ. The Chamber strongly advocates for	The Applicant will comply with its decommissioning obligations under Chapter 3 (Decommissioning of Offshore Installations) of the Energy Act 2004 which require the Applicant to

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		the full removal of all infrastructure above and below the seabed.	prepare a decommissioning programme following notice from the Secretary of State.
PLA	Section 42 Response, 14th July 2023	PLA noted there is no comment on the importance of Black Deep and King's Channel as being the DW access routes for the port and although highlighted in main commercial routes, routes through the black deep are not classed as a main route.	These DW routes are outside of the study area, however detailed draught analysis of associated vessels has been undertaken in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)).
PLA	Section 42 Response, 14th July 2023	There is no assessment of future traffic concerns assessed at this stage despite being listed under the MGN Checklist.	Future case vessel traffic is assessed in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)).
PLA	Section 42 Response, 14th July 2023	Although not in proximity to the array, local traffic routes to the Port of London or Harwich have not been considered.	Detailed analysis of the Sunk and Trinity DW is provided in the NRA (ES Appendix 15.1 (3.3.16)).
PLA	Section 42 Response, 14th July 2023	Vessels using the PLA DW routes are not considered in the draught analysis due to the set upper limit of the categories used. Current maximum draughts of vessels in the area are not highlighted and it is not considered how these draughts may increase over time.	Vessel draught analysis is included within the NRA (ES Appendix 15.1 Document Reference: 3.3.16)) including a focus on greater vessel draughts within the offshore cable corridor and DW routes. This includes consideration of the potential for increasing draughts.
PLA	Section 42 Response, 14th July 2023	The cable route is in direct conflict with the Sunk DWR which the London Gateway Harbour Empowerment Order (HEO) gives the power to dredge to 16.5m plus a 1m tolerance, noting this could be increased in the future. If the cable were laid with a 5% reduction in water depth at the current crossing point of the Sunk DW route (approximately 18m depth) then the resulting depth would be within the dredging range.	This has been considered and assessed in Section 15.6. The Project is committing to not reducing depths over the Sunk or Trinity DW routes.
PLA	Section 42 Response, 14th July 2023	Highlight the importance of future proofing and emphasised the PLA's requirement of a safeguarding of 20m of water plus any burial depth required for cable protection. Whilst underkeel clearance is important, the cable cannot limit the future of the UK's largest port by being laid at a depth that is insufficient to allow a dredge to occur at a later date. The risk in not laying the cable at depth has been considered but this only refers to interaction with vessels and not the risk to the Port. There is also no consideration of interaction with other cables or consideration of contingencies for areas where cable cannot be buried due to	Impacts on port access including in terms of future case trends are assessed in Section 15.6. Equivalent assessment on a cumulative basis is provided in Section 15.7.

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		surface nature. NeuConnect is mentioned but there is no consideration of crossing points and effect on burial depths.	
PLA	Section 42 Response, 14th July 2023	Opportunities to have a combined cable corridor with Five Estuaries have not been considered and in combination effects with Five Estuaries with regard to current and future port access need to be assessed in the ES. It is also noted that the scheme has a lifespan of approx. 30 years and upon decommissioning, cables would be abandoned and any scour protection (with its resultant impact on water depths) is likely to be left in situ.	See ES Chapter 4 Site Selection and Assessment of Alternatives (Document Reference: 3.1.6). Cumulative impacts are assessed in 15.7. The Outline NIP (Document Reference: 7.24) includes consideration of cumulative developments. The Applicant will comply with its decommissioning obligations under Chapter 3 (Decommissioning of Offshore Installations) of the Energy Act 2004 which require the Applicant to prepare a decommissioning programme following notice from the Secretary of State
PLA	Section 42 Response, 14th July 2023	No reference in the "reduced port access" worst case scenarios to burial depths not being achieved during construction or to the potential for reduced port access due to the burial depths that are proposed. Notably under the impact '*interaction with subsea cables'* there is reference to an offshore export cable target burial depth of only 0.5m and a minimum of 0m.	Impact on vessels transiting to/from local ports in the area, including use of approach channels, port operations and pilotage is assessed in Section 15.6.2.6.
PLA	Section 42 Response, 14th July 2023	The scale of navigation chart used in the figures for the Navigation and Shipping chapter does not show the location of the charted DW routes referenced in the assessment text.	Charted DW routes have been assessed in detail within the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)).
PLA	Section 42 Response, 14th July 2023	Further consideration needs to be given to the disruption to services around the Sunk Pilot station during construction. Any construction and eventually maintenance needs to be done in close cooperation with the PLA and Harwich in order to minimise the disruption over a 3 year period. It is also suggested that communication and consultation needs to occur with London Gateway and other terminal operators using the DW routes so that scheduling can be carefully managed throughout this time.	Collision risk and disruption from project vessels during construction is considered in Sections 15.6.1.4 and 15.6.1.6 and in Sections 15.6.2.4 and15.6.2.6. This includes consideration of the Outline NIP (Document Reference: 7.24) which North Falls have developed in liaison with local ports including PLA to manage impacts on pilotage. Embedded mitigation measures detailed in Section 15.3.4 including the marine coordination of Project vessels.
Chamber of Shipping	Meeting, 23rd August 2023	Chamber of Shipping content with revised site boundary while noting SAR and layout considerations required due to shape of site.	The PDE has been refined using input from consultation including the array area as detailed in Section 15.3.2. The

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			final layout will be agreed with the MCA and Trinity House.
Chamber of Shipping	Meeting, 23rd August 2023	Suggested the inclusion of a more detail vessel draught analysis in final NRA.	Vessel draught analysis is included within the NRA (ES Appendix 15.1, Document Reference: 3.3.16)) including a focus on greater vessel draughts within the offshore cable corridor and Deep Water (DW) routes.
Chamber of Shipping	Meeting, 23rd August 2023	Noted emergency anchoring is becoming challenging due to the number of cables potentially leading to further drifting.	Interaction with subsea cables is assessed in Section 15.6.2.7.
Chamber of Shipping	Meeting, 23rd August 2023	Suggested an increase to 30% for future case scenario.	Consultation with Chamber of Shipping has provided input into future case scenarios for assessment in traffic volumes and scenarios have been detailed within the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)). This includes a 30% future case scenario.
MCA	Meeting 24th August 2023	Raised concern over proximity to the Sunk TSS lanes and Outer Precautionary Area.	Associated impacts have been assessed in the NRA and in Section 15.6.
Trinity House	Meeting 26th August 2023	Trinity House content with revised site boundary, and no issue raised with proximity to the Sunk Outer Precautionary Area, only concerns would be if an isolated / protruding structure was present.	Allision risk is considered in Sections 15.6.1.1 and 15.6.2.1 and the Applicant will be fully compliant with MGN 654 as per Section 15.3.4 with the final layout will be agreed with the MCA and Trinity House.
HHA	Meeting, 29th August 2023	Discussions held around cable installation.	Impact from project vessels on port access and pilotage including from cable installation is considered in Section 15.6.1.6.
CLdN	Meeting, 11th September 2023	CLdN in agreement with 0.8nm setback of array area.	The PDE has been refined using input from consultation including the array area as detailed in Section 15.3.2.
CLdN	Meeting, 11th September 2023	No concerns over usage of the Galloper Recommended Ferry Route.	Assessment of the ferry route is included within the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)).
CLdN	Meeting, 11th September 2023	Slight re-routeing would be required by CLdN vessels through the Sunk TSS due to the presence of the Project but is not of concern.	Vessel traffic deviations have been assessed within the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)) with vessel displacement being assessed in Section 15.6.
PLA	Meeting, 27th September 2023	PLA preference for the spatial area where the cable will cross the DW routes to be minimised e.g., by considering angle of crossing.	The Applicant will be MGN 654 compliant including in terms of underkeel clearance provisions i.e. depth will not be reduced by more than 5% unless otherwise agreed with the MCA. This requirement is considered in the impact assessment in Section 15.6.2.7. Collision risk and disruption from project vessels is considered in Sections 15.6.1.4 and 15.6.1.6.
PLA	Meeting, 27th September 2023	Noted that berths at London Gateway may double and so will future traffic.	Consultation with PLA and London Gateway has provided input into future case scenarios for assessment in traffic volumes and scenarios have

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			been detailed within the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)).
Belgium National Authority for Maritime Safety	Meeting, 30th September 2023	Belgian National Authority for Maritime Safety agreed with site refinements to protect the Sunk routeing measures.	The PDE has been refined using input from consultation including the array area as detailed in Section 15.3.2.
Belgium National Authority for Maritime Safety	Meeting, 30th September 2023	Agreed the Galloper Recommended Ferry Route is no longer used for its original intended purpose, but it was established historically by the IMO and is protected under The 1982 United Nations Convention on the Law of the Sea (UNCLOS). It would have to go before the IMO to be removed	Assessment of the ferry route is included within the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)). This process will be progressed at the appropriate time with the IMO in consultation with the relevant stakeholders as the Project moves forward.
Belgium National Authority for Maritime Safety	Meeting, 30th September 2023	Requested deviations through the Sunk TSS for the ferry route be explored and the potential for addition traffic encounter situations.	Assessment of the ferry route is included within the NRA including potential deviation options (ES Appendix 15.1 (Document Reference: 3.3.16)) with vessel displacement being assessed in Section 15.6. Vessel encounters have been used an input into the impact assessment (Section 15.6).
London Gateway	Meeting, 4th October 2023	Key concern is pilot boarding and Sunk Trinity pilot as sunk pilotage used more frequently than others.	Collision risk and disruption from project vessels is considered in Sections 15.6.1.4 and 15.6.1.6.
London Gateway	Meeting, 4th October 2023	London Gateway specifically interested in depth of cable burial.	Consultation has been undertaken with HHA, PLA, and London Gateway including via the Sunk User Group in relation to the offshore cable corridor including in relation to underkeel clearance. The Applicant will be fully compliant with MGN 654 as per Section 15.3.4. This will include the provisions on underkeel clearance i.e. depth will not be reduced by more than 5% unless otherwise agreed with the MCA. There will be a cable burial risk assessment process as per Section 15.3.4.
London Gateway	Meeting, 4th October 2023	Noted that vessel movements are expected to at least double by the operational stage of the Project.	Consultation with London Gateway has provided input into future case scenarios for assessment in traffic volumes and scenarios have been detailed within the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)).
London Gateway	Meeting, 4th October 2023	Noted anchor strikes in an emergency situation should be considered.	Interaction with subsea cables is assessed in Section 15.6.2.7. There will be a cable burial risk assessment process as per Section 15.3.4.
London Gateway	Meeting, 4th October 2023	In London Gateway's view, burial depth needs to be deep enough to protect business for 50 years. 10% underneath clearance of	Compliance with MGN 654 including in relation to reduction in under keel clearance is included as mitigation in Section 15.3.3 and this requirement is considered in the impact assessment in Section 15.6. There will be a cable

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		water depth is required, and the cable needs to then sit below that.	burial risk assessment process as per Section 15.3.4. The NRA (ES Appendix 15.1 (Document Reference: 3.3.16)) includes future case considerations in terms of vessel size which has considered the London Gateway input.
London Gateway	Meeting, 4th October 2023	Input from London Gateway is vessel draughts are likely to increase in the future.	Consultation with London Gateway has provided input into future case scenarios for assessment in traffic volumes and scenarios, and have been detailed within the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)).
All attendees	Hazard Workshop, 12th October 2023	The presence of dredging dumping grounds should be considered.	Spoil grounds have been highlighted within the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)) and impacts on marine aggregate dredging are considered in Section 15.6.1.5.
MCA	Hazard Workshop, 12th October 2023	Raised concern over proximity to the Sunk TSS lanes and Outer Precautionary Area.	The MCA have been consulted on the Project including in relation to specific concerns over the array area, and the input has fed into the ES. Section 42 feedback and further liaison has been used to refine the PDE including the array area as detailed in Section 15.3.2. Distances from the structures to the local routeing measures is assessed and considered in Section 15.6.
MCA	Hazard Workshop, 12th October 2023	Recreational vessels use the Galloper Recommended Ferry Route and if pushed towards heavier commercial routes then it would be a safety concern. It was also noted that if deviated vessels go through North and West Hinder Junctions, this would cause interaction with more vessels.	Impacts on recreational vessels have been assessed in Section 15.6. Vessel deviations have been assessed in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)).
MCA	Hazard Workshop, 12th October 2023	The Project will need to consider VTS coverage in regard to radar interference.	Radar interference is assessed in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)). The Outline NIP (Document Reference: 7.24) includes consideration of potential stakeholder resource requirements including Sunk VTS.
Port of Felixstowe	Hazard Workshop, 12th October 2023	Noted Harwich has deepened the main approach channel to 16m, and they could currently get 17 metre (m) draught vessels in due to available routeing and with tides.	Assessment of 2023 AIS data capturing the Harwich DW Channel post deepening has been undertaken in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)).
HHA & London Gateway	Hazard Workshop, 12th October 2023	In regard to underkeel clearance, the DW route crossings are the key concern.	The Applicant will be fully compliant with MGN 654 as per Section 15.3.3. This will include the provisions on underkeel clearance i.e. depth will not be reduced by more than 5% unless otherwise agreed with the MCA. An assessment of underkeel clearance has been provided in Section 15.6.2.7.

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			There will be a cable burial risk assessment process as per Section 15.3.4.
Chamber of Shipping	Hazard Workshop, 12th October 2023	Noted that if there is an isolated structure on a pinch point corner it would be of concern.	Allision risk is considered in Sections 15.6.1.1 and 15.6.2.1 the Applicant will be fully compliant with MGN 654 as per Section 15.3.3 with the final layout agreed with the MCA and Trinity House.
Chamber of Shipping	Hazard Workshop, 12th October 2023	The Chamber of Shipping appreciated that entry/exit point locations may not be able to be confirmed at this stage but a commitment to their use could be a useful mitigation.	Embedded mitigation measures detailed in Section 15.3.3, which include definition of entry / exit points to the array area.
Chamber of Shipping	Hazard Workshop, 12th October 2023	Noted it is worth consulting with Cruising Association as the Royal Ocean Racing Club may pass through the site.	Cruising Association and RYA were consulted with as part of the NRA process.
Chamber of Shipping and Belgian National Authority for Maritime Safety	Hazard Workshop, 12th October 2023	Noted the vessel traffic analysis identified vessels transiting on the Galloper Recommended Ferry Route and agreement needed between Belgium and United Kingdom (UK) is required.	Assessment of the ferry route is included within the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)). This process will be progressed at the appropriate time with the IMO in consultation with the relevant stakeholders as the Project moves forward.
Chamber of Shipping	Hazard Workshop, 12th October 2023	Requested to see potential deviations and calculations for the Galloper Recommended Ferry Route as time sensitive scheduled services are of importance.	Assessment of the ferry route is included within the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)) including potential deviations for the route although it is understood the Galloper Recommended Ferry Route is not utilised.
DEME Group	Hazard Workshop, 12th October 2023	Dredging in Area 524 is not represented by the vessel traffic surveys due to activity only commencing April 2023. Current activity for the area is 110,000 tonnes equating at 25 minimum visits per year and can dredge up to 30m wide. Although 50-100m buffer is present at perimeters of dredge areas, vessels can still operate up to and beyond boundary. Stated that with the delivery of cargoes from Area 524 to the continent and east coast of England, e.g., Ipswich, dredgers would cross the area.	The NRA now considers up to date AIS data covering the period July 2023 to December 2023, in addition to a second vessel traffic survey undertaken in January 2024, datasets which include activity in Area 524. DEME have also been consulted directly following the hazard workshop.
RYA	Meeting, 27th October 2023	No concerns over 0.8nm distance of array area from TSS lanes noting most recreational vessel transit the TSS at 90 degrees and the Project is far enough offshore mariners should be aware of hazards.	Distances from the structures to the local routeing measures is assessed and considered in Section 15.6.

Consultee	Date / document	Comment	Response / where addressed in the ES
RYA	Meeting, 27th October 2023	Most important aspect for recreational vessels is to maintain the ability to transit within wind farm and a channel through array area would likely be most effective given it would provide confidence for mariners if choosing to transit through.	The Applicant will be fully compliant with MGN 654 as per Section 15.3.4. The final layout will be agreed with the MCA and Trinity House and will consider recreational vessels.
RYA	Meeting, 27th October 2023	Preference for two lines of orientation and consideration of the existing Greater Gabbard and Galloper turbines would be important	The Applicant will be fully compliant with MGN 654 as per Section 15.3.4. The final layout will be agreed with the MCA and Trinity House and will consider the existing infrastructure.
RYA	Meeting, 27th October 2023	Noted Cruising Association may have further insight given location of project further offshore.	Cruising Association were consulted with as part of the NRA and ES process.
RYA	Meeting, 27th October 2023	Promulgation of information would be the key mitigation in terms of recreational vessels.	Embedded mitigation measures detailed in Section 15.3.4 which include promulgation of information.
RYA	Meeting, 27th October 2023	Offshore concern for recreational vessels is during installation and maintenance activities. If large vessel/pilot operation are in area then recreational vessels will tend to avoid.	Compliance by all Project vessels with Convention on International Regulations for Preventing Collisions at Sea (COLREGS) (IMO, 1972) and International Convention for the Safety of Life at Sea (SOLAS) (IMO, 1974), promulgation of information and appropriate marking on nautical charts are all include.
RYA	Meeting, 27th October 2023	Typical recreational draughts don't exceed 4m, any reductions in water depths of less than 4m may be of concern.	Compliance with MGN 654 including in relation to reduction in under keel clearance is included as mitigation in Section 15.3.4 and this requirement is considered in the impact assessment in Section 15.6.
Cruising Association	Meeting, 29th November 2023	Content with the site reductions noting recreational users will avoid having to cross a TSS, and if they do need to would seek to cross at right angles as per COLREGS.	The PDE has been refined using input from consultation including the array area as detailed in Section 15.3.2.
Cruising Association	Meeting, 29th November 2023	A designated channel through the array would be an option for recreational vessels transiting within array.	The Applicant will be fully compliant with MGN 654 as per Section 15.3.4. The final layout will be agreed with the MCA and Trinity House and will consider recreational vessels.
MCA	Meeting, 5th March 2024	Discussions held around distances from structures within the Array Area and the local routeing measures. MCA position for North Falls is that a minimum distance of 1nm is required from all surface piercing infrastructure to the routeing measures.	Distances from the structures to the local routeing measures is assessed and considered in Section 15.6.
DEME	Meeting, 5th April 2024	DEME confirmed limited concerns with normal dredging operations given they do not dredge right up to the boundary of Area 524. Periodic surveys around total extent of Area 524 occur every	Associated impacts are assessed in Section 15.6.

Consultee	Date / document	Comment	Response / where addressed in the ES
		five years. Agreed that collaboration and liaison procedures should be put in place between DEME and North Falls.	
MCA, Trinity House and Chamber of Shipping (CoS)	Meeting, 27th June 2024	Key shipping and navigation considerations identified through the NRA process were discussed. All confirmed content that the implementation of a Structure Exclusion Zone (SEZ) whereby no surface piercing infrastructure is installed within 1nm of the local routeing measures (unless otherwise agreed with the MCA) resulted in sufficient distances between structures and the routeing measures.	Distances from the structures to the local routeing measures is assessed and considered in Section 15.6. This includes the implementation of the proposed SEZ.
MCA	Meeting, 27th June 2024	The MCA stated provision would need to be in place to formally remove the Galloper Recommended Ferry Route before construction commenced.	Consultation has been undertaken with the Belgian Authorities to discuss the Galloper Recommended Ferry Route. This process will be progressed at the appropriate time with the IMO in consultation with the relevant stakeholders as the Project moves forward.

15.3 Scope

15.3.1 Study area

7. The study area for Shipping and Navigation has been defined as a 10nm buffer of the offshore array area and 2nm around the offshore cable corridor. These are standard distances for Shipping and Navigation assessment and ensure relevant routeing which may be affected is captured, while still remaining site-specific to the area being studied. In the case of North Falls, the 10nm buffer around the array area captures the following key local elements and features:

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

8. It is noted that there are also IMO adopted routeing measures further offshore to the east, including the TSS North Hinder South, North Hinder Junction and the associated DW Routes. These measures sit outside of the study area. Given their large distance from the array area (which means the measures themselves will not be directly affected) 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 buffer. However, the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)) has considered the offshore routeing measures, noting potential for vessels on routes associated with routeing measures outside of the study area to still pass in proximity to the array area.

9. The 10nm and 2nm study areas are shown in ES Figure 15.1 (Document Reference: 3.2.11).

15.3.2 Site refinement

10. It is noted that significant changes have been made to the PDE 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. This reduction is in response to feedback raised in relation to a number of environmental aspects, and shipping and navigation stakeholder concerns were a primary driving factor. Issues raised in relation to shipping and navigation include:

    - Concerns over proximity of the south-western extent of the northern array area to the Sunk TSS North;
    - Concerns over overlap of north-western extent of southern array area and the Sunk Outer Precautionary Area; and
    - Concern over proximity of the southern array area to the Sunk TSS South and Sunk TSS East.

11. In response to these concerns, the northern array has been removed in its entirety and 26% of the southern array (now the 'array area') has been removed; including the overlap of the Sunk Outer Precautionary Area. Consideration of precise distances of surface piercing infrastructure to the local IMO routeing measures has been assessed within the array area in more detail in Section 15.6.

12. Concerns over the inclusion of the Galloper recommended ferry route within the array area have also been raised. A full analysis of the route, including potential deviations, has been undertaken in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)).

15.3.3 Realistic worst case scenario

13. The final design of North Falls will be confirmed through detailed engineering design studies that will be undertaken post-consent. In order to provide a precautionary but robust impact assessment at this stage of the development process, realistic worst case scenarios have been defined in terms of the likely significant effects that may arise. This approach to EIA, referred to as the Rochdale Envelope, is common practice for developments of this nature, as set out in Planning Inspectorate Advice Note Nine (2018). The Rochdale Envelope for a project outlines the realistic worst case scenario for each individual impact, so that it can be safely assumed that all other scenarios within the design envelope will have less impact. Further details are provided in ES Chapter 6 EIA Methodology (Document Reference: 3.1.8).

14. One area of optionality is in relation to the national grid connection point (discussed further in ES 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 and onshore cable duct installation (but with separate onshore export cables) and co-locating separate project onshore substation infrastructure with Five Estuaries Offshore Wind Farm (herein 'Five Estuaries); or
- Option 3: Offshore electrical connection, supplied by a third party.

15. The realistic worst case scenarios for the Shipping and Navigation assessment are summarised in Table 15.2. These are based on North Falls parameters described in ES Chapter 5 Project Description (Document Reference: 3.1.7), which provides further details regarding specific activities and their durations.

16. For Shipping and Navigation, options 1 and 2 would be the same, and these represent the worst case scenario described in Table 15.2 and assessed in Section 15.6. For Option 3 there would be no project offshore export cables to shore as the Project's connection to the national grid would be offshore at the offshore converter platform (OCP). Within the array area, under options 1 and 2 there would be up to two offshore substation platforms (OSPs); whereas for Option 3 there would be one OCP and up to one OSP, i.e. under all scenarios there would be a maximum of two platforms.

Table 15.2 Realistic worst case scenarios

Impact	Parameter	Notes
Construction		
Impact 1: Vessel to structure allision	• Full build out of array area; • 57 Wind Turbine Generators (WTGs); • WTGs on jacket foundations of 50x50m at Lowest Astronomical Tide (LAT); • Two OSPs; • OSP topside dimensions of 60x40m; • Offshore construction of two years.	Maximum number of structures with largest surface dimensions over greatest duration will lead to maximum allision risk.
Impact 2: Vessel displacement	• Maximum extent of buoyed construction areas; • 57 WTGs; • Two OSPs; • Use of 500m construction safety zones and 50m pre-commissioning safety zones; • Total offshore cable corridor length of 125.4 kilometres (km); • Maximum number of offshore export cables: Two • Peak of 35 construction vessels offshore; and • Offshore construction of two years.	Maximum extent of buoyed construction area and export cable over greatest duration will maximise displacement of deviated vessels.
Impact 3: Increased vessel to vessel collision risk (third party to third party)	• Maximum extent of buoyed construction area; • 57 WTGs; • Two OSPs; • Use of 500m construction safety zones and 50m pre-commissioning safety zones; • Total offshore cable corridor length of 125.4km; • Maximum number of offshore export cables: Two • Peak of 35 construction vessels offshore; and • Offshore construction of approximately two years.	Maximum extent of buoyed construction area and export cable over greatest duration will maximise displacement of deviated vessels which will lead to largest increase in collision risk.
Impact 4: Increased vessel to vessel collision risk (third party to project vessel)	• Maximum extent of buoyed construction areas; • 57 WTGs; • Two OSPs; • Use of 500m construction safety zones and 50m pre-commissioning safety zones; • Total offshore cable corridor length of 125.4km; • Maximum number of offshore export cables: Two • Peak of 35 construction vessels offshore; and	Maximum extent of construction works and maximum number of vessels over greatest duration will lead to largest collision risk between third party vessels and project vessels.

Impact	Parameter	Notes
	• Offshore construction of two years.	
Impact 5: Impacts on vessels involved in marine aggregate operations	• Maximum extent of buoyed construction areas; • 57 WTGs; • Two OSPs; • Use of 500 m construction safety zones and 50m pre-commissioning safety zones; • Total offshore cable corridor of 125.4km; • Maximum number of offshore export cables: Two • Peak of 35 construction vessels offshore; and • Offshore construction of two years.	Maximum number of structures with largest surface dimensions over greatest duration will lead to maximum allision risk.
Impact 6: Reduced port access	• Maximum extent of buoyed construction areas; • 57 WTGs; • Two OSPs; • Use of 500m construction safety zones and 50m pre-commissioning safety zones; • Total offshore cable corridor length of 125.4km; • Maximum number of offshore export cables: Two • Peak of 35 construction vessels offshore; and • Offshore construction of two years.	Largest possible extent, greatest number of vessels and activities associated with the Project over longest duration.
Impact 7: Reduction of emergency response capability	• Maximum extent of buoyed construction areas; • 57 WTGs; • WTGs on jacket foundations of 50x50m at LAT; • Two OSPs; • OSP topside dimensions of 60x40m; • Use of 500m construction safety zones and 50m pre-commissioning safety zones; • Total offshore cable corridor length of 125.4km; • Maximum number of offshore export cables: Two • Peak of 35 construction vessels offshore concurrently; and • Offshore construction of two years.	Largest possible extent, greatest number of vessels and activities associated with the Project over longest duration will lead to greatest risk of increase in incident rates and hence maximum impact on responder capability.
Operation		
Impact 1: Vessel to structure allision	• Full build out of array area; • 57 WTGs; • WTGs on jacket foundations of 50x50m at LAT;	Maximum number of structures with largest surface dimensions over longest duration will lead to maximum allision risk.

Impact	Parameter	Notes
	• Two OSPs; • OSP topside dimensions of 60x40m; and • Indicative operational life of 30 years.	
Impact 2: Vessel displacement	• Full build out of array area; • 57 WTGs; • Two OSPs; • Use of 500m major maintenance safety zones; • Total offshore cable corridor length of 125.4km; • Maximum number of offshore export cables: Two; • Annual peak of 22 maintenance vessels offshore with up to 1,222 round trips to port; and • Indicative operational life of 30 years.	Maximum extent of array area and export cable over greatest duration will maximise displacement of deviated vessels.
Impact 3: Increased vessel to vessel collision risk (third party to third party)	• Full build out of array area; • 57 WTGs; • Two OSPs; • Use of 500m major maintenance safety zones; • Total offshore cable corridor length of 125.4km; • Maximum number of offshore export cables: Two; • Peak of 22 maintenance vessels offshore with up to 1,222 round trips to port; and • Indicative operational life of 30 years.	Maximum extent of array area and export cable over greatest duration will maximise displacement of deviated vessels which will lead to largest increase in collision risk.
Impact 4: Increased vessel to vessel collision risk (third party to project vessel)	• Full build out of array area; • 57 WTGs; • Two OSPs; • Use of 500m major maintenance safety zones; • Total offshore cable corridor length of 125.4km; • Maximum number of offshore export cables: Two • Peak of 22 maintenance vessels offshore with up to 1,222 round trips to port; and • Indicative operational life of 30 years.	Maximum extent of array area and maximum number of vessels over longest duration will lead to largest collision risk between third party vessels and project vessels.
Impact 5: Impacts on vessels involved in marine aggregate operations	• Full build out of array area; • 57 WTGs; • Two OSPs; • Use of 500m major maintenance safety zones; • Total offshore cable corridor length of 125.4km;	Maximum extent of array area and export cable over greatest duration will maximise displacement of deviated vessels.

Impact	Parameter	Notes
	• Maximum number of offshore export cables: Two • Peak of 22 maintenance vessels offshore with up to 1,222 round trips to port; and • Indicative operational life of 30 years.	
Impact 6: Reduced port access	• Full build out of array area; • 57 WTGs; • Two OSPs; • Use of 500m major maintenance safety zones; • Total offshore cable corridor length of 125.4km; • Maximum number of offshore export cables: Two • Peak of 22 maintenance vessels offshore with up to 1,222 round trips to port; and • Indicative operational life of 30 years.	Largest possible extent, greatest number of vessels and activities associated with the Project over longest duration.
Impact 7: Interaction with subsea cables including cable protection	• 57 WTGs; • Two OSPs; • Total offshore cable corridor length: 125.4km; • Offshore export cable target minimum burial depth of 0.6m (depth needed and need for external protection determined via cable burial risk assessment); • Cable protection length for offshore export cable of 10% of total cable length; • Total array / platform interconnector cable length of 190km; • Array / platform interconnector cable target minimum burial depth of 0.6m (depth needed and need for external protection determined via cable burial risk assessment); • Cable protection length for array / platform interconnector cables of 20% of total cable length; and • Indicative height of cable protection of 1.4m (locations determined via cable burial risk assessment).	Greatest length of export and array/interconnector cables with burial depth and protection (which will be established via cable burial risk assessment) will lead to greatest potential interaction risk.
Impact 8: Reduction of emergency response capability	• Full build out of array area; • 57 WTGs; • WTGs on jacket foundations of 50x50m at LAT; • Two OSPs; • OSP topside dimensions of 60x40m; • Total offshore cable corridor length of 125.4km; • Maximum number of offshore export cables: Two	Largest possible extent, greatest number of vessels and activities associated with the Project over longest duration will lead to greatest risk of increase in incident rates.

Impact	Parameter	Notes
	• Peak of 22 maintenance vessels offshore with up to 1,222 round trips to port; and • Indicative operational life of 30 years.	
Decommissioning		
Impact 1: Vessel to structure allision	No final decision has yet been made regarding the final decommissioning policy for the offshore project infrastructure. It is also recognised that legislation and industry good practice change over time. However, the following infrastructure is likely be removed, reused or recycled where practicable: • WTGs including foundations; • OSPs / OCP including foundations; The following infrastructure is likely to be decommissioned in situ depending on available information at the time of decommissioning: • Scour protection; • Offshore cables; and • Crossings and cable protection. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and will be agreed with the regulator. For the purposes of the worst case scenario, it is anticipated that worst case impacts will be no greater than those assessed for the construction phase, noting decommissioning will generally be the reverse of the construction process and require similar vessel numbers and types.	
Impact 2: Vessel displacement		
Impact 3: Increased vessel to vessel collision risk (third party to third party)		
Impact 4: Increased vessel to vessel collision risk (third party to project vessel)		
Impact 5: Impacts on vessels involved in marine aggregate operations		
Impact 6: Reduced port access		
Impact 7: Reduction of emergency response capability		

15.3.4 Summary of mitigation embedded in the design

17. This section outlines the embedded mitigations relevant to the Shipping and Navigation assessment, which have either been incorporated into the design of North Falls (Table 15.3) or are considered industry standard under the FSA. Where additional mitigation measures are proposed for the purposes of ensuring risks are As Low As Reasonably Practicable (ALARP), these are detailed in the impact assessment (Section 15.6).

18. It is noted that significant reductions to the former array areas at PEIR have been made to arrive at the array area. This includes the removal of the northern array area in its entirety, and a 26% reduction of developable area of the southern array (now the array area). Further details of this process are provided in Section 15.3.2 and in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)).

Table 15.3 Embedded mitigation measures

Mitigation	Description	How Mitigation is Secured
Lighting and Marking	A lighting and marking plan will be agreed with the Marine Management Organisation (MMO), in consultation with Trinity House, MCA, and the Civil Aviation Authority, and considering IALA G1162/O-139 (IALA, 2021).	DCO/deemed Marine Licence (dML) Condition.
Safety Zones	Application for safety zones during the construction phase and periods of major maintenance.	Application for safety zones will be made post consent under 'The Electricity (Offshore Generating Stations) (Safety Zones) (Applications Procedures and Control of Access) Regulations 2007' (S.I. No 2007/1948).
Convention on International Regulations for Preventing Collisions at Sea (COLREGS) and International Convention for the Safety of Life at Sea (SOLAS)	Compliance by all Project vessels with COLREGS (IMO, 1972) and SOLAS (IMO, 1974).	International maritime law and flag state regulations.
Layout Approval	Layout will be agreed with the MMO in consultation with the MCA and Trinity House. These discussions will include how the layout will comply with MGN 654 (MCA, 2021) in terms of maintaining SAR access, and will give due consideration to the existing structures associated with Greater Gabbard. Minimum crosswind spacing will be 944m, noting that minimum downwind spacing will be 1,180m.	DCO/dML Condition.
MGN 654	Compliance with all aspects of MGN 654 including its annexes.	DCO/dML Condition.
Marine Coordination	Implemented to ensure management of Project vessel movements, to include the defining of entry /	Secured within the Outline Project Environmental Management Plan

Mitigation	Description	How Mitigation is Secured
	exit points into / out of the array area for Project vessels.	(PEMP) (Document Reference: 7.6).
Emergency Response Cooperation Plan	ERCoP in the required MCA format and structure and as required under MGN 654.	DCO/dML Condition (covered under MGN 654 compliance).
Promulgation of information	Advance warning and accurate location details of all construction, maintenance and decommissioning operations. This will include any associated Safety Zones and will be given via usual means including Notices to Mariners and Kingfisher Bulletins.	DCO/dML Condition.
Guard Vessels where Appropriate	Use of guard vessels where identified as necessary via risk assessment, as required under MGN 654.	DCO/dML Condition (covered under MGN 654 compliance).
Display on charts	Display of North Falls infrastructure (including cables) on appropriately scaled nautical charts.	DCO/dML Condition.
Cable Burial Risk Assessment	Assessment of required cable protection measures. This will form part of the cable specification and installation plan (secured by dML Condition), and will include proposed burial depths and cable protection (where necessary and permitted), noting this will include consideration of the DW routes used by deeper draught vessels locally.	DCO/dML Condition.
Buoyed construction area	The array construction / decommissioning area will be marked by buoyage as required and directed by Trinity House.	Construction buoyage in agreement with Trinity House.
Minimum blade clearance	There will be a minimum blade tip clearance of at least 27m above Mean High Water Springs (MHWS).	DCO/dML Condition (covered under MGN 654 compliance).
Navigation and Installation Plan (NIP)	A NIP will be in place to manage cable installation and maintenance within the Inner and Outer Precautionary Areas. The NIP will be approved by the MMO, and will include: • How information regarding cable installation and maintenance will be provided to Interested Parties and under what timelines; • How the NIP will be updated and implemented throughout its lifespan; • Details of anticipated activities and specific navigational procedures for individual activities; • Contingency plans and emergency procedures; and • Procedures for instances where cumulative works may be present. An outline plan is provided in Document Reference: 7.24.	DCO/dML Condition

15.4 Assessment methodology

15.4.1 Legislation, guidance and policy

15.4.1.1 National Policy Statements

19. The assessment of potential impacts upon Shipping and Navigation has been made with specific reference to the relevant legislation and guidance, of which the principal policy documents with respect to the Nationally Significant Infrastructure Projects (NSIPS) are the NPSs. Those relevant to the Projects are:

    - Overarching NPS for Energy (EN-1) (Department for Energy Security and Net Zero (DESNZ) 2023a);
    - NPS for Renewable Energy Infrastructure (EN-3) (DESNZ, 2023b); and
    - NPS for Electricity Networks Infrastructure (EN-5) (DESNZ 2023c).

20. EN-3 includes specific assessment requirements for Shipping and Navigation. These are summarised in Table 15.4 together with an indication of the section of the ES chapter where each is addressed.

21. The Department for Transport (DfT) NPS for Ports (DfT, 2012) has also been included. Whilst this policy is not directly applicable to North Falls, ports and port users have been identified as key shipping and navigation receptors in the area and therefore certain elements of the NPS are considered relevant.

Table 15.4 NPS assessment requirements

NPS requirement	NPS reference	ES reference
NPS for Renewable Energy Infrastructure (EN-3)		
To ensure safety of shipping applicants should reduce risks to navigational safety to ALARP.	Paragraph 2.8.179	ALARP principles have been applied to the impact assessment methodology in line with the FSA process prescribed in MGN 654 (see Section 15.4.3).
Applicants should engage with interested parties in the navigation sector early in the pre-application phase of the proposed offshore wind farm or offshore transmission to help identify mitigation measures to reduce navigational risk to ALARP, to facilitate proposed offshore wind development. This includes the Marine Management Organisation (MMO) or Natural Resources Wales (NRW) in Wales, MCA, the relevant General Lighthouse Authority (GLA), such as Trinity House, the relevant industry bodies (both national and local) and any representatives of recreational users of the sea, such as the RYA, who may be affected. This should continue throughout the life of the development including during the construction, operation and decommissioning phases.	Paragraph 2.8.184	Consultation to date is summarised in Section 15.2. Consultation includes engagement with MCA, Trinity House, Chamber of Shipping, RYA, Cruising Association, Sunk VTS, HHA, PLA, and London Gateway. Consultation and engagement has also included a hazard workshop and a regular operator outreach.
The presence of the wind turbines can also have impacts on communication	Paragraph 2.8.186	Impacts relating to navigation, communication, and position fixing equipment have been considered (see Section 12 of the NRA, (ES

NPS requirement	NPS reference	ES reference
and shipborne and shore-based Radar systems.		Appendix 15.1 (Document Reference: 3.3.16)).
Information on internationally recognised sea lanes is publicly available and this should be considered by applicants prior to undertaking assessments. The assessment should include reference to any relevant, publicly available data available on the Maritime Database.	Paragraphs 2.8.187 and 2.8.188.	IMO routeing measures in proximity to the Project have been considered when characterising the existing environments. All local routeing measures have been considered as per Section 15.5.1.
Applicants should undertake an NRA in accordance with relevant Government guidance prepared in consultation with the MCA and the other navigation stakeholders listed above.	Paragraph 2.8.189	An NRA (ES Appendix 15.1 (Document Reference: 3.3.16)) including a completed MGN 654 checklist to demonstrate compliance with MCA requirements has been completed.
The NRA would for example necessitate: A survey of vessel traffic in the vicinity of the proposed wind farm; A full NRA of the likely impact of the wind farm on navigation in the immediate area of the wind farm in accordance with the relevant marine guidance; and Cumulative and in-combination risks associated with the development and other developments (including other wind farms) in the same area of sea.	Paragraph 2.8.190	Vessel traffic surveys have been undertaken for the Array Area. An NRA has been undertaken in line with MGN 654 (ES Appendix 15.1 (Document Reference: 3.3.16)). A full CEA has been undertaken with consideration of other developments including offshore wind farms (OWFs) (see Section 15.7).
Applicants should undertake a detailed NRA, which includes SAR Response Assessment and emergency response assessment prior to applying for consent. The specific SAR requirements would then be discussed and agreed post-consent.	Paragraph 2.8.195	Impacts relating to the reduction of emergency response capability (including SAR access) have been assessed in the impact assessment, which includes discussions around the need to complete a SAR Checklist (see Section 15.6).
Mitigation measures would include site configuration, lighting and marking of projects to take account of any requirements of the GLA.	Paragraph 2.8.259	A layout plan and lighting and marking as required Trinity House, MCA, and Civil Aviation Authority are included as embedded mitigation measures (see Section 15.3.4)
DfT NPS for Ports		
Where the project is likely to have socio-economic impacts at local or regional levels, the applicant should undertake and include in their application an assessment of these impacts as part of the ES.	Paragraph 5.14.2	Socio-economic impacts are assessed in ES Chapter 31 (Document Reference: 3.1.33).
Applicants should describe the existing socio-economic conditions in the areas surrounding the proposed development and should also refer to how the development's socio-economic impacts correlate with local planning policies.	Paragraph 5.14.4	The socio-economic baseline and impacts are assessed in ES Chapter 31 (Document Reference: 3.1.33).
Socio-economic impacts may be linked to other impacts.	Paragraph 5.14.5	Socio-economic impacts are assessed in ES Chapter 31 (Document Reference: 3.1.33).

15.4.1.2 Other

22. In addition to the NPS, there are a number of pieces of legislation, policy and guidance applicable to the assessment of Shipping and Navigation.

23. The East Inshore and East Offshore Marine Plans includes the following policies of relevance to shipping and navigation:

- Policy PS1 - proposals that require static sea surface infrastructure or that significantly reduce under-keel clearance should not be authorised in IMO designated routes;
- Policy PS2 - proposals that require static sea surface infrastructure that encroaches onto important navigation routes should not be authorised unless there are exceptional circumstances.
- Policy PS3 - developments should not be authorised where use of IMO routes may be compromised. Indirect consequences for navigational safety, due to displacement of activities, are addressed under GOV3.

24. The requirements of these policies have been considered in the assessment (Section 15.6) and development of mitigation measures (Section 15.3.4).

25. The primary guidance considered is MGN 654 (MCA, 2021) which sets out issues to consider when assessing potential impacts to navigational safety and emergency response arising from the construction, operation and decommissioning of an OREI. The MGN 654 annexes have also been considered.

26. Other key guidance of relevance to Shipping and Navigation includes:

- Revised Guidelines for FSA for Use in the Rule-Making Process (IMO, 2018) – outlines the FSA methodology.
- MGN 372 Amendment 1 (M+F) Guidance to Mariners Operating in the Vicinity of United Kingdom (UK) OREIs (MCA, 2022) - highlights issues to be taken into account by third party mariners when planning and undertaking voyages in the vicinity of OREIs off the UK coast.
- IALA Recommendation R139 on The Marking of Man-Made Offshore Structures (IALA, 2021b) and Guidance G1162 on The Marking of Man-Made Offshore Structures (IALA, 2021a) – provides recommendations and guidance for developers with regard to the marking of structures which may represent obstructions to navigation (including OREIs).
- The RYA's Position on Offshore Renewable Energy Developments: Paper 1 (of 4) – Wind Energy (RYA, 2019) – facilitates developers in taking account of recreational boating concerns.
- Standard Marking Schedule for Offshore Installations (Department of Energy and Climate Change (DECC), 2011).

27. Further detail is provided in ES Chapter 3 Policy and Legislative Context (Document Reference: 3.1.5).

15.4.2 Data sources

15.4.2.1 Site-specific

28. In order to provide site-specific and up to date information on which to base the impact assessment, and as required by the MCA under MGN 654 (MCA, 2021), the Applicant has undertaken two dedicated vessel traffic surveys during 2022, and one in 2024:

    - Jan 29th to 2nd March 2022 (winter survey);
        - 29th January to 12th February within former northern array;
        - 14th February to 2nd March within former southern array;
    - June 29th to July 28th 2022 (summer survey);
        - 29th June to 13th July within former northern array;
        - 14th to 28th July within former southern array; and
    - January 17th to February 1st 2024 within array area (winter survey).

29. Noting the size of the study area assessed at PEIR stage (which has now been refined as highlighted in Section 15.3.2 and detailed in the NRA (ES Appendix 15.1, Document Reference: 3.3.16)), for the 2022 surveys the vessel collected a total of 14 days data while stationed in each array area. This means a total of 28 days was collected in each survey; therefore the overall total was 56 days[1] for the 2022 surveys. This approach ensured adequate range of radar coverage (supported by visual observations), noting that MGN 654 only requires collection of 28 days in total.

30. On this basis, as only the southern array has been taken forward (see Section 15.3.2 and the NRA (ES Appendix 15.1, Document Reference: 3.3.16)), it should be considered that 28 of the 56 days of 2022 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.

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

32. For the additional 2024 survey, the survey vessel was stationed in the array area. This additional survey was undertaken to ensure a winter period was captured within two years prior to submission as per MGN 654 (MCA, 2021).

[1] Effective survey period of 56 days noting overall periods detailed (Jan 29th to 2nd March 2022, winter survey and June 29th to July 28th, 2022, summer survey) are inclusive of periods when the survey vessel visited port between 14 day periods and sheltering from adverse weather.

33. The survey methodology was agreed in advance with both the MCA and Trinity House, and the data is considered to be MGN 654 compliant.

15.4.2.2 Other available sources

34. Additional desk based data sources considered to supplement the vessel traffic survey data (see Section 15.4.2.1) are shown in Table 15.5.

Table 15.5 Other available data and information sources

Data set	Spatial coverage	Year	Notes
6 months AIS	Study area and cable corridor study area	2023	Covers July 2023 to December 2023
12 months AIS	Study Area	2019/2020	March 2019 to Feb 2020[2]. Used to assess seasonal variation and low use routeing.
56 days AIS	Cable corridor study area	2022	Same periods as vessel traffic surveys.
Three years AIS	Study Area	2020/2023	July 2020 to June 2023. Used to assess vessel traffic movements within and in proximity to the Galloper Recommended Ferry Route.
Anatec ShipRoutes Database (Anatec, 2024)	Study Area	2024	For validation of the assessment of main routes.
Maritime Accident Investigation Branch (MAIB) marine accidents database.	Study Area	2012 to 2021	To assess marine incident baseline.
Royal National Lifeboat Institution (RNLI) incident data	Study Area	2013 to 2022	To assess marine incident baseline.
DfT UK civilian SAR helicopter taskings	Study Area	2015 to 2023	To assess marine incident baseline.
Marine aggregate dredging areas (licenced and active) (The Crown Estate, 2023).	Study Area	2023	To establish marine aggregate dredging baseline.
Transit routes (British Marine Aggregate Producers Association (BMAPA), published 2009, downloaded 2020)[3].	Study Area	2009 to 2020	To establish marine aggregate dredging baseline.
UKHO Admiralty Charts	Study Area and offshore cable corridor	2023	To establish the navigational features baseline.
Admiralty Sailing Directions Dover Strait Pilot NP28 (UKHO, 2020).	Study Area and offshore cable corridor	2020	To establish the navigational features baseline.
Wind direction data collected from offshore MetOffice station provided by The Applicant.	Study Area	2017 to 2022	Characterising weather conditions in proximity to array area for use as input in the collision and allision risk modelling.

[2] Period chosen to avoid effects of COVID pandemic on shipping volumes / patterns.
[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 set	Spatial coverage	Year	Notes
Significant wave height data recorded from an offshore MetOffice station provided by The Applicant.	Study Area	2017 to 2022	Characterising weather conditions in proximity to array area for use as input in the collision and allision risk modelling.
Tidal data provided by UKHO Admiralty Charts	Study Area	2023	Characterising weather conditions in proximity to array area for use as input in the collision and allision risk modelling.
Visibility data provided in Admiralty Sailing Directions Dover Strait Pilot NP28 (UKHO, 2020).	Study Area	2020	Characterising weather conditions in proximity to array area for use as input in the collision and allision risk modelling.

35. Limitations associated with these data sources are discussed in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)).

15.4.3 Impact assessment methodology

36. ES Chapter 6 EIA Methodology (Document Reference: 3.1.8) explains the general impact assessment methodology applied to North Falls. However, the MCA requires under MGN 654 (MCA, 2021) that Shipping and Navigation assessment for OREIs is undertaken via the IMO FSA (IMO, 2018).

37. The FSA process is a structured and systematic methodology based upon risk analysis and Cost Benefit Analysis (if applicable) to reduce impacts to ALARP. Each impact is assigned a “severity of consequence” and “frequency of occurrence”, which are then used to determine significance via a risk matrix approach.

38. The following sections confirm the FSA methodology used to assess the likely significant effects on Shipping and Navigation including how the terminology corresponds to the overarching methodology set out in ES Chapter 6 EIA Methodology (Document Reference: 3.1.8).

15.4.3.1 Definitions

39. For each impact identified, the FSA requires that the frequency of occurrence and severity of consequence is established based on the definitions provided in Table 15.6 and Table 15.7 respectively.

Table 15.6 Definition of frequency of occurrence

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

Table 15.7 Definition of severity of consequence

Rank	Description	Definition			
		People	Property	Environment[4]	Business
1	Negligible	No perceptible risk	No perceptible risk	No perceptible risk	No perceptible risk
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 risk to 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

15.4.3.2 Effect significance

40. To determine EIA significance, the FSA assesses the risk of each impact via a risk matrix based on the frequency of occurrence and severity of consequence (see Section 15.4.3.1). Table 15.8 shows how the matrix determines the significance of each effect as either broadly acceptable, tolerable, or unacceptable.

41. Under the FSA approach, any effects deemed to be of unacceptable significance require additional mitigation to bring them to within tolerable and ALARP parameters.

Table 15.8 Impact significance matrix

Consequence	Frequency				
	1	2	3	4	5
1	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable
2	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable	Tolerable
3	Broadly Acceptable	Tolerable	Tolerable	Tolerable	Unacceptable
4	Broadly Acceptable	Tolerable	Tolerable	Unacceptable	Unacceptable
5	Tolerable	Tolerable	Unacceptable	Unacceptable	Unacceptable

[4] Tiers as defined within the National Contingency Plan, A Strategic Overview for Responses to Marine Pollution from Shipping and Offshore Installations (MCA, 2014)

Table 15.9 Definition of impact significance

Significance	Definition
Broadly Acceptable	Low Risk – no action required
Tolerable	Moderate Risk – acceptable if ALARP
Unacceptable	High Risk – additional mitigation must be implemented to reduce to tolerable and ALARP

15.4.4 Cumulative effects assessment methodology

42. The CEA considers other plans, projects and activities that may impact cumulatively with North Falls. ES Chapter 6 EIA Methodology (Document Reference: 3.1.8) provides further details of the general framework and approach to the CEA.

43. For shipping and navigation, the key cumulative developments are those that include planned surface infrastructure that may cumulatively impact vessel routeing or other subsea cables within 2nm of the offshore cable corridor which includes those that may potentially cross the offshore cable corridor. The NRA provides a screening process to determine which projects are screened into the cumulative assessment for shipping and navigation at ES stage based on a routeing assessment undertaken on the refined array area. FSA rankings have been provided in Section 15.7.

44. It is noted that operational wind farms or those under construction (i.e. those that were already influencing routeing at the time of baseline data collection) are captured within the baseline assessment.

15.4.5 Transboundary impact assessment methodology

45. Transboundary impacts in terms of vessel routeing (including to international ports) are considered within Section 15.6 for the Project in isolation and on a cumulative basis both within the NRA and ES. Individual transits may have the potential to be associated with vessels that are internationally owned or located, noting that the Galloper Recommended Ferry Route intersecting the array area (see Section 15.5.1) was originally designed for ferry transits to / from Ostend in Belgium. However, any such transits have been captured within the baseline assessment of vessel traffic as per Section 15.5.2 (noting further detail and assessment is provided in the NRA (ES Appendix 15.1, Document Reference: 3.3.16)).

46. Therefore, relevant impacts are considered to be captured within the Project alone and cumulative assessments.

15.4.6 Assumptions and limitations

47. The shipping and navigation baseline, hazard identification and assessment have been undertaken based upon the information available and responses received at the time of preparation. It has been assessed based upon a realistic worst case scenario (see Section 15.3.3), in particular noting that the locations of structures will not be finalised until post-consent. This approach ensures that whatever is constructed will fall within the worst case parameters already assessed.

15.5 Existing environment

15.5.1 Navigational features

48. The key navigational features identified within the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)) are shown in ES Figure 15.2 (Document Reference: 3.2.11). Full details of all navigational features are provided in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)).

49. The majority of commercial vessel routeing in the study area (see Section 15.5.2) is observed to be dictated by the local IMO adopted routeing measures. This notably includes:

- The Sunk North, East and South TSSs;
- The Sunk Outer Precautionary Area (upon which the three TSSs converge);
- The Sunk Inner Precautionary Area (adjacent to the Sunk Outer Precautionary Area);
- Long Sand Head Two Way Route; and
- Area to be Avoided (the central part of the Sunk Outer Precautionary Area).

50. There is also the Galloper Recommended Ferry Route which intersects the array area. As detailed in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)), vessel traffic data indicates this route is no longer used for its intended purpose which was also supported during consultation (Section 15.2).

51. Three pilot boarding locations are in the vicinity of the array area. One of these is the Sunk Pilot Station, located within the offshore cable corridor, and is a focal point for shipping and navigation.

52. The nearest OWFs to the array area are the Greater Gabbard and Galloper OWFs. These are the only baseline OWFs in the study area, with the next nearest OWF being London Array, located approximately 11nm from the array area at its closest and therefore outside of the study area. Gunfleet Sand OWF is located approximately 3nm south of the offshore cable corridor and therefore outside of the study area.

53. 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.

54. Several marine aggregate dredging areas are located in proximity to the array area, including Exploration and Option Areas and Production Agreement Areas. 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.

55. There are a number of charted anchorage areas inshore of the array area including the closest to the array area the Sunk DW Anchorage; approximately 1.6nm north of the offshore cable corridor. The Sunk Inner Anchorage is also located 0.9nm from the offshore cable corridor.

56. There are three DW routes (Trinity, Sunk and Black Deep DW routes) located converging within the Sunk Inner Precautionary Area, within the vicinity of the Sunk Pilot Boarding Station. The most northern of these leads to the entrance of the Harwich Deep Water Channel, which has a maintained depth of 16m, and leads north-west on approach to the Harwich Haven. 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 via the Black Deep DW route.

57. Two existing subsea cables intersect the array area, namely the Britned High-Voltage Direct-Current (a power cable) and the Atlantic Crossing 1 (a communications cable).

15.5.2 Vessel traffic

58. The vessel traffic baseline has primarily been established based on the 56 days of vessel traffic survey data, with the long term AIS also used on a supplementary basis. As discussed in Section 15.4.2, the Applicant has collected vessel traffic survey data over a greater period than required under MGN 654 to ensure adequate radar coverage noting the size of the study area assessed at PEIR. Although the array area, and subsequently the study area, has been refined, the 56 days of AIS data has still been assessed.

59. The 56 days of vessel traffic survey data collected during 2022 is shown in ES Figure 15.3 (Document Reference: 3.2.11), colour coded by vessel type. The additional 14 days of data collected during the survey undertaken in 2024 is shown in ES Figure 15.4 (Document Reference: 3.2.11). Additional detailed analysis is provided in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)), with a summary of the 56 days dataset given below.

60. An average of approximately 134 unique vessels per day was recorded within the study area during the winter vessel traffic survey, rising to an average of 147 unique vessels per day during the summer survey. The increase vessel counts in summer was observed to be primarily associated with increased volumes of wind farm vessels and recreational vessels.

61. 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. The most commonly recorded vessel types within this intersecting traffic during winter were cargo vessels followed by fishing vessels and tankers.

62. 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. The majority of this intersecting traffic was recreational, accounting for 57% of vessels. This was followed by cargo, which accounted for almost a third of vessels.

63. The most common vessel type during both survey periods was cargo, which accounted for more than half of all vessel traffic recorded (58%). Tankers were the next most common, accounting for nearly quarter of all vessel traffic across both surveys (23%).

64. Fishing vessels were mainly recorded to the south of the array area with an average of three to four unique vessels recorded per day across the combined

survey periods, with numbers slightly greater during winter. Likely active fishing was recorded, including within the array area.

65. An average of eight unique recreational vessels were recorded per day during the summer survey, noting these included transits through the array area. Recreational activity was much lower in winter, with an average of less than one unique vessel per day recorded in the study area.

66. Other key vessel types included marine aggregate dredgers and wind farm vessels, noting the local presence of marine aggregate dredging areas and the Greater Gabbard and Galloper wind farms as per Section 15.5.1.

67. Pilot vessels were also recorded to the north-west of the array area routeing to / from the Sunk Pilot Boarding Station. This traffic was more prominent within the cable corridor study area, with traffic mainly comprised from four unique pilot vessels. Based on the data it is estimated that an average of 15 pilot vessel transits, either to or from the Sunk Pilot Boarding Station, occurred per day.

68. Vessels with draughts equal to or greater than 12m were rarely noted outside of one of the three DW routes within the cable corridor study area. An average of two to three unique vessels per day with a vessel draught equal to or greater than 12m, were recorded using the Sunk DW Route which intersects the offshore cable corridor. An average of one unique vessel with a vessel draught of greater than 12m was recorded using the Trinity DW route every three days. Vessels with a draught of greater than or equal to 15m were mainly utilising the Sunk DW route, noting that vessel draught was recorded at a maximum of 15.7m. No vessels above a 15m draught were recorded within the Trinity DW route.

15.5.3 Maritime incidents

69. The marine incident baseline has been established via assessment of DfT Helicopter taskings, MAIB, and RNLI data. Full details are available in the NRA baseline (ES Appendix 15.1 (Document Reference: 3.3.16)).

70. A total of 17 SAR helicopter taskings were undertaken for incidents 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”, accounting for 65%. No taskings were undertaken within the array area.

71. A total of 94 incidents were responded to by the RNLI within the study area between 2013 and 2022, corresponding to an average of 10 incidents per year. The most common incident type was “machinery failure”, accounting for 46% of all incidents recorded. Excluding “person in danger” and non-vessel based incidents, the most common casualty type recorded was powered recreational vessels accounting for 54%. RNLI recorded a sail failure incident by a recreational sailing vessel within the array area in 2019.

72. 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. 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%).

73. No incidents were recorded within the array area. A further analysis of a previous 10-year data set (2002 to 2011) is provided within the NRA i.e. 20 years in total has been assessed.

15.5.4 Future trends in baseline conditions

74. Future traffic levels are dependent on market conditions, and fluctuations are therefore difficult to predict, however the current accepted trend is that vessel size will increase, as per a study undertaken by the International Transport Forum (ITF) at the Organisation for Economic Cooperation and Development (OECD) on the impact of 'Mega Ships' (OECD/ITF, 2015). Consultation input has indicated that larger vessels are likely to use the Sunk routeing measures including for access to local ports within the operational lifespan of North Falls, with a value of 20m draught suggested by various stakeholders as a suitable assumption.

75. The NRA (ES Appendix 15.1 (Document Reference: 3.3.16)) considers future case traffic growth scenarios both with and without North Falls of 10%, 20% and 30%.

76. The installation of OWFs in the UK is set to continue and there are a number of projects at varying stages of development with further projects expected to meet the UK Government's renewable energy targets. This is likely to mean that wind farm vessel volumes will increase in UK waters. Further, in line with operational experience of other existing wind farms, third party commercial vessels are likely to deviate to avoid future wind farm developments, which may mean that vessel routeing changes in the area. However, no significant changes to certain key local routeing would be expected given it is largely dictated by the local IMO routeing measures.

77. There are not considered to be any direct effects on the shipping and navigation baseline associated with climate change or natural trends. Vessels are required to comply with IMO emission requirements, however future trends are difficult to predict and are influenced by a variety of other factors.

15.6 Assessment of significance

78. This section provides assessment of the likely significant effects resulting from potential impacts for the purposes of the ES. As per Section 15.1, the ES is accompanied by an NRA (ES Appendix 15.1 (Document Reference: 3.3.16)) which considers additional inputs including quantitative modelling, the Hazard Workshop, and the PEIR feedback received under Section 42.

15.6.1 Likely significant effects during construction

15.6.1.1 Impact 1: Vessel to structure allision risk

79. The structures within the buoyed construction area will increase allision risk to passing vessels or vessels navigating internally.

80. In terms of passing vessels, there is a large volume of commercial traffic passing in proximity to the array area which could be at risk of a powered or

drifting allision with structures in the buoyed construction area. The MCA and Trinity House raised during consultation that certain sections of the array area would be of concern given that build out into those sections would either overlap the routeing measures or fail to provide a sufficient buffer based on existing precedents and guidance in MGN 654.

81. On this basis, a refinement of the array areas at PEIR stage has been made, with the following being removed:

- The entirety of the northern array area;
- All overlap with the precautionary area; and
- Site area within 0.8nm of the Sunk TSS South and Sunk TSS East.

82. As per the consultation section (Section 15.2), the MCA have indicated that within the refined array area, there should be a minimum distance of 1nm from all surface piercing infrastructure including blades to the Outer Precautionary Area, Sunk TSS South and Sunk TSS East. The Applicant has considered this and included a DCO requirement (Draft DCO (Document Reference: 6.1)) which provides that, unless otherwise agreed with the MCA, the Applicant will implement a SEZ, whereby all surface piercing infrastructure including blades will be located at least 1nm from the local routeing measures. Further details are provided in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)).

83. Commercial vessels are expected to comply with international and flag state regulations (including the COLREGs and SOLAS) and will be able to passage plan in advance given the promulgation of information relating to the Project including display of the structure locations on nautical charts to ensure powered and drifting allision risk is minimised. Further, during the construction phase the structures will also be lit and marked as directed by Trinity House to ensure passing mariner awareness including in poor visibility (this includes deployment of the buoyed construction area and temporary lighting of the structures).

84. Vessels transiting in the region will already be familiar with navigating in proximity to OWFs while using the neighbouring routing measures, including Greater Gabbard and Galloper, noting no allisions have occurred at either of these developments to date. The presence of construction operations and partial structures, however, does introduce new allision risk which is localised in nature given that a vessel must be in close proximity to a structure for an allision incident to occur.

85. Based on experience of other UK wind farms under construction, it is likely that all commercial vessels and the majority of smaller vessels (e.g. fishing and recreational vessels) will avoid the buoyed construction area and hence the structures therein. However, in terms of internal navigation, the final layout will be agreed with the MCA and Trinity House to ensure the structures are spaced and located to safely facilitate internal transits and minimise internal allision risk. Minimum cross wind direction spacing of 944m and minimum downwind spacing of 1,180m is considered sufficient to accommodate internal navigation noting it exceeds that of other operational wind farms. Further, pre-commissioning safety zones of 50m in radius will be applied for around structures up until the point of final commissioning of the Project.

86. It is noted that the NRA includes modelling to quantify the risks based on the worst case parameters under consideration, including the future case considerations described for the vessel displacement impact, noting that a full build out of the array area is assumed. This includes modelling of powered, drifting, and internal navigation scenarios. These are detailed below.

15.6.1.1.1 Powered Allision Risk

87. From historical incident data, there have been two reported instances of a third party vessel alliding with an operational wind farm structure in the UK. These incidents both involved a fishing vessel, with a RNLI lifeboat attending on each occasion and a helicopter deployed in one case. Given the already embedded and firm routeing measures present in the region (i.e. the Sunk TSSs and precautionary areas) and subsequent heightened mariner alertness, it is unlikely that such an incident will occur at North Falls. In this regard it is noted that there have been no reported allision incidents associated with the existing WTGs of the Greater Gabbard and Galloper developments, likely reflective of the extensive existing mitigation including the routeing measures and the Sunk VTS. The presence of these existing developments also means that passing vessels will be used to safely navigating in proximity to wind farm infrastructure.

88. Post wind farm modelling undertaken in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)) using the main commercial route deviations as input gives an estimated powered allision return period of one in 146 years for base case traffic levels. The significant majority of this risk was observed to be associated with the WTGs on the southern periphery, resulting from the traffic predicted to pass to the south. There is notable searoom to the south, and it is likely that vessels will utilise a larger passing distance than that assumed within the NRA modelling.

89. Approximately 5% of the total modelled powered allision risk was associated with traffic using the TSS lanes, equating to a return period of one per 2,900 years. However, as discussed above based on consultation input from the MCA, to further reduce the risk the Applicant has included a DCO requirement (Draft DCO (Document Reference: 6.1)) which provides that, unless otherwise agreed with the MCA, the Applicant will implement a SEZ whereby all surface piercing infrastructure will be located at least 1nm from the local routeing measures.

90. During construction, the array area will be marked as a buoyed construction area, with temporary lighting used to mark individual structures to ensure the presence of structures is clear to passing traffic.

91. Should a powered allision incident occur, the consequences will depend on multiple factors including the energy of the contact, structural integrity of the vessel involved, type of structure contacted, and the sea state at the time of the contact. Small craft including commercial fishing vessels and recreational vessels are considered most vulnerable to the hazard given the potential for a non-steel construction.

92. With consideration of lessons learned the most likely consequences are minor damage with the vessel involved able to resume passage and undertake a full inspection at the next port of call. As a worst case foundering resulting in Potential Loss of Life (PLL) and pollution may occur.

15.6.1.1.2 Drifting Allision Risk

93. A vessel adrift may only develop into an allision situation where the vessel is in proximity to a structure and the direction of the wind and / or tide is such as to direct the vessel towards the structure. In a circumstance where a vessel drifts towards a structure, there are actions that may be taken to prevent the incident developing into an allision situation.

94. For a powered vessel, the ideal and most likely solution would be restoring power prior to reaching the array (by rectifying any fault). If not possible, the vessel will follow the emergency response procedures that are implemented which may include emergency anchoring following a check of the relevant nautical charts to ensure the deployment of the anchor will not lead to other effects (such as anchor snagging on a subsea cable), or use of thrusters (dependent on the vessel and power status).

95. Where anchor deployment is not practicable then project vessels on-site may be able to render assistance including under SOLAS obligations (IMO, 1974) and this response will be managed via marine coordination (in liaison with His Majesty's Coast Guard (HMCG)) and depends on the type and capability of vessels on site, and the drifting vessel itself. This would be particularly relevant for sailing vessels whose propulsion is dictated solely by the metocean conditions, although if the vessel becomes adrift in proximity to a structure there may be limited time to render assistance. However, if a drifting allision was to occur, the speed at which the contact occurs will likely be lower than that of a powered vessel, resulting in the contact energy to be lower.

96. Post wind farm modelling using the main commercial route deviations as input gives an estimated drifting allision return period of one in 772 years for base case traffic levels. As discussed above, based on consultation input from the MCA, to further reduce the risk the Applicant has included a DCO requirement (Draft DCO (Document Reference: 6.1)) which provides that, unless otherwise agreed with the MCA, the Applicant will implement a SEZ whereby all surface piercing infrastructure will be located at least 1nm from the local routeing measures.

97. There is some potential for a vessel to run adrift in this region; this is reflected in the number of machinery failure incidents reported locally to the MAIB (33% of all reported incidents within the study area across a recent 10-year period). From historical incident data, there have been no instances of a third party vessel alliding with an operational wind farm structure in the UK whilst Not Under Command (NUC). This includes no drifting allisions with the existing Greater Gabbard and Galloper developments.

15.6.1.1.3 Internal Allision Risk

98. Post wind farm modelling undertaken in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)) using the vessel traffic survey data as an input gives an estimated commercial fishing allision return period of one in 13.4 years for base case traffic levels. This return period is largely characteristic of fishing vessels engaged in fishing rather than in transit, and it is noted that the model assumes extremely conservative assumptions around fishing vessel behaviour. Full

details are provided in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)).

99. The minimum spacing (cross wind direction spacing of 944m and minimum downwind spacing of 1,180m) is sufficient for safe internal navigation and is greater than that associated with many other UK OWFs, some of which are navigated by commercial fishing vessels transiting in favourable conditions. The minimum spacing between structures is also greater than that at the neighbouring Greater Gabbard and Galloper developments (approximately 800m).

100. As aforementioned, the final array layout will be agreed with the MCA and Trinity House post consent but will be compliant with the requirements of MGN 654 (MCA, 2021), including the completion of a safety justification for a Single Line of Orientation (SLoO) layout should this be taken forward. As with any passage, a vessel navigating internally within the array is expected to passage plan in accordance with SOLAS Chapter V (IMO, 1974). The construction phase lighting and marking of the array area, as required by Trinity House will assist with minimising the likelihood of a mariner becoming disoriented whilst navigating internally within the buoyed construction area.

101. For recreational vessels under sail navigating internally within the array area, there is also potential for effects such as wind shear, masking, and turbulence to occur. From previous studies of offshore wind developments, it has been concluded that WTGs do reduce wind velocity downwind of a WTG (MCA, 2022) but that no negative effects on recreational craft have been reported on the basis of the limited spatial extent of the effect and its similarity to that experienced when passing a large vessel or close to other large structures (such as bridges) or the coastline. In addition, no practical issues have been raised by recreational users to date when operating in proximity to existing offshore wind developments.

102. An additional allision risk associated with the WTG blades applies for recreational vessels with a mast when navigating internally within the array. However, the minimum air gap will be 27m above MHWS which is greater than the minimum clearance the RYA recommend for localised allision risk (RYA, 2019) and which is also noted in MGN 654.

103. Should an internal allision incident occur, the consequences will be similar to those outlined for a powered allision incident, including the determining factors. However, as with a drifting allision incident, the speed at which the contact occurs will likely be lower than for an external allision, resulting in the contact energy being lower.

15.6.1.1.4 Frequency of Occurrence

104. Frequency of occurrence is considered to be remote noting the embedded mitigations including layout approval and lighting and marking.

15.6.1.1.5 Severity of Consequence

105. Severity of consequence is considered to be serious given the potential for a notable incident including fatalities.

15.6.1.1.6 Impact significance

106. Noting that the final layout will be agreed with the MCA and Trinity House (see Section 15.3.4) and the additional mitigation of the SEZ to maintain a distance

of at least 1nm from all surface piercing infrastructure to the local IMO routeing measures unless otherwise agreed with the MCA, the impact is assessed as being tolerable and ALARP.

15.6.1.2 Impact 2: Vessel displacement due to activities associated with the Project

107. Based on operational experience, it is likely that commercial vessels will deviate to avoid the buoyed construction area established around the array area (as directed by Trinity House) during the construction phase. Smaller vessels (e.g. fishing and recreation), may still choose to transit through at the discretion of individual vessel masters.

108. As detailed in Section 15.5, the majority of vessel routeing in the vicinity of the array area is defined by the TSS lanes and precautionary areas, and as such the majority of commercial traffic already avoids the array area. However, certain vessels are associated with routes outside of the TSS lanes and precautionary areas that may alter passage as a result of the Project depending on the final build out scenario.

109. Commercial vessels using the Galloper Recommended Ferry Route are also likely to require to deviate to avoid the array area, noting this includes adverse weather routeing as set out within the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)). Consultation input from Stena (see Section 15.2) indicates such use is infrequent, and that safe alternate passage would be available around the array area via the Sunk TSS South or Sunk TSS East, albeit requiring a longer transit time.

110. It should also be considered that vessels on routes associated with the routeing measures may still utilise very minor deviations, for example to increase passing distance from the buoyed construction area when accessing or departing a TSS lane.

111. The Galloper Recommended Ferry Route was observed to be used on a very infrequent basis by commercial vessels, with an average of one unique cargo vessel per every eight days was estimated based on study of three years of AIS data between July 2020 and June 2023. Within this period, only five transits from passenger vessels and two transits from one tanker were recorded. It is considered likely that following deployment of the buoyed construction area, these vessels would use either the Sunk TSS East or Sunk TSS South noting this aligns with input from Stena Line who use the Galloper Recommended Ferry Route on an infrequent basis as outlined above. Similarly, deviations exist for any future ferry routes from Ostend or other Belgian ports that would have previously used the Galloper Recommended Ferry route (noting the route was originally defined for routeing into the Sunk from Ostend). Study of six months of AIS data from 2023 in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)) shows that vessels transiting to Belgium ports from the Sunk area do not typically use the Galloper Recommended Ferry route and instead most commonly use the Sunk TSS South, with certain transits also recorded using the Sunk TSS East. It is noted that there are no known plans to reopen the Ostend ferry route for which the original Galloper Recommended Ferry Route was defined.

112. Within the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)), main commercial routes have been identified in line with the principles set out in MGN 654 (MCA, 2021) based primarily on vessel traffic data collected during dedicated surveys (56 days in winter and summer 2022) and from coastal receivers (12 months in 2019/20) as well as using Anatec's ShipRoutes database.

113. The NRA also includes quantitative assessment of vessel deviations arising from the array area along with the full methodology used to assume each deviation. Deviations due to the presence of the Project could be required for two out of the 43 main commercial routes identified (one a high use route and the other a low use route), with the level of deviation no greater than 1%. Both routes are expected to pass south of the array area, where there is sea room to accommodate such deviations (in excess of 6nm of sea room is available between the array area and the North Hinder TSS).

114. Smaller vessels may still utilise the buoyed construction area for transit noting entry would not be prohibited other than through any active safety zones. The minimum spacing (cross wind direction spacing of 944m and minimum downwind spacing of 1,180m) is sufficient for safe internal navigation and is greater than that associated with many other UK OWFs, some of which are navigated by commercial fishing vessels in favourable conditions. The minimum spacing between structures is also greater than that at the neighbouring Greater Gabbard and Galloper developments. The final layout will be agreed with the MCA and Trinity House and these discussions will include consideration of facilitation of internal navigation.

115. The most likely consequences of vessel displacement will be increased journey times and distances for affected third party vessels. Vessels are expected to comply with international and flag state regulations (including the COLREGs and SOLAS) and will be able to passage plan in advance given the promulgation of information relating to the Project and relevant nautical charts. This high level of awareness will assist with ensuring that vessels make safe and effective deviations which minimise journey increases.

116. As a worst case, there could be disruption to schedules, particularly for commercial ferry operators in the region but given the anticipated size of the deviations outlined above and the international nature of routeing in the region alongside the ability to passage plan, disruptions to schedule are expected to be minimal.

117. There will also be some displacement associated with the installation of the offshore export cables within the offshore cable corridor. Any such displacement would be temporary and spatially limited, however does have the potential to impact routeing and pilotage within the precautionary areas. On this basis liaison procedures should be in place with PLA and HHA to determine appropriate arrangements for instances of cable installation. This is assessed in more detail in Section 15.6.1.6.

15.6.1.2.1 Frequency of occurrence

118. Frequency of occurrence is considered to be reasonably probable noting limited deviations are anticipated to occur.

15.6.1.2.2 Severity of consequence

119. Severity of consequence is considered to be minor given the layout will require MCA and Trinity House approval.

15.6.1.2.3 Impact significance

120. Minor deviations will occur albeit with sufficient searoom for safe navigation and alternate routeing options, the impact is therefore assessed as being tolerable and ALARP.

15.6.1.3 Impact 3: Increased vessel to vessel collision risk between third party vessels due to vessel displacement

121. As discussed in Section 15.6.1.2, it is likely that commercial vessels will deviate to avoid the buoyed construction area established around the array area (as directed by Trinity House) during the construction phase. Such vessels displaced from the array area may increase encounter rates with other third party vessels which may lead to an increase in collision risk.

122. Local traffic patterns inshore of the array area are currently managed by the existing Sunk routeing measures. These routeing measures are used by a relatively large number of vessels per day, however there was only one collision incident recorded within the study area over the most recent ten years of incident data studied (2012 to 2021). This incident involved two cargo vessels manoeuvring within the Sunk Deepwater Anchorage but was a near miss and the vessels did not make contact. This incident was also not a case of routeing vessels or any vessels in proximity to the array area. One collision incident was also reported in the preceding ten year period (2002-2011), which again occurred within the north-west of the study area involving a fishing vessel and a tug and was the result of a fishing gear snag. The limited number of collisions is likely reflective of the risk being managed by the significant traffic management mitigations already in place including the routeing measures and the Sunk VTS.

123. In poor visibility, third party vessels may experience limitations regarding visual identification of other third party vessels when passing on another side of the buoyed construction areas. These limitations may increase the potential for an encounter. However, this will be mitigated by the application of the COLREGs (reduced speeds) in adverse weather conditions. Moreover, the minimum spacing between WTGs (cross wind direction spacing of 944m and minimum downwind spacing of 1,180m) will be sufficient to ensure any visual restriction is very short-term in nature. Given the presence of the array area between routeing measures and noting the presence of the precautionary area, it is also likely that vessels will be very aware of the potential for other vessels navigating locally.

124. Within the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)), post wind farm modelling using all main commercial routes identified as input gives an estimated collision return period of one in 2.87 years for base case traffic levels. The high level of collision risk is due to the significant volumes of vessels already within the surrounding area of the Project. The base case collision result represents a 0.32% increase compared to the pre wind farm base case result, indicating that the influence of the array area on the overall collision risk for commercial traffic is very low. This is reflective of the open searoom available to the south of the array area where vessels would be expected to deviate as

per Section 15.6.1.2. However, as discussed in the allision risk impact (Section 15.6.1.1), based on consultation input from the MCA, to further reduce the risk the Applicant has included a DCO requirement (Draft DCO (Document Reference: 6.1)) which provides that, unless otherwise agreed with the MCA, the Applicant will implement a SEZ whereby all surface piercing infrastructure will be located at least 1nm from the local routeing measures. This will increase searoom for vessels within the TSS lanes in the event that collision avoidance is necessary.

125. During the Hazard Workshop, it was raised that recreational vessels that would normally transit through the array area to avoid the TSS lanes may be displaced by the buoyed construction area into the TSS lanes. However, minimum spacing (cross wind direction spacing of 944m and minimum downwind spacing of 1,180m) is sufficient for safe internal navigation and is greater than that associated with many other UK OWFs, some of which are navigated by commercial fishing vessels in favourable conditions. The minimum spacing between structures is also greater than that at the neighbouring Greater Gabbard and Galloper developments. While 500m safety zones will be present, these would only be active where construction was ongoing at any given structure (i.e. only a limited number of 500m safety zones will be active at any given time), and therefore access through the array area would not be prevented. The final layout will be agreed with the MCA and Trinity House and these discussions will include consideration of facilitation of internal navigation for smaller vessels including recreational vessels.

126. In the event that an encounter does occur, it is likely to be very localised and occur for only a short duration, with collision avoidance action implemented by the vessels involved, in line with the COLREGs, thus minimising the risk that the situation will develop into a collision incident.

127. Historical collision incident data (as per the NRA, ES Appendix 15.1 (Document Reference: 3.3.16)) also indicates that no collision incidents between third party vessels have occurred directly as a result of an UK OWF and that the most likely consequences will be low should a collision occur, with minor contact between the vessels resulting in minor damage and no injuries to persons, with both vessels able to resume their respective passages and undertake a full inspection at the next port. As an unlikely worst case, one of the vessels could be foundered resulting in a PLL and / or pollution.

15.6.1.3.1 Frequency of occurrence

128. Frequency of occurrence of a collision is considered to be remote.

15.6.1.3.2 Severity of consequence

129. Severity of consequence is considered to be moderate based on consideration of historical incident data.

15.6.1.3.3 Impact significance

130. Noting the embedded mitigation in place (see Section 15.3.4), the existing traffic management measures, and assuming the implementation of the additional mitigation of the SEZ to maintain a distance of at least 1nm from all surface piercing infrastructure and the local IMO routeing measures unless otherwise agreed with the MCA, the impact is assessed as being tolerable and ALARP.

15.6.1.4 Impact 4: Vessel to vessel collision risk (third party to project vessel)

131. Increases in wind farm vessel activity associated with the construction of North Falls could lead to increased collision rates in the area.

132. All Project vessel movements will be managed via marine coordination for the purposes of ensuring any potential increase in encounter rates with third party vessels is minimised. The Applicant will also ensure effective promulgation including in relation to construction activities which will highlight to marine users when and where there may be increased activity.

133. It is also noted that there is already wind farm vessel activity present within the area associated with the operation and maintenance of the existing Galloper and Gabbard projects. On this basis, local users and regular operators are likely to already be familiar with similar works and transits that will occur in relation to North Falls. In this regard it is noted that there have been no reported collision incidents between vessels associated with Greater Gabbard and Galloper and third party vessels to date. Further, as detailed in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)), there has only been one reported collision incident between a third party vessel and a wind farm vessel in the UK, noting this incident occurred within a harbour.

134. The CoS recommended during consultation (see Section 15.2) that entry / exit points for project vessels accessing or leaving the array area were defined to maximise mariner awareness of where project vessel encounters may occur. As per Section 15.3.4, these have been assumed as embedded mitigation as part of marine coordination procedures.

135. The Applicant will apply for safety zones of 500m around any structure where construction is ongoing (i.e. where there may be sensitive vessel operations underway). Advisory safe passing distances may also be promulgated around any sensitive operations where a safety zone does not apply (e.g. cable installation). These measures will ensure third party vessels are aware of the areas that should be avoided to minimise collision risk with project vessels.

136. In terms of cable installation, a key output of the NRA process notably consultation was that mitigation was needed to manage hazards associated with the cable installation process, noting the location of the offshore cable corridor intersecting the outer and inner precautionary areas, the Trinity and Sunk DW routes, and the charted Sunk pilotage (see Section 15.5.1). The cable installation process will require a vessel(s) that is Restricted in Ability to Manoeuvre.

137. North Falls has therefore created an Outline NIP (Document Reference: 7.24) in liaison with the local ports and other key maritime stakeholders which sets out procedures by which associated hazards will be managed.

15.6.1.4.1 Frequency of occurrence

138. Frequency of occurrence is considered to be remote.

15.6.1.4.2 Severity of consequence

139. Severity of consequence is considered to be moderate based on consideration of historical incident data.

15.6.1.4.3 Impact significance

140. The impact is therefore determined to be tolerable and ALARP assuming the implementation of the NIP.

15.6.1.5 Impact 5: Impacts on vessels involved in marine aggregate operations

141. The offshore infrastructure, project vessels and activities may impact marine aggregate dredging operations in the area during construction.

142. In terms of transit to / from marine aggregate dredging areas, there will be no restriction on entry into the buoyed construction area other than through active safety zones. However, marine aggregate dredgers may choose to deviate to avoid the array area. This aligns with consultation input from CEMEX who stated during consultation (September 2021) their vessels would likely deviate to use the Sunk TSS South lanes without difficulty. The vessel traffic data showed the majority of dredger transits already occur in the TSS lanes, and on this basis it is not considered that there will be notable impacts on transits.

143. In terms of active marine aggregate dredging, there is one marine aggregate dredging area located adjacent to the array area; area 524 ("Thames D") – adjacent to the south-eastern boundary of the array area, operated by DEME. Input from DEME noted a minimum of 25 visits per year or 110,000 tonnes. The six months of AIS data collected during 2023 and the winter vessel traffic survey also identified marine aggregate dredging within Area 524. DEME stated during consultation that operational marine aggregate dredging is unlikely to be notably impacted given the extents of Area 524 are not typically dredged to ensure the activity remains within the licensed boundaries. Five yearly surveys do occur in and around Area 524, and it was confirmed during consultation that liaison between North Falls and DEME would be undertaken in advance of and during any works occurring to ensure operations from both parties can be facilitated.

144. It is noted that the northern array area was located adjacent to dredging Area 507/6 operated by CEMEX which during consultation (Section 15.2) was of concern given use of the area would be restricted during flood tides given the size of the area and fast tides as vessels need additional space to turn. With the northern array now removed in its entirety, in which shipping and navigation stakeholders were a driving factor, there is now no proximity impact with Area 507/6.

15.6.1.5.1 Frequency of occurrence

145. Frequency of occurrence is considered to be remote.

15.6.1.5.2 Severity of consequence

146. Severity of consequence is considered to be minor.

15.6.1.5.3 Impact significance

147. The impact is therefore determined to be broadly acceptable under the FSA.

15.6.1.6 Impact 6: Impact on vessels transiting to / from local ports in the area, including use of approach channels, port operations and pilotage

148. Vessels or activities associated with the construction of North Falls may restrict or hinder third party traffic access to local ports and facilities, including approach channels and pilotage.

149. The offshore cable corridor intersects or passes in proximity to the following features:

- Sunk Outer Precautionary Area;
- Charted Sunk Pilot Station;
- Sunk Inner Precautionary Area;
- Harwich DW Channel; and
- Sunk, Trinity, and Harwich approach DW routes.

150. As part of Site Selection work (ES Chapter 4 Site Selection and Assessment of Alternatives (Document Reference: 3.1.6)), the Applicant has engaged with PLA and HHA with regard to cable routeing and has implemented changes to the offshore cable corridor to minimise impacts on the key areas raised as being of concern. Changes made include:

- Shifting the offshore cable corridor further south from the Sunk Pilot Station;
- Shifting the offshore cable corridor south of the Harwich DW Channel;
- TSS crossing angle moved closer to 90 degrees; and
- Offshore cable corridor moved as far as practicable from the Sunk roundabout feature.

151. The final layout will be agreed with MCA and Trinity House. On this basis, and noting the majority of commercial vessel traffic already utilise the TSS lanes as well as the size of main commercial route deviations due to the presence of the buoyed construction areas (as outlined for the vessel displacement hazard) are small, it is considered unlikely that the buoyed construction area will notably impact port / pilot access and arrival times and anything that will occur will be minimal and so schedules are not deemed to be impacted.

152. In terms of cable installation, a key output of the NRA process notably consultation was that mitigation was needed to manage hazards associated with the cable installation process, noting the location of the offshore cable corridor intersecting the outer and inner precautionary areas, the Trinity and Sunk DW routes, and the charted Sunk pilotage (see Section 15.5.1). North Falls has therefore created an Outline NIP (Document Reference: 7.24) in liaison with the local ports and other key maritime stakeholders which sets out procedures by which associated hazards will be managed.

153. As per Section 15.6.1.4, Project vessel movements will be managed via marine coordination including entry / exit points to the array area. All project vessels will also be compliant with all Flag State regulations including the COLREGs, to ensure any impact on third party vessels accessing local ports is minimised. Given the presence of Greater Gabbard and Galloper, whose O&M vessels are operated out of Harwich Haven and Port of Lowestoft, respectively, mariners will already have experience of increased vessel movements associated with OWFs in the area.

154. The most likely consequences of reduced port access in relation to the array area will be limited effects on port / pilot schedules. As a worst case, there could be disruption to port / pilot schedules, but with no safety issues.

155. Consideration of impacts on water depths in terms of port access have been considered in Section 15.6.2.7, including consideration of future case increases in vessel size.

15.6.1.6.1 Frequency of occurrence

156. Frequency of occurrence is considered to be reasonably probable.

15.6.1.6.2 Severity of consequence

157. Severity of consequence is considered to be moderate.

15.6.1.6.3 Impact significance

158. The impact is assessed as being tolerable and ALARP assuming the implementation of the NIP.

15.6.1.7 Impact 7: Reduction of emergency response capability due to increased incident rates and / or reduced access for SAR responders

159. The construction of North Falls will lead to an increased level of vessels and personnel in the area over current baseline levels. The increased vessel and personnel numbers may lead to an increase in the number of incidents requiring an emergency response over baseline rates.

160. It is not anticipated that the construction of North Falls will lead to a notable increase in baseline incident rates, noting that as detailed in the NRA baseline (ES Appendix 15.1 (Document Reference: 3.3.16)), there have not been a significant number of reported incidents associated with constructing or operational wind farms in the UK. Further, the on site vessels will form additional resources in the event of an emergency incident, and may be able to assist in liaison with the MCA.

161. As required under MGN 654, the Applicant will produce and submit an ERCoP to the MCA detailing cooperation and assistance procedures in the event of an emergency incident. This will include the anticipated vessel and equipment resources the Project will have available. A SAR checklist will also be produced and agreed with the MCA setting out what additional SAR mitigations are implemented.

162. The final layout will be agreed with the MCA and Trinity House post-consent, as required under the DCO. These discussions will include how the layout will comply with MGN 654 (MCA, 2021) in terms of maintaining SAR access, and will give due consideration to the existing structures associated with Greater Gabbard.

15.6.1.7.1 Frequency of occurrence

163. Frequency of occurrence is considered to be extremely unlikely noting low baseline incident rates and the additional Project resources that may be able to assist in an emergency.

15.6.1.7.2 Severity of consequence

164. Severity of consequence is considered to be serious given the potential for a notable incident with potential for fatalities.

15.6.1.7.3 Impact significance

165. Given the additional resources associated with the Project and noting layout agreement to ensure suitable SAR access, the impact is considered tolerable and ALARP under the FSA.

15.6.2 Likely significant effects during operation

15.6.2.1 Impact 1: Vessel to structure allision risk

166. The structures within the array area will increase allision risk to passing vessels or vessels navigating internally.

167. As discussed in the equivalent construction phase impact (Section 15.6.1.1), The MCA and Trinity House raised during consultation that certain sections of the array area would be of concern given that build out into those sections would either overlap the routeing measures or fail to provide a sufficient buffer based on existing precedents and guidance in MGN 654.

168. On this basis, a refinement of the array areas at PEIR stage has been made, with the following being removed:

- The entirety of the former northern array area;
- All overlap with the precautionary area; and
- Site area within 0.8nm of the Sunk TSS South and Sunk TSS East.

169. As per the consultation section (Section 15.2), the MCA have indicated that within the refined array area, there should be a minimum distance of 1nm from all surface piercing infrastructure including blades to the Outer Precautionary Area, Sunk TSS South and Sunk TSS East. Applicant has included a DCO requirement (Draft DCO (Document Reference: 6.1)) which provides that, unless otherwise agreed with the MCA, the Applicant will implement a SEZ whereby all surface piercing infrastructure will be located at least 1nm from the local routeing measures. Further details are provided in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)).

170. Commercial vessels are expected to comply with international and flag state regulations (including the COLREGs and SOLAS) and will be able to passage plan in advance given the promulgation of information relating to the Project including display of the structure locations on nautical charts to ensure powered and drifting allision risk is minimised. Further, the structures will also be lit and marked as directed by Trinity House to ensure passing mariner awareness (e.g. lights, sound signals) including in poor visibility. Vessels transiting in the region will already be familiar with navigating in proximity to OWFs while using the neighbouring routing measures, including Greater Gabbard and Galloper. The presence of new surface structures, however, does introduce new allision risk which is localised in nature given that a vessel must be in close proximity to a structure for an allision incident to occur.

171. Based on experience of other UK wind farms, it is likely that all commercial vessels will avoid the array area and hence the structures therein. However, smaller vessels may choose to transit through. In terms of internal navigation, the final layout will be agreed with the MCA and Trinity House to ensure the structures are spaced and located to safely facilitate internal transits and minimise internal allision risk.

172. It is noted that the NRA includes modelling to quantify the risks based on the worst case parameters under consideration, including the future case considerations described for the vessel displacement impact, noting that a full

build out of the array area is assumed. This includes modelling of powered, drifting, and internal navigation scenarios. These are detailed below.

15.6.2.1.1 Powered allision risk

173. From historical incident data, there have been two instances of a third party vessel alliding with an operational wind farm structure in the UK. These incidents both involved a fishing vessel, with a RNLI lifeboat attending on each occasion and a helicopter deployed in one case. Given the already embedded and firm routeing measures present in the region (i.e. the Sunk TSSs and precautionary areas) and subsequent heightened mariner alertness, it is unlikely that such an incident will occur at North Falls. In this regard it is noted that there have been no reported allision incidents associated with the existing WTGs of the Greater Gabbard and Galloper developments, likely reflective of the extensive existing mitigation including the routeing measures and the Sunk VTS. The presence of these existing developments also means that passing vessels will be used to safely navigating in proximity to wind farm infrastructure.

174. Post wind farm modelling using the main commercial route deviations as input gives an estimated powered allision return period of one in 146 years for base case traffic levels. The significant majority of this risk was observed to be associated with the WTGs on the southern periphery, resulting from the traffic predicted to pass to the south. There is notable searoom to the south, and it is likely that vessels will utilise a larger passing distance than that assumed within the NRA modelling.

175. Approximately 5% of the total modelled powered allision risk was associated with traffic using the TSS lanes, equating to a return period of one per 2,900 years. However, as discussed above based on consultation input from the MCA, to further reduce the risk Applicant has included a DCO requirement (Draft DCO (Document Reference: 6.1)) which provides that, unless otherwise agreed with the MCA, the Applicant will implement a SEZ whereby all surface piercing infrastructure will be located at least 1nm from the local routeing measures.

176. During the operational phase, operational lighting and marking will be in place as per IALA G1162 (IALA, 2021a) and as directed by Trinity House. All infrastructure will also be shown on appropriate navigational charts. This will ensure the structure locations are clear to passing traffic.

177. Should a powered allision incident occur, the consequences will depend on multiple factors including the energy of the contact, structural integrity of the vessel involved, type of structure contacted, and the sea state at the time of the contact. Small craft including commercial fishing vessels and recreational vessels are considered most vulnerable to the hazard given the potential for a non-steel construction.

178. With consideration of lessons learned the most likely consequences are minor damage with the vessel involved able to resume passage and undertake a full inspection at the next port of call. As a worst case foundering resulting in PLL and pollution may occur.

15.6.2.1.2 Drifting allision risk

179. A vessel adrift may only develop into an allision situation where the vessel is in proximity to a structure and the direction of the wind and / or tide is such as to direct the vessel towards the structure. Vessel traffic in this area, although of high volume, is within highly regulated routeing measures and it is assumed that in a circumstance where a vessel drifts towards a structure, there are actions that may be taken to prevent the incident developing into an allision situation.

180. For a powered vessel, the ideal and most likely solution would be restoring power prior to reaching the array (by rectifying any fault). If not possible, the vessel will follow the emergency response procedures that are implemented which may include emergency anchoring following a check of the relevant nautical charts to ensure the deployment of the anchor will not lead to other effects (such as anchor snagging on a subsea cable), or use of thrusters (dependent on the vessel and power status).

181. Where anchor deployment is not practicable then project vessels on-site may be able to render assistance including under SOLAS obligations (IMO, 1974) and this response will be managed via marine coordination (in liaison with HMCG) and depends on the type and capability of vessels on site and the drifting vessel itself. This would be particularly relevant for sailing vessels whose propulsion is dictated solely by the metocean conditions, although if the vessel becomes adrift in proximity to a structure there may be limited time to render assistance. If a drifting allision was to occur, the speed at which the contact occurs will likely be lower than that of a powered vessel, resulting in the contact energy to be lower.

182. Post wind farm modelling using the main commercial route deviations as input gives an estimated drifting allision return period of one in 772 years for base case traffic levels. As discussed above, based on consultation input from the MCA, to further reduce the risk Applicant has included a DCO requirement (Draft DCO (Document Reference: 6.1)) which provides that, unless otherwise agreed with the MCA, the Applicant will implement a SEZ whereby all surface piercing infrastructure will be located at least 1nm from the local routeing measures.

183. There is some potential for a vessel to run adrift in this region; this is reflected in the number of machinery failure incidents reported locally to the MAIB (33% of all reported incidents within the study area across a recent ten-year period). From historical incident data, there have been no instances of a third party vessel alliding with an operational wind farm structure in the UK whilst NUC. This includes no drifting allisions with the existing Greater Gabbard and Galloper developments.

15.6.2.1.3 Internal allision risk

184. Post wind farm modelling undertaken in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)) using the vessel traffic survey data as an input gives an estimated to commercial fishing allision return period of one in 13.4 years for base case traffic levels. This return period is largely characteristic of fishing vessels engaged in fishing rather than in transit, and it is noted that the model

assumes extremely conservative assumptions around fishing vessel behaviour. Full details are provided in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)).

185. The minimum spacing (cross wind direction spacing of 944m and minimum downwind spacing of 1,180m) is sufficient for safe internal navigation and is greater than that associated with many other UK OWFs, some of which are navigated by commercial fishing vessels in favourable conditions. The minimum spacing between structures is also similar to that present at the neighbouring Greater Gabbard and Galloper.

186. As aforementioned, the final array layout will be agreed with the MCA and Trinity House post consent but will be compliant with the requirements of MGN 654 (MCA, 2021), including the completion of a safety justification for a SLoO layout should this be taken forward. As with any passage, a vessel navigating internally within the array is expected to passage plan in accordance with SOLAS Chapter V (IMO, 1974). The lighting and marking of the array area as required by Trinity House and the MCA (as per MGN 654) includes compliant unique identification marking of structures in an easily identifiable pattern which will assist with minimising the likelihood of a mariner becoming disoriented whilst navigating internally within the array area.

187. For recreational vessels under sail navigating internally within the array, there is also potential for effects such as wind shear, masking, and turbulence to occur. From previous studies of offshore wind developments, it has been concluded that WTGs do reduce wind velocity downwind of a WTG (MCA, 2022) but that no negative effects on recreational craft have been reported on the basis of the limited spatial extent of the effect and its similarity to that experienced when passing a large vessel or close to other large structures (such as bridges) or the coastline. In addition, no practical issues have been raised by recreational users to date when operating in proximity to existing offshore wind developments.

188. An additional allision risk associated with the WTG blades applies for recreational vessels with a mast when navigating internally within the array. However, the minimum air gap will be 27m above MHWS which is greater than the minimum clearance the RYA recommend for localised allision risk (RYA, 2019) and which is also noted in MGN 654.

189. Should an internal allision incident occur, the consequences will be similar to those outlined for a powered allision incident, including the determining factors. However, as with a drifting allision incident, the speed at which the contact occurs will likely be lower than for an external allision, resulting in the contact energy being lower.

15.6.2.1.4 Frequency of occurrence

190. Frequency of occurrence is considered to be remote noting the embedded mitigations including layout approval and lighting and marking.

15.6.2.1.5 Severity of consequence

191. Severity of consequence is considered to be serious given the potential for a notable incident including fatalities.

15.6.2.1.6 Impact significance

192. Noting that the final layout will be agreed with the MCA and Trinity House (see Section 15.3.4) and the additional mitigation of the SEZ to maintain a distance of at least 1nm from all surface piercing infrastructure to the local IMO routeing measures unless otherwise agreed with the MCA, the impact is assessed as being tolerable and ALARP.

15.6.2.2 Impact 2: Vessel displacement due to activities associated with the Project

193. Based on operational experience, it is likely that commercial vessels will deviate to avoid the array area during the operational phase on similar deviations to those established during construction (see Section 15.6.1.2). Smaller vessels (e.g. fishing and recreation), may still choose to transit through at the discretion of individual vessel masters.

194. As detailed in Section 15.5, the majority of vessel routeing in the vicinity of the array area is defined by the TSS lanes and precautionary areas, and as such the majority of commercial traffic already avoids the array area. However, certain vessels are associated with routes outside of the TSS lanes and precautionary areas that may alter passage as a result of the Project depending on the final build out scenario.

195. Commercial vessels using the Galloper Recommended Ferry Route are also likely to require to deviate to avoid the array area, noting this includes adverse weather routeing as set out within the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)). Consultation input from Stena (see Section 15.2) indicates such use is infrequent, and that safe alternate passage would be available around the array area via the Sunk TSS South or Sunk TSS East, albeit requiring a longer transit time. Similarly, deviations exist for any future ferry routes from Ostend or other Belgian ports that would have previously used the Galloper Recommended Ferry route (noting the route was originally defined for routeing into the Sunk from Ostend). Study of six months of AIS data from 2023 in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)) shows that vessels transiting to Belgium ports from the Sunk area do not typically use the Galloper Recommended Ferry route and instead most commonly use the Sunk TSS South, with certain transits also recorded using the Sunk TSS East. It is noted that there are no known plans to reopen the Ostend ferry route for which the original Galloper Recommended Ferry Route was defined.

196. It should also be considered that vessels on routes associated with the routeing measures may still utilise very minor deviations, for example to increase passing distance from the array area when accessing or departing a TSS lane.

197. As per Section 15.6.1.2, deviations due to the presence of the Project could be required for two out of the 43 main commercial routes identified (one a high use route and the other a low use route), with the level of deviation no greater than 1%. Both routes are expected to pass south of the array area, where there is sea room to accommodate such deviations (in excess of 6nm of sea room is available between the array area and the North Hinder TSS).

198. The Galloper Recommended Ferry Route was observed to be used on a very infrequent basis by commercial vessels, with an average of one unique cargo vessel per every eight days was estimated based on study of three years of AIS

data between July 2020 and June 2023. Within this period, only five transits from passenger vessels (three of which were from one RoPax and the other two large sailing vessels) and two transits from one tanker were recorded. It is considered likely that these vessels would use either the Sunk TSS East or Sunk TSS South noting this aligns with input from Stena Line who use the Galloper Recommended Ferry Route on an infrequent basis as outlined above.

199. Smaller vessels may still utilise the array area for transit noting entry would not be prohibited other than through any active safety zones. The minimum spacing (cross wind direction spacing of 944m and minimum downwind spacing of 1,180m) is sufficient for safe internal navigation and is greater than that associated with many other UK OWFs, some of which are navigated by commercial fishing vessels in favourable conditions. The minimum spacing between structures is also greater than that at the neighbouring Greater Gabbard and Galloper developments. The final layout will be agreed with the MCA and Trinity House and these discussions will include consideration of facilitation of internal navigation.

200. The most likely consequences of vessel displacement will be increased journey times and distances for affected third party vessels and as a worst case, there could be disruption to schedules, particularly for commercial ferry operators in the region but given the anticipated size of the deviations outlined above and the international nature of routeing in the region alongside the ability to passage plan, disruptions to schedule are expected to be minimal. Vessels are expected to comply with international and flag state regulations (including the COLREGs and SOLAS) and will be able to passage plan in advance given the promulgation of information relating to the Project and relevant nautical charts. This high level of awareness will assist with ensuring that vessels make safe and effective deviations which minimise journey increases.

201. As a worst case, there could be disruption to schedules, particularly for commercial ferry operators in the region but given the anticipated size of the deviations outlined above and the international nature of routeing in the region alongside the ability to passage plan, disruptions to schedule are expected to be minimal.

202. There will also be some displacement associated with any maintenance of the offshore export cables within the offshore cable corridor. Any such displacement would be temporary and spatially limited and likely to be much less frequent than during the construction phase, however, does have the potential to impact routeing and pilotage within the precautionary areas if it were to occur. On this basis liaison procedures will be in place with PLA and HHA to determine appropriate arrangements for instances of cable maintenance, via the NIP. This is assessed in more detail in Section 15.6.2.6.

15.6.2.2.1 Frequency of occurrence

203. Frequency of occurrence is considered to be reasonably probable noting limited deviations are anticipated to occur.

15.6.2.2.2 Severity of consequence

204. Severity of consequence is considered to be minor given the layout will require MCA and Trinity House approval and deviations will already have been established during the construction phase.

15.6.2.2.3 Impact significance

205. Minor deviations will occur albeit with sufficient searoom for safe navigation and alternate routeing options, the impact is therefore assessed as being tolerable and ALARP.

15.6.2.3 Impact 3: Increased vessel to vessel collision risk between third party vessels due to vessel displacement

206. As discussed in Section 15.6.2.2, it is likely that commercial vessels will deviate to avoid the array area during the operational phase. Such vessels displaced from the array area may increase encounter rates with other third party vessels which may lead to an increase in collision risk.

207. Local traffic patterns inshore of the array area are currently managed by the existing Sunk routeing measures. These routeing measures are used by a relatively large number of vessels per day, however as detailed in Section 15.6.1.3, there was only one collision incidents recorded within the study area over the 10 years of incident data studied. One collision incident was also reported in the preceding ten year period. The limited number of collisions is likely reflective of the risk being managed by the significant traffic management mitigations already in place including the routeing measures and the Sunk VTS.

208. In poor visibility, third party vessels may experience limitations regarding visual identification of other third party vessels when passing on another side of the array area. These limitations may increase the potential for an encounter. However, this will be mitigated by the application of the COLREGs (reduced speeds) in adverse weather conditions. Moreover, the minimum spacing between WTGs (cross wind direction spacing of 944m and minimum downwind spacing of 1,180m) will be sufficient to ensure any visual restriction is very short-term in nature. Given the presence of the array area between routeing measures and noting the presence of the precautionary area, it is also very likely that vessels will be very aware of the potential for other vessels navigating locally.

209. Within the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)), post wind farm modelling using all main commercial routes identified as input gives an estimated collision return period of one in 2.87 years for base case traffic levels. The high level of collision risk is due to the significant volumes of vessels already within the surrounding area of the Project. The base case collision result represents a 0.32% increase compared to the pre wind farm base case result, indicating that the influence of the array area on the overall collision risk for commercial traffic is very low. This is reflective of the open searoom available to the south of the array area where vessels would be expected to deviate as discussed in Section 15.6.1.1.2. However, as discussed in the allision risk impact (Section 15.6.2.1), based on consultation input from the MCA, to further reduce the risk Applicant has included a DCO requirement (Draft DCO (Document Reference: 6.1)) which provides that, unless otherwise agreed with the MCA, the Applicant will implement a SEZ whereby all surface piercing infrastructure will be located at least 1nm from the local routeing measures.

210. During the Hazard Workshop, it was raised that recreational vessels that would normally transit through the array area to avoid the TSS lanes may be displaced into the TSS lanes. However, minimums spacing (cross wind direction spacing of 944m and minimum downwind spacing of 1,180m) is sufficient for safe

internal navigation and is greater than that associated with many other UK OWFs, some of which are navigated by commercial fishing vessels in favourable conditions. The minimum spacing between structures is also greater than that at the neighbouring Greater Gabbard and Galloper developments. The final layout will be agreed with the MCA and Trinity House and these discussions will include consideration of facilitation of internal navigation for smaller vessels including recreational vessels.

211. In the event that an encounter does occur, it is likely to be very localised and occur for only a short duration, with collision avoidance action implemented by the vessels involved, in line with the COLREGs, thus minimising the risk that the situation will develop into a collision incident.

212. Historical collision incident data (as per the NRA, ES Appendix 15.1 (Document Reference: 3.3.16)) also indicates that no collision incidents between third party vessels have occurred directly as a result of a UK OWF and that the most likely consequences will be low should a collision occur, with minor contact between the vessels resulting in minor damage and no injuries to persons, with both vessels able to resume their respective passages and undertake a full inspection at the next port. As an unlikely worst case, one of the vessels could be foundered resulting in a PLL and / or pollution.

15.6.2.3.1 Frequency of occurrence

213. Frequency of occurrence of a collision is considered to be remote.

15.6.2.3.2 Severity of consequence

214. Severity of consequence is considered to be moderate based on consideration of historical incident data.

15.6.2.3.3 Impact significance

215. Noting that the final layout will be agreed with the MCA and Trinity House (see Section 15.3.4) and the additional mitigation of the SEZ to maintain a distance of at least 1nm from all surface piercing infrastructure to the local IMO routeing measures unless otherwise agreed with the MCA, the impact is assessed as being tolerable and ALARP.

15.6.2.4 Impact 4: Vessel to vessel collision risk (third party to project vessel)

216. Increases in wind farm vessel activity associated with the operation of North Falls could lead to increased collision rates in the area.

217. All Project vessel movements will be managed via marine coordination for the purposes of ensuring any potential increase in encounter rates with third party vessels is minimised. The Applicant will also ensure effective promulgation including in relation to maintenance activities which will highlight to marine users when and where there may be increased activity.

218. It is also noted that there is already wind farm vessel activity present within the area associated with the operation and maintenance of the existing Galloper and Gabbard projects. Further, there will likely be lower activity associated with North Falls during the operational phase than was the case during construction. On this basis, local users and regular operators are likely to already be familiar with similar works and transits that will occur in relation to the operation of North Falls. In this regard it is noted that there have been no reported collision incidents between vessels associated with Greater Gabbard and Galloper and

third party vessels to date. Further, as detailed in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)), there has only been one reported collision incident between a third party vessel and a wind farm vessel in the UK, noting this incident occurred within a harbour.

219. The CoS recommended during consultation (see Section 15.2) that entry / exit points for project vessels accessing or leaving the array area were defined to maximise mariner awareness of where project vessel encounters may occur. As per Section 15.3.4, these have been assumed as embedded mitigation as part of marine coordination procedures.

220. The Applicant will apply for safety zones of 500m around any structure where major maintenance is ongoing (i.e. where there may be sensitive vessel operations underway). Advisory safe passing distances may also be promulgated around any sensitive operations where a safety zone does not apply (e.g. cable maintenance). These measures will ensure third party vessels are aware of the areas that should be avoided to minimise collision risk with project vessels.

221. In terms of the export cables, a key output of the NRA process notably consultation was that mitigation was needed to manage hazards associated with any cable maintenance, noting the location of the offshore cable corridor intersecting the outer and inner precautionary areas, the Trinity and Sunk DW routes, and the charted Sunk pilotage (see Section 15.5.1).

222. North Falls has therefore created an Outline NIP (Document Reference: 7.24) in liaison with the local ports and other key maritime stakeholders which sets out procedures by which associated hazards will be managed. This includes consideration of the need for any cable maintenance, noting any such need is likely to be a very infrequent event.

15.6.2.4.1 Frequency of occurrence

223. Frequency of occurrence is considered to be extremely unlikely.

15.6.2.4.2 Severity of consequence

224. Severity of consequence is considered to be moderate based on consideration of historical incident data.

15.6.2.4.3 Impact significance

225. The impact is therefore determined to be broadly acceptable.

15.6.2.5 Impact 5: Impacts on vessels involved in marine aggregate operations

226. The offshore infrastructure, project vessels and activities may impact marine aggregate dredging operations in the area during the operational phase.

227. In terms of transit to / from marine aggregate dredging areas, there will be no restriction on entry into the array area other than through active safety zones. However, marine aggregate dredgers may choose to deviate to avoid the array area. This aligns with consultation input from CEMEX who stated during consultation (September 2021) their vessels would likely deviate to use the Sunk TSS South lanes without difficulty. The vessel traffic data showed the majority of dredger transits already occur in the TSS lanes, and on this basis it is not considered that there will be notable impacts on transits.

228. In terms of marine aggregate dredging, there is one marine aggregate dredging areas located adjacent to the array area; 524 (“Thames D”) – adjacent to

southern array area, operated by DEME. Input from DEME noted a minimum of 25 visits per year or 110,000 tonnes. The six months of AIS data collected during 2023 and the winter vessel traffic survey also identified marine aggregate dredging within Area 524. DEME stated during consultation that operational marine aggregate dredging is unlikely to be notably impacted given the extents of Area 524 are not typically dredged to ensure the activity remains within the licensed boundaries. Five yearly surveys do occur in and around Area 524, and it was confirmed during consultation that liaison between North Falls and DEME would be undertaken in advance of and during any works occurring to ensure operations from both parties can be facilitated.

229. It is noted that the northern array area was located adjacent to dredging Area 507/6 operated by CEMEX which during consultation (Section 15.2) was of concern given use of the area would be restricted during flood tides noting the size of the area and fast tides as vessels need additional space to turn. With the northern array now removed in its entirety, in which shipping and navigation stakeholders were a driving factor, there is now no proximity impact with Area 507/6.

15.6.2.5.1 Frequency of occurrence

230. Frequency of occurrence is considered to be remote.

15.6.2.5.2 Severity of consequence

231. Severity of consequence is considered to be minor.

15.6.2.5.3 Impact significance

232. The impact is therefore determined to be broadly acceptable under the FSA.

15.6.2.6 Impact 6: Impact on vessels transiting to / from local ports in the area, including use of approach channels, port operations and pilotage

233. Vessels or activities associated with the operation of North Falls may restrict or hinder third party traffic access to local ports and facilities, including approach channels and pilotage.

234. The offshore cable corridor intersects or passes in proximity to the following features:

- Sunk Outer Precautionary Area;
- Charted Sunk Pilot Station;
- Sunk Inner Precautionary Area;
- Harwich DW Channel; and
- Sunk, Trinity, and Harwich approach DW route.

235. As part of Site Selection work (ES Chapter 4 Site Selection and Assessment of Alternatives (Document Reference: 3.1.6)), the Applicant has engaged with PLA and HHA with regard to cable routeing and has implemented changes to the offshore cable corridor to minimise impacts on the key areas raised as being of concern. Changes made include:

- Shifting the offshore cable corridor further south from the Sunk Pilot Station;
- Shifting the offshore cable corridor south of the Harwich DW Channel;
- TSS crossing angle moved closer to 90 degrees; and

- Offshore cable corridor moved as far as practicable from the Sunk roundabout feature.

236. The final layout of structures will be agreed with MCA and Trinity House. On this basis, and noting the majority of commercial vessel traffic already utilise the TSS lanes as well as the size of main commercial route deviations due to the presence of the array area (as outlined for the vessel displacement hazard) are small, it is considered unlikely that the array area will notably impact port / pilot access and arrival times and anything that will occur will be minimal and so schedules are not deemed to be impacted.

237. In terms of the export cables, a key output of the NRA process notably consultation was that mitigation was needed to manage associated hazards including from cable maintenance, noting the location of the offshore cable corridor intersecting the outer and inner precautionary areas, the Trinity and Sunk DW routes, and the charted Sunk pilotage (see Section 15.5.1). North Falls has therefore created an Outline NIP (Document Reference: 7.24) in liaison with the local ports and other key maritime stakeholders which sets out procedures by which associated hazards will be managed, noting any instances of cable maintenance are anticipated be very infrequent.

238. A key area of concern from stakeholders notably local port authorities is the sections of the offshore cable corridor that intersect the Sunk and Trinity DW routes. It is noted that the offshore cable corridor also passes in proximity to the DW route approach to the Harwich DW Channel. These DW routes are crucial as they are the only option for deep draught vessels to access major local ports including the Thames and Medway ports, Harwich Haven, and the Port of Felixstowe. A reduction in water depth resultant of cable protection may therefore prevent port access for larger vessels, and laid cables may also restrict ability to deepen the DW routes in the future, preventing access for larger vessels in the future. This is considered in Section 15.6.2.7.

239. As per Section 15.6.2.4, Project vessel movements will be managed via marine coordination including entry / exit points to the array area. All project vessels will also be compliant with all Flag State regulations including the COLREGs, to ensure any impact on third party vessels accessing local ports is minimised. Given the presence of Greater Gabbard and Galloper, whose O&M vessels are operated out of Harwich Haven and Port of Lowestoft, respectively, mariners will already have experience of increased vessel movements associated with OWFs in the area.

240. The most likely consequences of reduced port access in relation to the operational array area will be limited effects on port / pilot schedules. As a worst case, there could be disruption to port / pilot schedules, but with no safety issues.

15.6.2.6.1 Frequency of occurrence

241. Frequency of occurrence is considered to be remote.

15.6.2.6.2 Severity of consequence

242. Severity of consequence is considered to be moderate.

15.6.2.6.3 Impact significance

243. The impact is assessed as being tolerable and ALARP assuming the implementation of the NIP.

15.6.2.7 Impact 7: Interaction with subsea cables including cable protection

244. Up to 103nm (190km) of array cables / platform interconnector cable will be located within the array area and up to two offshore export cables with a combined total length of 68nm (125.4km) will be within the offshore cable corridor. Where available, the primary means of cable protection will be by seabed burial, with a target minimum burial depth of 0.6m. Cables may require alternative cable protection with an indicative height of 1.4m. The burial depth and protection necessary will be informed by the Cable Burial Risk Assessment.

245. Any changes in water depth associated with the installed cable protection could lead to an increase in underkeel interaction risk for third party vessels navigating in the area. This was raised as a key concern by local port authorities notably the HHA and PLA during consultation with the Sunk VTS User Group and in other forums (see Section 15.2).

246. It is noted that the Applicant has already engaged in consultation with key stakeholders in its offshore cable corridor site selection process, including the MCA, Trinity House, PLA, and HHA. The input received has been fed into the offshore cable corridor selection process to date. Further details are provided in Section 15.6.1.6 and ES Chapter 4 Site Selection and Assessment of Alternatives (Document Reference: 3.1.6). Of relevance to underkeel clearance is the shifting south of the offshore cable corridor so it sits outside of the Harwich DW Channel.

247. MGN 654 requires that any reduction in water depth of greater than 5% must be discussed with the MCA to agree appropriate mitigation. Changes in water depth within any “areas of critical depths in relation to under keel clearance” including routeing measures and port approaches must also be discussed with the MCA regardless of the extent of the change. This aligns with consultation input received during the cable corridor selection process, with any reductions in water depth near the DW routes in particular raised as being of key concern. As per Section 15.6.2.6, the Sunk DW route, Trinity DW route, and the DW route approach to the Harwich DW Channel are crucial as they are only options for deeper draught vessels to access major local ports.

248. Within the DW routes, a maximum vessel draught of 16.9m was recorded using the HHA DW route approach, 15.7m using the Sunk DW route, and 14.1m using the Trinity DW route. On this basis, port access will not be restricted assuming base case vessel draughts, given that the cables will likely be buried in water depths of at least 19m in the areas that intersect the offshore cable corridor, providing in excess of 10% underkeel clearance, noting this assumes no reduction in water depths associated with the export cables over the Sunk or Trinity DW routes. On the basis the Project is committing to not reducing water depths in proximity to the intersections between the offshore cable corridor and the DW routes (the Sunk DW Area - West and Trinity DW Area as defined in the Outline NIP (Document Reference: 7.24)).

249. General consensus throughout the consultation process indicated that a 20m vessel draught was a reasonable assumption in terms of increased vessel size over the lifetime of the Project (see Section 15.2), and that an additional 10% was required to ensure suitable underkeel clearance for vessels. This means the channel would need to be excavated to a depth of at least 22m. On this basis additional dredging to install the cables, and over the installed cables

would be required (where they intersected the DW routes) and therefore consideration of this and agreement on values would be required as part of the cable burial risk assessment process. It is noted that allowing access for 20m vessels would require dredging along the existing deep-water routes, within turning areas and berths at the relevant ports. Additionally, burial depths should account for tidal constraints associated with larger vessel movements within the areas of concern. It is noted that the current depths over the Sunk and Trinity DW routes do not allow for 20m draught vessels, and substantial future dredging operations would be required to accommodate such vessels regardless of the presence of North Falls.

250. RYA noted during consultation concern over reductions of water depth in the nearshore area where there are large volumes of recreational transits, with particular concern over any reductions in areas where water depths were less than 4m above Chart Datum. Based on MCA requirements under MGN 654 (MCA, 2021) as detailed above, any reduction in water depth of more than 20cm assuming a 4m water depth would require MCA consultation.

251. As part of the Cable Specification and Installation Plan process, the Cable Burial Risk Assessment and additional burial assessments, and associated burial assessments, will set out the proposed burial depths and cable protection (where necessary and permitted), which will take into account areas where deep draught vessels transit, and therefore areas where water depth cannot be compromised. The NIP will be developed in accordance with the Outline NIP (Document Reference: 7.24) to ensure that installation and maintenance methodologies do not compromise safe vessel access to local ports. Furthermore, where appropriate, burial and protection will consider any foreseeable future spot dredging associated with London Gateway operations around the Sunk and Trinity DW routes to mitigate impacts on such operations. The Cable Burial Risk Assessment and NIP will be conditioned in the dML.

252. Should an underwater interaction occur, minor damage incurred is the most likely consequence, and foundering the unlikely worst case consequence.

15.6.2.7.1 Anchor interaction

253. The offshore cable corridor passes in proximity to the Sunk DW Anchorage and Sunk Inner Anchorage. Based on the vessel traffic survey data, an estimated three vessels per day were at anchor within 2nm of the offshore cable corridor, with the nearest being in the Sunk Inner Anchorage. In the event that a vessel were to drag anchor, it may interact with the offshore export cables.

254. It should also be considered that the offshore cable corridor intersect areas of high commercial vessel density, in particular the Sunk TSS East and South lanes, and the precautionary areas. The route has been designed to minimise impacts, such as by crossing TSS lanes at close to right angles where practicable. In an emergency incident it may be necessary for a vessel to drop anchor to avoid drifting into danger e.g. towards wind turbines. The locations of charted cables would be taken into consideration when deciding whether or not to drop anchor in such a situation, however the prevention of an allision or collision incident would likely take priority over the risk of potential cable interaction.

255. As per Section 15.3.4, the Applicant will determine suitable cable burial depths and protection measures via the Cable Burial Risk Assessment process. This

will consider the vessel densities, types and sizes across and in the vicinity of the offshore cable corridor to ensure protection / burial is sufficient relative to the potential anchor sizes that may be used in the area. As discussed above, the potential need for future dredging over the DW routes will need to be considered within the Cable Burial Risk Assessment process.

256. Should an anchor interaction incident occur with the subsea cables, the most likely consequences will be low based on historical anchor interaction incidents, with no damage incurred to the cable or the vessel. As an unlikely worst case, a snagging incident could occur and / or the vessel's anchor and the cable could be damaged.

15.6.2.7.2 Frequency of occurrence

257. Frequency of occurrence is considered to be reasonably probable.

15.6.2.7.3 Severity of consequence

258. Severity of consequence is considered to be moderate.

15.6.2.7.4 Impact significance

259. The impact is assessed as being tolerable and ALARP assuming the implementation of the NIP.

15.6.2.8 Impact 8: Reduction of emergency response capability due to increased incident rates and / or reduced access for SAR responders

260. The operation of North Falls will lead to an increased level of vessels and personnel in the area over current baseline levels, noting that numbers are likely to be lower than during construction. The increased vessel and personnel numbers may lead to an increase in the number of incidents requiring an emergency response over baseline rates.

261. It is not anticipated that the operation and maintenance of North Falls will lead to a notable increase in baseline incident rates, noting that as detailed in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)), there have not been a significant number of reported incidents associated with wind farms in the UK. Further, the onsite vessels will form additional resources in the event of an emergency incident, and may be able to assist in liaison with HMCG.

262. As required under MGN 654, the Applicant will produce and submit an ERCoP to the MCA detailing cooperation and assistance procedures in the event of an emergency incident. This will include the anticipated vessel and equipment resources the Project will have available. A SAR checklist will also be produced and agreed with the MCA setting out what additional SAR mitigations are implemented.

263. The final layout will be agreed with the MCA and Trinity House post-consent, as required under the DCO. These discussions will include how the layout will comply with MGN 654 (MCA, 2021) in terms of maintaining SAR access, and will give due consideration to the existing structures associated with Greater Gabbard.

15.6.2.8.1 Frequency of occurrence

264. Frequency of occurrence is considered to be extremely unlikely noting low baseline incident rates and the additional Project resources that may be able to assist in an emergency.

15.6.2.8.2 Severity of consequence

265. Severity of consequence is considered to be serious given the potential for a notable incident with potential for fatalities.

15.6.2.8.3 Impact significance

266. Given the additional resources associated with the Project and noting layout agreement to ensure suitable SAR access, the impact is considered tolerable and ALARP.

15.6.3 Likely significant effects during decommissioning

15.6.3.1 Impact 1: Vessel to structure allision risk

267. Allision risk during decommissioning is likely to be similar to that during the construction phase (see Section 15.6.1.1), noting similar activities will be occurring and mitigations in place, and a similar scenario in terms of increased vessel numbers. Vessels are expected to comply with international and flag state regulations (including the COLREGs and SOLAS) and will be able to passage plan in advance given the promulgation of information relating to the decommissioning of the Project meaning allision risk will be minimised.

15.6.3.1.1 Frequency of occurrence

268. Frequency of occurrence is considered to be remote.

15.6.3.1.2 Severity of consequence

269. Severity of consequence is considered to be serious given the potential for a notable incident including fatalities.

15.6.3.1.3 Impact significance

270. The impact is assessed as being Tolerable and ALARP.

15.6.3.2 Impact 2: Vessel displacement due to activities associated with the Project

271. It is anticipated that this impact will be similar in nature to the equivalent construction phase impact (see Section 15.6.1.2) noting similar activities will be occurring and mitigations in place, and a similar scenario in terms of increased vessel numbers. In particular, any displacement of vessels is likely to be similar.

15.6.3.2.1 Frequency of occurrence

272. Frequency of occurrence is considered to be reasonably probable noting limited deviations are anticipated.

15.6.3.2.2 Severity of consequence

273. Severity of consequence is considered to be minor given the layout will require MCA and Trinity House approval.

15.6.3.2.3 Impact significance

274. Minor deviations will occur albeit with sufficient searoom for safe navigation and alternate routeing options, the impact is therefore assessed as being tolerable and ALARP.

15.6.3.3 Impact 3: Increased vessel to vessel collision risk between third party vessels due to vessel displacement

275. It is anticipated that this impact will be similar in nature to the equivalent construction phase impact (see Section 15.6.1.3) noting similar activities will be occurring and mitigations in place, and a similar scenario in terms of increased

vessel numbers. In particular, any displacement of vessels is likely to be similar, and therefore by extension the impacts on collision risk.

15.6.3.3.1 Frequency of occurrence

276. Frequency of occurrence is considered to be remote.

15.6.3.3.2 Severity of consequence

277. Severity of consequence is considered to be moderate based on consideration of historical incident data.

15.6.3.3.3 Impact significance

278. Noting the embedded mitigation in place (see Section 15.3.4) and considering the existing traffic management measures, the impact is assessed as being tolerable and ALARP.

15.6.3.4 Impact 4: Vessel to vessel collision risk (third party to project vessel)

279. It is anticipated that this impact will be similar in nature to the equivalent construction phase impact (see Section 15.6.1.4) noting similar activities will be occurring and mitigations in place, and a similar scenario in terms of increased vessel numbers. In particular, Project vessel movements will be managed via marine coordination.

15.6.3.4.1 Frequency of occurrence

280. Frequency of occurrence is considered to be remote.

15.6.3.4.2 Severity of consequence

281. Severity of consequence is considered to be moderate based on consideration of historical incident data.

15.6.3.4.3 Impact significance

282. The impact is therefore determined to be tolerable and ALARP.

15.6.3.5 Impact 5: Impacts on vessels involved in marine aggregate operations

283. It is anticipated that this impact will be similar in nature to the equivalent construction phase impact (see Section 15.6.1.4) noting similar activities will be occurring and mitigations in place, and a similar scenario in terms of increased vessel numbers. However, it is noted that status of the local marine aggregate dredging areas will likely have changed.

15.6.3.5.1 Frequency of occurrence

284. Frequency of occurrence is considered to be remote noting proximity to existing marine aggregate dredging areas (noting uncertainty over status of marine aggregate dredging areas).

15.6.3.5.2 Severity of consequence

285. Severity of consequence is considered to be minor given the layout will require MCA and Trinity House approval.

15.6.3.5.3 Impact significance

286. The impact is therefore determined to be broadly acceptable under the FSA.

15.6.3.6 Impact 6: Impact on vessels transiting to / from local ports in the area, including use of approach channels, port operations and pilotage

287. It is anticipated that this impact will be similar in nature to the equivalent construction phase impact (see Section 15.6.1.6) noting similar activities will be occurring and mitigations in place, and a similar scenario in terms of increased

vessel numbers. As discussed in that section, liaison with HHA and PLA would be undertaken to agree appropriate arrangements for any required works in sensitive areas, including in relation to promulgation of information.

15.6.3.6.1 Frequency of occurrence

288. Frequency of occurrence is considered to be reasonably probable.

15.6.3.6.2 Severity of consequence

289. Severity of consequence is considered to be moderate.

15.6.3.6.3 Impact significance

290. The impact is assessed as being tolerable and ALARP assuming the implementation of the NIP.

15.6.3.7 Impact 7: Reduction of emergency response capability due to increased incident rates and / or reduced access for SAR responders

291. It is anticipated that this impact will be similar in nature to the equivalent construction phase impact (see Section 15.6.1.7) noting similar activities will be occurring and mitigations in place, and a similar scenario in terms of increased vessel numbers.

15.6.3.7.1 Frequency of occurrence

292. Frequency of occurrence is considered to be extremely unlikely noting low baseline incident rates and the additional Project resources that may be able to assist in an emergency.

15.6.3.7.2 Severity of consequence

293. Severity of consequence is considered to be serious given the potential for a notable incident with potential for fatalities.

15.6.3.7.3 Impact significance

294. Given the additional resources associated with the Project and noting layout agreement to ensure suitable SAR access, the impact is considered tolerable and ALARP.

15.7 Cumulative effects

15.7.1 Identification of potential cumulative effects

295. Table 15.10 provides a summary of the impacts considered cumulatively.

Table 15.10 Potential cumulative effects

Impact	Potential for cumulative effect	Rationale
Vessel to structure allision	Yes	Additional surface piercing structures will increase allision risk.
Increased vessel to vessel collision risk (third party to third party)	Yes	Additional surface piercing structures will increase displacement and reduce searoom which may lead to increased collision risk.
Increased vessel to vessel collision risk (third party to project vessel)	Yes	Additional vessels associated with other cumulative projects may lead to increased cumulative collision risk.

Impact	Potential for cumulative effect	Rationale
Vessel displacement	Yes	Additional surface piercing structures will increase cumulative displacement.
Impacts on vessels involved in marine aggregate operations	No	No marine aggregate dredging areas directly adjacent to both North Falls and a cumulative development (and therefore no marine aggregate dredging areas with a pathway for cumulative effect given wind farm structures only impact on marine aggregate dredging operations if in direct proximity).
Impact on vessels transiting to / from local ports in the area, including use of approach channels, port operations and pilotage	Yes	Additional surface piercing structures, project activities and vessels may increase cumulative effect on port access.
Interaction with subsea cables	Yes	Additional cables in the area may lead to cumulative effect on under keel clearance.
Reduction of emergency response capability due to increased incident rates and / or reduced access for SAR responders	Yes	Additional surface piercing structures, project activities and vessels may lead to increased incident rates on a cumulative basis or impact SAR access on a cumulative basis.

15.7.2 Other plans, projects and activities

296. The second step in the cumulative assessment is the identification of the other plans, projects and activities that may result in cumulative effects for inclusion in the CEA (described as 'project screening'). This information is set out in Table 15.11 below, together with a consideration of the relevant details of each, including current status (e.g. under construction), planned construction period, closest distance to North Falls, status of available data and rationale for including or excluding from the assessment.

297. The project screening has been informed by the development of a CEA Project List which forms an exhaustive list of plans, projects and activities in a very large study area relevant to North Falls. The list has been appraised, based on the confidence in being able to undertake an assessment from the information and data available, enabling individual plans, projects and activities to be screened in or out.

298. For shipping and navigation, the screening process has been applied to:

- OWFs within 50nm of the array area (noting wind farm developments typically have the greatest potential for causing vessel deviation);
- Oil and gas developments within 10nm of the array area (noting oil and gas platforms are less likely to cause large scale deviations than OWFs and
- Subsea cables within 2nm of the offshore cable corridor (impacts from subsea cables tend to be localised).

299. Constructing or operational projects are considered captured within the baseline assessment and hence have not been considered within the screening process.

Table 15.11 Summary of projects considered for the CEA in relation to Shipping and Navigation (project screening)

Project	Status	Construction period	Closest distance from the array area (nm)	Distance from the offshore cable corridor (nm)	Confidence in data	Included in the CEA (Y/N)	Rationale
Five Estuaries	In Planning	2028-2030	0	0.7	Medium High	Y	OWF project within 50nm, potential for cumulative impacts in relation to allision, displacement, collision and emergency response.
East Anglia ONE North	Consented	2023-2026	34	36	High	Y	OWF within 50nm, no interaction with main routes impacted by North Falls.
East Anglia TWO	Consented	2023-2026	16.9	20.3	High	Y	OWF within 50nm, no interaction with main routes impacted by North Falls.
Dunkerque	In Planning	2026-2029	31.8	39	Medium	Y	OWF within 50nm, no interaction with main routes impacted by North Falls.
NeuConnect Interconnector	In construction	2023-2028	1.3	0	High	Y	Subsea cables within 2nm
Nautilus Interconnector	Pre Application	2025-2028	Cable route unknown	Cable route unknown	Low	Y	The offshore study area for Nautilus intersects with the North Falls. Therefore, there is potential for cumulative effects, subject to the final location and programme for the interconnector.
Sea Link	Pre Application	2026-2030	2.9	0	Medium	Y	The emerging preferred and alternative routes for Sea Link intersect with the offshore cable corridor.
Tarchon Energy Interconnector	Pre Planning	2027-2030	Cable route unknown	Cable route unknown	Low	Y	Interconnector between UK and Germany with potential to be in proximity to the North Falls.
BritNed Interconnector	Operational	N/A	0	5	High	N	Baseline
Offshore Wind Farm Borssele	Operational	N/A	37	44	High	N	Baseline
Offshore Wind Farm Borssele III	Operational	N/A	32	39	High	N	Baseline

Project	Status	Construction period	Closest distance from the array area (nm)	Distance from the offshore cable corridor (nm)	Confidence in data	Included in the CEA (Y/N)	Rationale
Offshore Wind Farm Borssele IV	Operational	N/A	27	34	High	N	Baseline
Borssele Kavel V	Operational	N/A	35	42.	High	N	Baseline
Borssele	In Planning	N/A	27	34	Low	N	Low data confidence, no interaction with main routes
Hollandse Kust F	In Planning	N/A	48	54	Low	N	Low data confidence, no interaction with main routes
Northwind	Operational	N/A	32	39	High	N	Baseline
Belwind phase 1	Operational	N/A	28	35	High	N	Baseline
Rentel	Operational	N/A	33	40	High	N	Baseline
Norther	Operational	N/A	36	43	High	N	Baseline
Seastar	Operational	N/A	30	37	High	N	Baseline
Mermaid	Operational	N/A	25	32	High	N	Baseline
Northwester 2	Operational	N/A	25	32	High	N	Baseline
C-Power (Zone A)	Operational	N/A	33	40	High	N	Baseline
C-Power (Zone B)	Operational	N/A	36	43	High	N	Baseline
Belwind phase 2 (Nobelwind) (Zone 2)	Operational	N/A	29	36	High	N	Baseline
Belwind phase 2 (Nobelwind) (Zone 1)	Operational	N/A	27	35	High	N	Baseline
Borssele Kavel II	Operational	N/A	37	44	High	N	Baseline
Borssele Kavel III	Operational	N/A	32	39	High	N	Baseline
Borssele Kavel IV	Operational	N/A	27	34	High	N	Baseline

Project	Status	Construction period	Closest distance from the array area (nm)	Distance from the offshore cable corridor (nm)	Confidence in data	Included in the CEA (Y/N)	Rationale
Borssele Kavel I	Operational	N/A	35	42	High	N	Baseline
Gunfleet Sands I	Operational	N/A	22	3	High	N	Baseline
Gunfleet Sands II	Operational	N/A	21	4	High	N	Baseline
Gunfleet Sands Demo	Operational	N/A	24	6	High	N	Baseline
Kentish Flats	Operational	N/A	30	22	High	N	Baseline
Kentish Flats Extension	Operational	N/A	30	21	High	N	Baseline
London Array	Operational	N/A	11	9	High	N	Baseline
Thanet	Operational	N/A	13	19	High	N	Baseline
Greater Gabbard	Operational	N/A	0	2	High	N	Baseline
Galloper	Operational	N/A	0	3.4	High	N	Baseline
East Anglia ONE	Operational	N/A	29	32	High	N	Baseline

15.7.3 Assessment of cumulative effects

15.7.3.1 Cumulative Impact 1: Vessel to structure allision risk

300. The structures within the array area will increase allision risk to vessels passing outside of the WTGs or vessels navigating internally through the WTGs, noting the presence of existing structures associated with the Greater Gabbard and Galloper offshore wind farms. Allision risk is generally localised to adjacent or nearby developments. In the case of North Falls, it is considered there will be a cumulative increase when considered with Five Estuaries in particular (noting other screened in developments are in excess of 15nm from the array area and therefore are not anticipated as contributing to cumulative allision risk).

301. Both the array area and the Five Estuaries array areas are located adjacent to certain Sunk routeing measures, and in proximity to the existing Galloper and Greater Gabbard WTGs. As detailed in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)), there have been no reported allision incidents to date associated with the existing WTGs, which is likely reflective of the existing mitigation, including the lighting and marking of the WTGs, and the wider traffic management measures in place including the routeing measures and the Sunk VTS.

302. All screened in wind farm developments including Five Estuaries will be required to implement marking and lighting as directed by Trinity House and in compliance with IALA G1162 (IALA, 2021a). All layouts including Five Estuaries will also be required to be agreed with the MCA and Trinity House to ensure they are safe from a surface navigation perspective including on a cumulative basis. Other relevant cumulative developments will be included within MCA and Trinity House lighting and marking and layout agreements.

15.7.3.1.1 Frequency of occurrence

303. Frequency of occurrence is considered to be remote noting the embedded mitigations including layout approval and lighting and marking.

15.7.3.1.2 Severity of consequence

304. Severity of consequence is considered to be serious given the potential for a notable incident including fatalities.

15.7.3.1.3 Impact significance

305. Noting that the final layout and lighting and marking will be agreed with the MCA and Trinity House (see Section 15.3.4) and assuming the implementation of the SEZ, the impact is assessed as being tolerable and ALARP.

15.7.3.2 Cumulative Impact 2: Vessel displacement due to activities associated with the Project

306. The NRA (ES Appendix 15.1 (Document Reference: 3.3.16)) includes quantitative assessment of vessel deviations arising from the array area including on a cumulative basis (considering the screened in surface developments of East Anglia ONE North, East Anglia TWO, Dunkerque and Five Estuaries). As detailed in Section 15.5, the majority of vessel routeing in the vicinity of the array area is defined by the TSS lanes and precautionary areas, and as such the majority of commercial traffic already avoids the array area. However, certain vessels are associated with routes outside of the TSS lanes and precautionary areas that may alter passage as a result of the Project

depending on the final build out scenario, and as such may experience cumulative deviation.

307. Two routes were anticipated to deviate cumulatively as follows (see NRA ES Appendix 15.1 (Document Reference: 3.3.16)) for full details):

- Route 10: three vessels a day, <1% increase in journey distance within the study area; and
- Route 42: < 1 vessel a day, 3% increase in journey distance within the study area.

308. As shown, vessels on Route 10 will experience a minor deviation of less than 1% in distance within the study area. Vessels on Route 42 will experience a larger albeit still minor deviation of 3%, noting that this route was classed as “low use".

309. On this basis there are considered to be no notable cumulative changes in deviation distance when compared against the pre wind farm and in isolation post wind farm cases and there are no cumulatively screened in developments inshore of the study area, and open searoom including the relevant IMO Routeing Measures to the east. As such further large changes in the wider cumulative area are unlikely. This aligns with discussion at the hazard workshop (see Section 15.2), with the agreed minutes stating that “*Cumulative issues were reviewed for the array but general consensus was that the removal of the northern array had dealt with the key navigational concerns*”.

310. There may be some cumulative displacement associated with the works associated with cumulative subsea cables that require surface vessel presence (e.g. cable installation). Any such displacement would be temporary and spatially limited, however does have the potential to impact key vessel routeing options within the precautionary areas. North Falls has therefore created an Outline NIP (Document Reference: 7.24) in liaison with the local ports and other key maritime stakeholders which sets out procedures by which associated hazards will be managed. This is considered in Section 15.7.3.5. It is noted that the Five Estuaries project is developing a similar plan (Five Estuaries (2024)).

15.7.3.2.1 Frequency of occurrence

311. Frequency of occurrence is considered to be reasonably probable noting limited deviations are anticipated.

15.7.3.2.2 Severity of consequence

312. Severity of consequence is considered to be negligible when considering the size of the cumulative area assessed.

15.7.3.2.3 Impact significance

313. Minor deviations will occur albeit with sufficient searoom for safe navigation and alternate routeing options, the impact is therefore assessed as being Broadly Acceptable.

15.7.3.3 Cumulative Impact 3: Increased vessel to vessel collision risk between third party vessels due to vessel displacement

314. The presence of cumulative developments may reduce available searoom and lead to increased encounter rates and collision risk due to cumulative vessel displacement (see Section 15.7.3.2)

315. Collision incidents recorded within the study area are detailed in Section 15.6.1.3, and as discussed in that section are observed to be infrequent.

316. As per Section 15.7.3.2, cumulative deviations are not anticipated to be notable, with increases in journey distance limited to just two identified routes, with the change being low for both these routes. This is reflective of the vast majority of vessels in the study area already passing clear of the array area, either via the Sunk TSS South, Sunk TSS East, or to the south.

317. On this basis, given limited anticipated impact on vessel routeing, there is considered unlikely to be a notable change in collision risk.

15.7.3.3.1 Frequency of occurrence

318. Frequency of occurrence is considered to be remote.

15.7.3.3.2 Severity of consequence

319. Severity of consequence is considered to be moderate based on consideration of historical incident data.

15.7.3.3.3 Impact significance

320. Noting the embedded mitigation in place (see Section 15.3.4) and considering the existing traffic management measures, the impact is assessed as being tolerable and ALARP.

15.7.3.4 Cumulative Impact 4: Vessel to vessel collision risk (third party to project vessel)

321. All Project vessel movements associated with North Falls will be managed via marine coordination for the purposes of ensuring any potential increase in encounter rates with third party vessels is minimised. The Applicant will also ensure effective promulgation including in relation to maintenance activities which will highlight to marine users when and where there may be increased activity. All wind farm developments are expected to be implementing similar appropriate vessel management procedures including via marine coordination to ensure any disruption to third party traffic is minimised. It is also expected that all developers will apply for standard safety zones. All project vessels regardless of developer will also be required to comply with COLREGS which will manage encounter situations.

322. In terms of cable installation, a key output of the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)) process notably consultation was that mitigation was needed to manage hazards associated with the cable installation process, noting the location of the offshore cable corridor intersecting the outer and inner precautionary areas, the Trinity and Sunk DW routes, and the charted Sunk pilotage (see Section 15.5.1). North Falls has therefore created an Outline NIP (Document Reference: 7.24) in liaison with the local ports and other key maritime stakeholders which sets out procedures by which associated hazards will be managed.

15.7.3.4.1 Frequency of occurrence

323. Frequency of occurrence is considered to be remote.

15.7.3.4.2 Severity of consequence

324. Severity of consequence is considered to be moderate based on consideration of historical incident data.

15.7.3.4.3 Impact significance

325. The impact is therefore determined to be tolerable and ALARP assuming the implementation of the NIP.

15.7.3.5 Cumulative Impact 5: Impact on vessels transiting to/from local ports in the area, including use of approach channels, port operations and pilotage

326. Vessels or activities associated with the operation of North Falls may restrict or hinder third party traffic access to local ports and facilities, including approach channels and pilotage. Additional activities and vessels associated with other developments may increase the impact on a cumulative basis.

327. In particular, should surface activities of cumulative developments associated with subsea cables overlap on a temporal basis with similar activities at North Falls in the vicinity of the Sunk routeing measures, there may be temporary increased levels of impact to vessels associated with transits to / from local ports including pilotage. The screened in cumulative cable developments are:

- Five Estuaries export cables;
- NeuConnect Interconnector;
- Nautilus Interconnector;
- Sea Link; and
- Tarchon Energy Interconnector.

328. The Applicant has engaged with PLA and HHA with regard to cable routeing and has implemented changes to the offshore cable corridor to minimise impacts on the key areas raised as being of concern.

329. Liaison has taken place with PLA and HHA to agree appropriate arrangements for cable activities in sensitive areas, including in relation to promulgation of information. This is of particular importance for works required in the vicinity of the Sunk Pilot Station given its location relative to the offshore cable corridor. The key output of this consultation is the Outline NIP (Document Reference: 7.24), which has been drafted in liaison with the local ports and other key maritime stakeholders which sets out procedures by which associated hazards will be managed. The Outline NIP (Document Reference: 7.24) includes consideration of cumulatively screened in cable developments and will be further developed in liaison with the Interested Parties to account for any required additional procedures.

330. As per Section 15.7.3.4, Project vessel movements will be managed via marine coordination to ensure any impact on third party vessels accessing local ports is minimised, and other developers should be applying the same measures.

15.7.3.5.1 Frequency of occurrence

331. Frequency of occurrence is considered to be reasonably probable.

15.7.3.5.2 Severity of consequence

332. Severity of consequence is considered to be moderate.

15.7.3.5.3 Impact significance

333. The cumulative impact is assessed as being tolerable and ALARP assuming the implementation of the NIP.

15.7.3.6 Cumulative Impact 6: Interaction with subsea cables including cable protection

334. Any cumulative changes in water depth associated with the installed cable protection including at cable crossing points could lead to an increase in underkeel interaction risk for third party vessels navigating in the area. This was raised as a key concern by local port authorities notably the HHA and PLA during consultation with the Sunk VTS User Group and other forums.

335. As discussed in Section 15.6.2.7, MGN 654 requires that any reduction in water depth of greater than 5% must be discussed with the MCA to agree appropriate mitigation. Changes in water depth within any "areas of critical depths in relation to under keel clearance" including routeing measures and port approaches must also be discussed with the MCA regardless of the extent of the change. The MCA will consider cumulative issues in this regard in terms of acceptability and appropriate mitigation.

336. Any crossings with cumulative cable developments will likely lead to reductions in navigable depth resultant of cable protection, with an indicative height of 1.4m (analogous to the in isolation assessment). Crossings will be considered as part of the Cable Burial Risk Assessment process and Cable Specification and Installation Plan process, to ensure they are appropriately designed to mitigate environmental effects.

337. As per Section 15.3.4, the Applicant will determine suitable cable burial depths and protection measures via a cable burial risk assessment process, as will developers of other screened in cumulative developments.

15.7.3.6.1 Frequency of occurrence

338. Frequency of occurrence is considered to be reasonably probable.

15.7.3.6.2 Severity of consequence

339. Severity of consequence is considered to be moderate.

15.7.3.6.3 Impact significance

340. The cumulative impact is assessed as being tolerable and ALARP assuming the implementation of the NIP.

15.7.3.7 Cumulative Impact 7: Reduction of emergency response capability due to increased incident rates and/or reduced access for SAR responders

341. It is not anticipated that there will be a notable increase in baseline incident rates on a cumulative basis, noting that as detailed in the NRA (ES Appendix 15.1 (Document Reference: 3.3.16)), there have not been a significant number of reported incidents associated with wind farms in the UK. Further, the onsite vessels associated with North Falls and other cumulative developments will form additional resources in the event of an emergency incident, and may be able to assist in liaison with the MCA.

342. As required under MGN 654 (MCA, 2021), the Applicant will produce and submit an ERCoP to the MCA detailing cooperation and assistance procedures in the event of an emergency incident, and the same requirement will apply to other developers.

343. The final layouts of all cumulative development will be required to be agreed with the MCA and Trinity House. These discussions will include how the layouts

will comply with MGN 654 (MCA, 2021) in terms of maintaining SAR access, and will give due consideration to existing structures.

15.7.3.7.1 Frequency of occurrence

344. Frequency of occurrence is considered to be extremely unlikely noting low baseline incident rates and the additional Project resources that may be able to assist in an emergency.

15.7.3.7.2 Severity of consequence

345. Severity of consequence is considered to be serious given the potential for a notable incident with potential for fatalities.

15.7.3.7.3 Impact significance

346. Given the additional resources associated with the Project and noting layout agreement to ensure suitable SAR access, the impact is considered tolerable and ALARP, and therefore not significant in EIA terms.

15.8 Transboundary impacts

347. As per Section 15.4.5, transboundary impacts are considered to be captured by the in isolation assessment and the cumulative assessment.

15.9 Interactions

348. Table 15.12 illustrates the interactions between effects discussed in this chapter and those discussed in other chapters.

Table 15.12: Shipping and navigation users inter-relationships

Topic and description	Related chapter (Volume 3.1)	Where addressed in this chapter	Rationale
Impacts on fishing vessels (displacement)	ES Chapter 14 Commercial Fisheries (Document Reference: 3.1.16)	The impact to vessel displacement and navigational safety are assessed in Section 15.6	Displacement (and the safety implications) impacts based on vessel type and their usage of the study area are assessed in Section 15.6. Commercial effects of displacement are considered in ES Chapter 14 Commercial Fisheries (Document Reference: 3.1.16).
Collision and allision risk	ES Chapter 14 Commercial Fisheries (Document Reference: 3.1.16)	Allision and collision risk in Section 15.6	Allision and collision risk modelling includes all vessel types. The number and vessel types associated with fishing are further defined within the ES Chapter 14 Commercial Fisheries (Document Reference: 3.1.16).
Impacts on communications and SAR	ES Chapter 17 Aviation and Radar (Document Reference: 3.1.19)	Impacts emergency response are considered in Section 15.6.	Impacts to emergency response are assessed in Section 15.6 with impacts associated with aviation assessed in ES Chapter 17 Aviation and Radar (Document Reference: 3.1.19).

15.10 Inter-relationships

349. Table 15.13 provides a screening tool for whether multiple impacts affecting the same receptor have the potential to inter-relate to increase the level of impact upon that receptor.

350. Within Table 15.14 the effects are assessed relative to each development phase (Phase assessment, i.e. construction, operation or decommissioning) to see if (for example) multiple construction impacts affecting the same receptor could increase the level of impact upon that receptor. Following this, a lifetime assessment is undertaken which considers the potential for impacts to affect receptors across all development phases Table 15.14.

Table 15.13 Interaction between impacts - screening

Potential interaction between impacts								
	Impact 1: Vessel to structure allision	Impact 2: Vessel displacement	Impact 3: Vessel to vessel collision (3rd parties)	Impact 4: Vessel to project vessel collision	Impact 5: Impacts on marine aggregates vessels	Impact 6: Impacts on vessels transiting to/from port	Impact 7: Interaction with cable protection	Impact 8: Impact on SAR
Impact 1: Vessel to structure allision		Yes	No	No	Yes	Yes	No	Yes
Impact 2: Vessel displacement	Yes		Yes	No	Yes	Yes	No	Yes
Impact 3: Vessel to vessel collision (3rd parties)	No	Yes		No	Yes	Yes	No	Yes
Impact 4: Vessel to project vessel collision	No	No	No		Yes	Yes	No	Yes
Impact 5: Impacts on marine aggregates vessels	Yes	Yes	Yes	Yes		Yes	No	Yes
Impact 6: Impacts on vessels transiting to/from port	Yes	Yes	Yes	Yes	Yes		No	Yes
Impact 7: Interaction with cable protection	No	No	No	No	No	No		Yes
Impact 8: Impact on SAR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	

Table 15.14 Inter-relationship between impacts – phase and lifetime assessment

Receptor	Highest residual significance level			Phase assessment	Lifetime assessment
	Construction	Operation	Decommissioning		
Shipping and Navigation	Tolerable and ALARP	Tolerable and ALARP	Tolerable and ALARP	No greater than individually assessed impacts	Tolerable and ALARP

15.11 Potential monitoring requirements

351. Monitoring requirements of relevance to shipping and navigation anticipated to be required for the Project include:

352. Construction traffic monitoring by AIS, including continual collection of data from a suitable location. An assessment of a minimum of 28 days and comparison against the results of the NRA vessel traffic analysis and anticipated future case routeing will be submitted to the MCA annually throughout the construction phase and is likely to continue through the first year of the operation and maintenance phase to ensure measures implemented are effective.

353. The subsea cables will be subject to periodic inspection post construction to monitor cable burial depths and protection. If exposed cables or ineffective cable protection measures are identified, these would be promulgated to relevant sea users including via notifications to mariners and Kingfisher Bulletins and if there was deemed to be an immediate risk additional temporary measures may be deployed until such time as the risk is permanently mitigated (e.g. surface marking, use of a guard vessel).

354. As required by MGN 654, detailed and accurate hydrographic surveys will be undertaken periodically at intervals agreed with the MCA.

355. These measures are detailed in the Outline Vessel Traffic Monitoring (Document Reference: 7.21).

15.12 Summary

356. This chapter has provided a characterisation of the Shipping and Navigation in the offshore area of the Project. Dedicated vessel traffic surveys, supplemented with desk-based data sources and a NRA have been used to inform this assessment.

357. A summary of the Shipping and Navigation project alone assessment is provided in Table 15.15 and a summary of the cumulative effects assessment is provided in Table 15.16.

358. The impacts assessed include:

- Impacts on vessels involved in marine aggregate operations;
- Impacts on vessels transiting to/from local ports in the area;
- Increased risk of vessel-to-vessel collisions (third party to third party vessels and third party to project vessels);
- Interaction with subsea cables including cable protection;
- Reduction of emergency capabilities due to the increased incident rates and/or reduced access for SAR responders.
- Vessel displacement;
- Vessel to structure allision;

359. The impact assessment of shipping and navigation receptors has determined, that with the implementation of mitigation measures, North Falls is predicted to

have no greater than tolerable and ALARP or broadly acceptable impact (not significant in EIA terms).

360. There is potential for cumulative effects to occur with a number of other OWFs and other projects (see Section 15.7). However, when considering proposed mitigation measures, it is not anticipated that cumulative effects are likely to be significant in EIA terms.

361. Transboundary effects have been captured within the baseline assessment of vessel traffic and assessed through the in isolation assessment (Section 15.6) and the cumulative assessment (Section 15.7) as per Section 15.4.5 (noting further detail and assessment is provided in the NRA (ES Appendix 15.1, Document Reference: 3.3.16)).

362. Effects on Shipping and Navigation also have the potential to affect other receptors and these effects are fully considered in the topic-specific chapters. These receptors are outlined in Table 15.12, and the topic-specific chapters below:

- ES Chapter 14 Commercial Fisheries (Document Reference: 3.1.6); and
- ES Chapter 17 Aviation and Radar (Document Reference: 3.1.19).

363. Inter-relationships between the potential impacts are outlined in Table 15.14, none of the potential inter-relationships identified with respect to Shipping and Navigation are expected to result in a synergistic or greater impact than those assessed in Section 15.6.

364. Further monitoring requirement relevant to Shipping and Navigation are anticipated to include: a Construction traffic monitoring by AIS and periodic subsea cables inspection post construction to monitor cable burial depths and protection allowing for mitigation measures and warning of relevant sea users. Additionally, periodical hydrographic surveys will be undertaken at intervals agreed with the MCA as required by MGN 654.

Table 15.15 Summary of project alone effect assessment for Shipping and Navigation

Potential impact	Receptor	Frequency of occurrence	Severity of consequence	Significance of effect	Mitigation measures proposed	Residual effect
Construction Phase						
Impact 1: Vessel to structure allision	Third party traffic	Remote	Serious	Tolerable	SEZ to maintain a distance of at least 1nm from all surface piercing infrastructure to the local IMO routeing measures unless otherwise agreed with the MCA.	Tolerable and ALARP
Impact 2: Vessel displacement	Third party traffic	Reasonably Probable	Minor	Tolerable	None identified	Tolerable and ALARP
Impact 3: Increased vessel to vessel collision risk (third party to third party)	Third party traffic	Remote	Moderate	Tolerable	SEZ to maintain a distance of at least 1nm from all surface piercing infrastructure to the local IMO routeing measures unless otherwise agreed with the MCA.	Tolerable and ALARP
Impact 4: Increased vessel to vessel collision risk (third party to project vessel)	Third party traffic	Remote	Moderate	Tolerable	None identified	Tolerable and ALARP
Impact 5: Impacts on vessels involved in marine aggregate operations	Marine aggregate dredgers	Remote	Minor	Broadly Acceptable	None identified	Broadly Acceptable
Impact 6: Impact on vessels transiting to/from local ports in the area, including use of approach channels, port operations and pilotage	Ports and port users	Reasonably Probable	Moderate	Tolerable	None identified	Tolerable and ALARP
Impact 7: Reduction of emergency response capability due to increased incident rates and/or reduced access for SAR responders	Emergency Response Resources	Extremely Unlikely	Serious	Tolerable	None identified	Tolerable and ALARP

Potential impact	Receptor	Frequency of occurrence	Severity of consequence	Significance of effect	Mitigation measures proposed	Residual effect
Operational Phase						
Impact 1: Vessel to structure allision	Third party traffic	Remote	Serious	Tolerable	SEZ to maintain a distance of at least 1nm from all surface piercing infrastructure to the local IMO routeing measures unless otherwise agreed with the MCA.	Tolerable and ALARP
Impact 2: Vessel displacement	Third party traffic	Reasonably Probable	Minor	Tolerable	None identified	Tolerable and ALARP
Impact 3: Increased vessel to vessel collision risk (third party to third party)	Third party traffic	Remote	Moderate	Tolerable	SEZ to maintain a distance of at least 1nm from all surface piercing infrastructure to the local IMO routeing measures unless otherwise agreed with the MCA.	Tolerable and ALARP
Impact 4: Increased vessel to vessel collision risk (third party to project vessel)	Third party traffic	Extremely Unlikely	Moderate	Broadly Acceptable	None identified	Broadly Acceptable
Impact 5: Impacts on vessels involved in marine aggregate operations	Marine aggregate dredgers	Remote	Minor	Broadly Acceptable	None identified	Broadly Acceptable
Impact 6: Impact on vessels transiting to/from local ports in the area, including use of approach channels, port operations and pilotage	Ports and port users	Remote	Moderate	Tolerable	None identified	Tolerable and ALARP
Impact 7: Interaction with subsea cables including cable protection	Third party traffic	Reasonably Probable	Moderate	Tolerable	None identified	Tolerable and ALARP
Impact 8: Reduction of emergency response capability due to increased incident rates and/or reduced access for SAR responders	Emergency Response Resources	Extremely Unlikely	Serious	Tolerable	None identified	Tolerable and ALARP

Potential impact	Receptor	Frequency of occurrence	Severity of consequence	Significance of effect	Mitigation measures proposed	Residual effect
Decommissioning Phase						
Impact 1: Vessel to structure allision	Third party traffic	Remote	Serious	Tolerable	SEZ to maintain a distance of at least 1nm from all surface piercing infrastructure to the local IMO routeing measures unless otherwise agreed with the MCA.	Tolerable and ALARP
Impact 2: Vessel displacement	Third party traffic	Reasonably Probable	Minor	Tolerable	None identified	Tolerable and ALARP
Impact 3: Increased vessel to vessel collision risk (third party to third party)	Third party traffic	Remote	Moderate	Tolerable	SEZ to maintain a distance of at least 1nm from all surface piercing infrastructure to the local IMO routeing measures unless otherwise agreed with the MCA.	Tolerable and ALARP
Impact 4: Increased vessel to vessel collision risk (third party to project vessel)	Third party traffic	Remote	Moderate	Tolerable	None identified	Tolerable and ALARP
Impact 5: Impacts on vessels involved in marine aggregate operations	Marine aggregate dredgers	Remote	Minor	Broadly Acceptable	None identified	Broadly Acceptable
Impact 6: Impact on vessels transiting to/from local ports in the area, including use of approach channels, port operations and pilotage	Ports and port users	Reasonably Probable	Moderate	Tolerable	None identified	Tolerable and ALARP
Impact 7: Reduction of emergency response capability due to increased incident rates and/or reduced access for SAR responders	Emergency Response Resources	Extremely Unlikely	Serious	Tolerable	None identified	Tolerable and ALARP

Table 15.16 Summary of cumulative effect assessment for Shipping and Navigation

Potential impact	Receptor	Frequency of occurrence	Severity of consequence	Significance of effect	Mitigation measures proposed	Residual effect
Impact 1: Vessel to structure allision	Third party traffic	Remote	Serious	Tolerable	SEZ to maintain a distance of at least 1nm from all surface piercing infrastructure to the local IMO routeing measures unless otherwise agreed with the MCA.	Tolerable and ALARP
Impact 2: Vessel displacement	Third party traffic	Reasonably Probable	Negligible	Broadly Acceptable	None identified	Broadly Acceptable
Impact 3: Increased vessel to vessel collision risk (third party to third party)	Third party traffic	Remote	Moderate	Tolerable	SEZ to maintain a distance of at least 1nm from all surface piercing infrastructure to the local IMO routeing measures unless otherwise agreed with the MCA.	Tolerable and ALARP
Impact 4: Increased vessel to vessel collision risk (third party to project vessel)	Third party traffic	Remote	Moderate	Tolerable	None identified	Tolerable and ALARP
Impact 5: Impact on vessels transiting to/from local ports in the area, including use of approach channels, port operations and pilotage	Ports and port users	Reasonably Probable	Moderate	Tolerable	None identified	Tolerable and ALARP
Impact 6: Interaction with subsea cables including cable protection	Third party traffic	Reasonably Probable	Moderate	Tolerable	None identified	Tolerable and ALARP
Impact 7: Reduction of emergency response capability due to increased incident rates and/or reduced access for SAR responders	Emergency Response Resources	Extremely Unlikely	Serious	Tolerable	None identified	Tolerable and ALARP

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