RWE Renewables UK Dogger Bank South (West) Limited

RWE Renewables UK Dogger Bank South (East) Limited

Dogger Bank South Offshore Wind Farms

Preliminary Environmental Information Report

Chapter 14 – Shipping and Navigation

25/04/2023

Document Reference: 004300122

Revision: 04

Unrestricted

RWE

Company:	**RWE Renewables UK Dogger Bank South (West) Limited and RWE Renewables UK Dogger Bank South (East) Limited**	Asset:	**Development**
Project:	**Dogger Bank South Offshore Wind Farms**	Sub Project/Package:	**Consents**
Document Title or Description:	Preliminary Environmental Information Report – Chapter 14 – Shipping and Navigation		
Document Number:	004300122-04	Contractor Reference Number:	PC2340-RHD-OF-ZZ-RP-Z-0054

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Rev No.	Date	Status/Reason for Issue	Author	Checked by	Approved by
01	06/02/2023	First Issue	Anatec Ltd	HC	AP
02	01/03/2023	Second Issue	Anatec Ltd	CC	HC
03	23/03/2023	Third Issue	Anatec Ltd	CC	HC
04	25/04/2023	Fourth Issue	Anatec Ltd	HC	AC

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Contents

Tables

Volume 2 - Figures

Volume 3 – Appendices

Glossary

Term	Definition
Allision	The act of striking or collision of a moving vessel against a stationary object.
Array Areas	The DBS East and DBS West offshore array areas, where the wind turbines and array cables will be located. The array areas do not include the offshore export cable corridor.
Automatic Identification System (AIS)	A system by which vessels automatically broadcast their identity, key statistics including location, destination, length, speed and current status, e.g., under power. Most commercial vessels and United Kingdom/European Union fishing vessels over 15m length are required to carry AIS.
Baseline	The existing conditions as represented by the latest available survey and other data which is used as a benchmark for making comparisons to assess the impact of the Projects.
Collision	The act or process of colliding (crashing) between two moving objects.
Cumulative Effects	Changes to the environment caused by a combination of present and future projects, plans or activities.
Cumulative Effect Assessment (CEA)	Assessment of potential significant effects as a result of the incremental change caused by other past, present and reasonably foreseeable activities together with a development.
Environmental Impact Assessment (EIA)	The process of evaluating the likely significant environmental effects of a proposed development over and above the existing circumstances (or 'baseline').
Formal Safety Assessment (FSA)	A structured and systematic process for assessing the risks and costs (if applicable) associated with shipping activity.

Term	Definition
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.
Main Commercial Route	Defined transit route (mean position) of commercial vessels identified within each shipping and navigation study area.
Marine Guidance Note (MGN)	A system of guidance notes issued by the Maritime and Coastguard Agency which provide significant advice relating to the improvement of the safety of shipping at sea, and to prevent or minimise pollution from shipping.
Navigational Risk Assessment (NRA)	A document which assesses the hazards to shipping and navigation of a proposed Offshore Renewable Energy Installation based upon Formal Safety Assessment.
Offshore Development Area	The Offshore Development Area encompasses the wind farm site and the options for the offshore transmission works.
Offshore Export Cable Corridor	This is the area which will contain the offshore export cables (and potentially the ESP and / or RCP) between the offshore substation/converter platforms and Transition Joint Bays at the landfall.
Offshore Export Cable Corridor Shipping and Navigation Study Area	A buffer of two nautical miles applied around the offshore export cable corridor.

Term	Definition
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, 2021). For the purposes of this report and in keeping with the consistency of the Environmental Impact Assessment, OREI can mean offshore wind turbines and the associated electrical infrastructure such as offshore substations.
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.
Safety Zone	A statutory marine zone demarcated for the purposes of safety around a possibly hazardous installation or works/construction area.
Scoping Opinion	The report adopted by the Planning Inspectorate on behalf of the Secretary of State.
Scoping Report	The report that was produced in order to request a Scoping Opinion from the Secretary of State.
Shipping and Navigation Study Area	A buffer of ten nautical miles applied around each array area. The shipping and navigation study areas for DBS East and DBS West are referred to as the ‘DBS East shipping and navigation study area’ and ‘DBS West shipping and navigation study area’ respectively.

Term	Definition
The Applicant	RWE Renewables UK Dogger Bank South (West) Limited and RWE Renewables UK Dogger Bank South (East) Limited as the owners of DBS West and DBS East respectively are the named undertakers that will have the benefit of the Development Consent Order. References in this document to obligations on, or commitments by, 'the Applicant' are given on behalf of RWE Renewables UK Dogger Bank South (West) Limited and RWE Renewables UK Dogger Bank South (East) Limited.
The Projects	DBS East and DBS West are two separate projects, collectively known as the Dogger Bank South (DBS) offshore wind farms.
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.

Acronyms

Term	Definition
AIS	Automatic Identification System
ARPA	Automatic Radar Plotting Aid
BEIS	Department for Business, Energy and Industrial Strategy
CAA	Civil Aviation Authority
CD	Chart Datum
CEA	Cumulative Effect Assessment
COLREGs	Convention on the International Regulations for Preventing Collisions at Sea
CTV	Crew Transfer Vessel
DBS	Dogger Bank South
DCO	Development Consent Order
DECC	Department of Energy and Climate Change
DfT	Department for Transport
EEA	European Economic Area
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
ERCoP	Emergency Response Cooperation Plan
ES	Environmental Statement
FLO	Fisheries Liaison Officer
FSA	Formal Safety Assessment

Term	Definition
GLA	General Lighthouse Authority
GT	Gross Tonnage
HRA	Helicopter Refuge Area
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IMO	International Maritime Organization
IPMP	In-Principle Monitoring Plan
LOA	Length Overall
m	Metre
MAIB	Marine Accident Investigation Branch
MCA	Maritime and Coastguard Agency
MDA	Managed Danger Area
MGN	Marine Guidance Note
MHWS	Mean High Water Springs
MMO	Marine Management Organisation
MoD	Ministry of Defence
MPCP	Marine Pollution Contingency Plan
MSL	Mean Sea Level
nm	Nautical Mile

Term	Definition
nm^2	Square Nautical Mile
NPS	National Policy Statement
NRA	Navigational Risk Assessment
NUC	Not Under Command
OREI	Offshore Renewable Energy Installation
PEIR	Preliminary Environmental Information Report
PEXA	Practice and Exercise Area
PLL	Potential Loss of Life
Radar	Radio Detection and Ranging
RAM	Restricted in Ability to Manoeuvre
RCP	Reactive Compensation Platform
RNLI	Royal National Lifeboat Institute
RoRo	Roll-on/Roll-off Cargo
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
UK	United Kingdom
UKHO	United Kingdom Hydrography Office
VHF	Very High Frequency

14 Shipping and Navigation

14.1 Introduction

1. This chapter of the Preliminary Environmental Information Report (PEIR) considers the likely significant effects of the Projects on shipping and navigation. The chapter provides an overview of the existing environment for the proposed Offshore Development Area, followed by an assessment of likely significant effects for the construction, operation, and decommissioning phases of the Projects.

2. The assessment should be read in conjunction with the following linked chapters:

- **Chapter 5 Project Description**;
- **Chapter 13 Commercial Fisheries**;
- **Chapter 15 Aviation and Radar**; and
- **Chapter 16 Infrastructure and Other Users**.

Additional information to support the shipping and navigation assessment includes:

- **Appendix 14-1 Navigational Risk Assessment**.

14.2 Consultation

3. Consultation with regard to shipping and navigation has been undertaken in line with the general process described in **Chapter 6 EIA Methodology**. The key elements of consultation to date have included scoping, as well as meetings with the United Kingdom (UK) Chamber of Shipping, the Maritime and Coastguard Agency (MCA), and Trinity House. The feedback received has been considered in preparing the PEIR. **Table 14-1** provides a summary of how the consultation responses received to date have influenced the approach that has been taken.

4. This chapter will be updated following consultation on PEIR in order to produce the final assessment that will be submitted with the Development Consent Order (DCO) application. Full details of the consultation process will also be presented in the Consultation Report alongside the DCO application.

Table 14-1 Consultation Responses

Comment	Project Response
Pre-Scoping meeting with the UK Chamber of Shipping 21/09/2021	
A singular offshore export cable corridor would be preferable to minimise impacts.	The offshore export cable corridor has been refined from that considered at the scoping stage, with only one landfall area now considered. Offshore the corridor may separate into two to serve the two wind farms.
Queries whether a substation may be required along the offshore export cable corridor.	A Reactive Compensation Platform (RCP) is included in the design envelope and would be located within the offshore export cable corridor. An electrical switching platform may also be located within the offshore export cable corridor, alongside the RCP. The baseline characterisation for platforms within the offshore export cable corridor will be set out in the ES using data from the vessel traffic surveys which are currently ongoing.

Comment	Project Response
Pre-Scoping meeting with the MCA and Trinity House 27/09/2021	
Satisfied with the survey methodology proposed, noting that the data when collected will need to be reviewed.	Survey methodology has been agreed as appropriate by the MCA and Trinity House as acknowledged in the assessment methodology in section 14.4.2.1.
Queried whether changes to the National Policy EN-3 will be considered.	Acknowledged in the assessment methodology in section 14.4.2.1.
Initial Scoping response from the Ministry of Defence (MoD) 07/12/2021	
It is acknowledged that the Dogger Bank South (DBS) array areas may fall wholly or partially within the Southern Managed Danger Area (MDA) Practice and Exercise Areas (PEXA) D323A, D323B, D323C, D323D, D323E, D323F, and D323G. The lower vertical limits of blocks of danger area airspace are also noted and the export cables may pass through the Danger Area D307 (Donna Nook).	Military practice and exercise areas have been acknowledged in the existing environment in section 14.5.1.
Initial Scoping response from Trinity House 08/12/2021	
Expected that a comprehensive vessel traffic analysis is undertaken in accordance with Marine Guidance Note (MGN) 654.	Two seasonal vessel traffic surveys have been undertaken with related analysis carried out, as acknowledged in the assessment methodology in section 14.4.2.1, with the findings outlined in section 14.5.2.
The possible cumulative and in-combination effects on shipping routes and patterns should be adequately assessed including the potential 'corridor' between the project and Dogger Bank A.	Given that the relevant other plans, projects and activities are likely to change prior to the submission of the DCO application a full Cumulative Effect Assessment (CEA) has not been provided at the PEIR stage but will be provided in the Environmental Statement (ES). This will be discussed with stakeholders prior to DCO submission.

Comment	Project Response
The development will need to be marked with marine aids to navigation in accordance with the general principles outlined in International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Recommendation O-139 as a risk mitigation measure and agreed with Trinity House.	Lighting and marking guidance will be adhered to as acknowledged in the assessment methodology in section 14.4.1. Lighting and marking is included as mitigation embedded in the design in section 14.3.3.
Additional aids to navigation such as buoys may be necessary to mitigate the risk posed to the mariner, particularly during the construction phase.	Implementation of construction buoyage will be applied as acknowledged in the mitigation embedded in the design in section 14.3.3.
A Decommissioning Plan, which includes a scenario where upon decommissioning and completion of removal operations an obstruction considered a danger to navigation is left on site 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.	Development of a Decommissioning Plan is acknowledged in the mitigation embedded in the design in section 14.3.3.
There may be a requirement for navigational marking of the export cables and the vessels laying them. If it is necessary for the 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.	Any protection for export cables will adhere to the requirements of MGN 654 and a Cable Specification and Installation Plan will be produced prior to installation, as acknowledged in the mitigation embedded in the design in section 14.3.3.
Initial Scoping response from the UK Chamber of Shipping 13/01/2022	
It is important to widen the routeing shipping and navigation study area for the project, far beyond the ten nautical mile (nm) traffic study area, given the cumulative impact to the surrounding area as the number of wind farms increases.	The cumulative assessment, as per the methodology detailed in section 3 of **Appendix 14-1 Navigational Risk Assessment**, will screen all offshore wind farm projects within 50nm.

Comment	Project Response
Scoping Opinion response from the Planning Inspectorate 02/09/2022	
The Scoping Report seeks to scope out the following (during the construction and decommissioning phases only): • Vessel to structure allision risk; • Reduction of under keel clearance; • Increased anchor interaction with sub-sea cable(s); • Interference with marine navigation, communications and position fixing equipment; and • Reduction of emergency response provision including Search and Rescue (SAR) capability. The Inspectorate has assumed that these impacts are considered only relevant to the operation phase and subject to this assumption being correct, agrees to scope them out of the ES. The ES should explain the impacts relevant to each project phase, including where impacts are limited to a particular phase of the project.	The assessment of significance (see section 14.6) considers each impact across each phase of the Projects where appropriate.
The Scoping Report notes a requirement for additional traffic surveys if a RCP is required as part of the Proposed Development. The Inspectorate advises that careful consideration is given to the implications of the timing of this design decision for the ES (and the NRA which will inform it).	The baseline characterisation and impact assessment for platforms within the offshore export cable corridor will be set out in the ES using data from the vessel traffic surveys which are currently ongoing. This will be incorporated into the NRA for the Projects and therefore inform the ES.

Comment	Project Response
The Scoping Report states that safety zones of up to 500 metres (m) will be applied during construction, maintenance, and decommissioning phases. The ES should provide more information regarding the safety zones and include details of any diversions to navigational routes which will be required for existing vessels to avoid the Proposed Development. The ES should also include details of any other mitigation measures to be adopted that the assessment has relied upon.	Routeing displacement has been considered in the impact assessment (see section 14.6).
The Applicant is advised to consult with relevant stakeholders on the design and implementation of any safety zones and other mitigation measures adopted, and the ES should reflect the outcomes of this consultation.	An application for safety zones is acknowledged in the mitigation embedded in the design in section 14.3.3, and includes standard safety zones for offshore renewable developments. Mitigation embedded in the design will be discussed with relevant stakeholders at the Hazard Workshop and therefore inform the ES.
The Applicant should ensure that any structures 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 cable protection expected to be used.	A realistic worst case scenario has been established for shipping and navigation in section 14.3.2, including in relation to cable protection.
This aspect chapter should cross-refer to the relevant assessments of the ES, including assessments which consider the potential for vessel movements which could facilitate the spread of INNS (e.g., through ballast water, accidents, and spillages) or which displace shipping traffic into designated wildlife sites.	Pollution is considered as a potential consequence where appropriate in the impact assessment (see section 14.6). The potential for vessels to facilitate the spread of INNS is covered in **Chapter 9 Benthic Habitats**.

Comment	Project Response
Scoping Opinion response from the MCA 02/09/2022	
The area carries moderate traffic volumes including several important routes to/from UK ports – attention should be paid to routeing, particularly in adverse weather and cumulative effects should be considered.	Main commercial routes have been identified using the principles set out in MGN 654 (see section 14.5) and routeing displacement, including in adverse weather, has been considered in the impact assessment (see section 14.6). Given that the relevant other plans, projects and activities are likely to change prior to the submission of the DCO application a full CEA has not been provided at the PEIR stage but will be provided in the ES, including consideration of cumulative deviations of main commercial routes.
An NRA is required in accordance with MGN 654 including the MGN 654 Checklist.	An NRA has been undertaken (see **Appendix 14-1 Navigational Risk Assessment**) and includes a completed MGN 654 Checklist.
Vessel traffic surveys should consist of a minimum of 28 days of seasonal data using Automatic Identification System (AIS), Radio Detection and Ranging (Radar) and visual observations recorded within 24 months prior to DCO application.	Details of the vessel traffic surveys, which are compliant with MGN 654 requirements, are provided in section 14.4.
Cumulative impacts of other nearby offshore wind farms, particularly Dogger Bank A, Dogger Bank B, Dogger Bank C and Sofia, should be assessed as they will change routeing.	Given that the relevant other plans, projects and activities are likely to change prior to the submission of the DCO application a full CEA has not been provided at the PEIR stage but will be provided in the ES. The cumulative assessment, as per the methodology detailed in section 3 of **Appendix 14-1 Navigational Risk Assessment**), will screen all offshore wind farm projects within 50nm.

Comment	Project Response
Attention should be given to oil and gas activity in the area.	Oil and gas vessels have been considered in the characterisation of vessel traffic movements in section 14.5.
A Burial Protection Index study should be undertaken for cable burial with the MCA willing to accept a 5% reduction in surrounding depths reference to Chart Datum (CD).	Any protection for export cables will adhere to the requirements of MGN 654 and a Cable Specification and Installation Plan will be produced prior to installation, as acknowledged in the mitigation embedded in the design in section 14.3.3.
Implications to SAR resources should be considered and recognition of the level of Radar interference, AIS and shore-based Very High Frequency (VHF) radio coverage – a SAR Checklist will also need to be completed.	Reduction of emergency response capability (including SAR access) has been considered in the impact assessment including the need to complete a SAR Checklist (see section 14.6).
Scoping Opinion response from MoD 02/09/2022	
The offshore export cable corridor passes through D323K, D323D and D323C. The MoD has highly surveyed routes which may be relevant to the installation of the export cables and associated infrastructure.	Military practice and exercise areas have been acknowledged in the existing environment in section 14.5.1.
Scoping Opinion response from Trinity House 02/09/2022	
Comprehensive vessel traffic analysis is expected in accordance with MGN 654.	Two seasonal vessel traffic surveys have been undertaken with related analysis carried out, as acknowledged in the assessment methodology in section 14.4.2.1, with the findings outlined in section 14.5.2.
The possible cumulative effects on routes should be adequately assessed.	Given that the relevant other plans, projects and activities are likely to change prior to the submission of the DCO application a full CEA has not been provided at the PEIR stage but will be provided in the ES, including consideration of cumulative deviations of main commercial routes.

Comment	Project Response
The potential 'corridor' between the DBS array areas and Dogger Bank A, including future traffic patterns, should be considered and assessed.	A main commercial route (used only by oil and gas vessels) has been identified passing between the DBS array areas and Dogger Bank A.
Lighting and marking will be required in accordance with IALA G1162 and in agreement with Trinity House – additional aids to navigation such as buoys may be necessary to mitigate the risk posed, particularly during construction.	Lighting and marking guidance will be adhered to as acknowledged in the assessment methodology in section 14.4.1. Lighting and marking is included as mitigation embedded in the design in section 14.3.3.
Assessment should be included of the impact on existing aids to navigation (both offshore and shore based).	Impacts on existing aids to navigation are considered in the impact assessment (see section 14.6).
A decommissioning plan should be considered.	A Decommissioning Plan will be developed prior to decommissioning based on the relevant guidance and legislation at the time. This is included as mitigation embedded in the design in section 14.3.3.
Pre-PEIR meeting with the MCA and Trinity House 23/01/2023	
Queried whether there will be a separate risk assessment for platforms in the offshore export cable corridor.	The impact assessment for platforms within the offshore export cable corridor will be undertaken post PEIR given that vessel traffic survey data collection is ongoing. This will be incorporated into the NRA for the Projects and therefore inform the ES.
MCA reconfirmed they are content with the vessel traffic survey data collected including the time periods.	Acknowledged in section 14.4.2.
The Hornsea developments should be considered cumulatively including impacts on DFDS Seaways' Immingham-Gothenburg routes in relation to Hornsea Four.	The Hornsea developments have been screened into the CEA (see section 14.8.1).

Comment	Project Response
Platforms within the offshore export cable corridor will need to be marked as standalone structures.	Noted and will be considered in the impact assessment for platforms within the offshore export cable corridor when undertaken post PEIR.
Pre-PEIR meeting with the UK Chamber of Shipping 01/02/2023	
It is normal procedure to hold a Hazard Workshop prior to the PEIR and for its results to feed into the PEIR.	Consultation has been undertaken with key stakeholders (MCA, Trinity House, UK Chamber of Shipping) pre-PEIR and the Hazard Workshop undertaken will inform the impact assessment at the ES stage.
Use of a long term 12-month AIS dataset was queried.	More specific on-site surveys have been used as a secondary source featuring piggyback data.
Important to check tanker routes and port pairings rather than specific operators.	Noted and will be considered when identifying Regular Operators post PEIR.

14.3 Scope

14.3.1 Shipping and Navigation Study Areas

5. The shipping and navigation study areas have been defined on the basis of 10nm buffers of each of the DBS array areas, as shown on **Figure 14-1** (hereafter the 'DBS East shipping and navigation study area' and the 'DBS West shipping and navigation study area'). Using a buffer of 10nm is standard practice for defining shipping and navigation assessment study areas and has been used in the majority of UK offshore wind farms as it captures relevant routeing in the area that may be affected, whilst remaining site-specific.

6. A 2nm buffer has been applied around the offshore export cable corridor (hereafter the 'offshore export cable corridor shipping and navigation study area') as also shown on **Figure 14-1**. As with each array area shipping and navigation study area, this shipping and navigation study area has been defined to capture relevant receptors and their movements within, and in proximity to, the offshore export cable corridor. This study area is also considered standard for shipping and navigation assessment around cable corridors for UK offshore wind farms.

14.3.2 Realistic Worst Case Scenario

14.3.2.1 General Approach

7. The realistic worst case design parameters for likely significant effects scoped into the EIA for the shipping and navigation assessment are summarised in **Table 14-2**. These are based on the project parameters described in **Chapter 5 Project Description**, which provides further details regarding specific activities and their durations.

8. In addition to the design parameters set out in **Table 14-2**, consideration is also given to the different development scenarios still under consideration and the possible phasing of the construction as set out in sections 14.3.2.2 to 14.3.2.5.

Table 14-2 Realistic Worst Case Design Parameters

	Parameter			
	DBS East or DBS West in isolation	**DBS West and DBS East concurrently**	**DBS West and DBS East sequentially**	**Notes and rationale**
Construction				
DBS array areas	Construction in isolation of up to five years. Full build out of either the DBS East array area or DBS West array area taken forward. Up to 175nm of array cables for DBS East or up to 175nm of array cables for DBS West. Up to four inter-platform cables with combined 30nm length for DBS East and combined 53nm length for DBS West. Buoyed construction area encompassing the	Concurrent construction of DBS East and DBS West of up to five years. Full build out of the DBS array areas. Up to 350nm of array cables. Up to four inter-platform cables with combined 208nm length. Buoyed construction area encompassing the maximum extent of the DBS array areas. Presence of 500m construction safety zones	Sequential construction of DBS East and DBS West of up to seven years. Full build out of the DBS array areas. Up to 350nm of array cables. Up to four inter-platform cables with combined 208nm length. Buoyed construction area encompassing the maximum extent of the DBS array areas. Presence of 500m construction safety zones	Largest possible extent of infrastructure, greatest number of simultaneous vessel activities and greatest duration resulting in the maximum spatial and temporal effect of impacts.

	Parameter			
	DBS East or DBS West in isolation	DBS West and DBS East concurrently	DBS West and DBS East sequentially	Notes and rationale
	maximum extent of either the DBS array area or DBS West array area taken forward. Presence of 500m construction safety zones and 50m pre commissioning safety zones. Up to 66 construction vessels on-site simultaneously and up to 5,745 round trips to port.	and 50m pre commissioning safety zones. Up to 132 construction vessels on-site simultaneously and up to 11,489 round trips to port.	and 50m pre commissioning safety zones. Up to 132 construction / decommissioning vessels on-site simultaneously and up to 11,489 round trips to port.	
Offshore export cable route	Up to two offshore export cables each of 107nm length for DBS East or up to four offshore export cables each of 85nm length for DBS West.	Up to six offshore export cables including four of 107nm length (for DBS East) and two of 85nm length (for DBS West).	Up to six offshore export cables including four of 107nm length (for DBS East) and two of 85nm length (for DBS West).	Largest possible extent of infrastructure, greatest number of simultaneous vessel activities and greatest duration

	Parameter			
	DBS East or DBS West in isolation	**DBS West and DBS East concurrently**	**DBS West and DBS East sequentially**	**Notes and rationale**
	Indicative separation of 50m between offshore export cables.	Indicative separation of 50m between offshore export cables.	Indicative separation of 50m between offshore export cables.	resulting in the maximum spatial and temporal effect of impacts.
Operation				
DBS array areas	Maximum operational life of 30 years. Full build out of the DBS East array area or DBS West array area taken forward. Up to 100 wind turbines on four-legged pile jackets with sea surface dimensions of 40x40m. Up to five platforms with topside dimensions of 125x110m.	Maximum operational life of 30 years. Full build out of the DBS array areas. Up to 200 wind turbines on four-legged pile jackets with sea surface dimensions of 40x40m. Up to nine platforms with topside dimensions of 125x110m. Minimum spacing of 830m between array structures.	Maximum operational life of 32 years. Full build out of the DBS array areas. Up to 200 wind turbines on four-legged pile jackets with sea surface dimensions of 40x40m. Up to nine platforms with topside dimensions of 125x110m. Minimum spacing of 830m between array structures.	Largest possible extent of infrastructure, greatest number of simultaneous vessel activities and greatest duration resulting in the maximum spatial and temporal effect of impacts.

	Parameter			
	DBS East or DBS West in isolation	**DBS West and DBS East concurrently**	**DBS West and DBS East sequentially**	**Notes and rationale**
	Minimum spacing of 830m between array structures. Single line of orientation (SLoO) in array layout. Minimum wind turbine air gap of 34m above Mean Sea Level (MSL). Up to 175nm of array cables for DBS East or up to 175nm of array cables for DBS West. Up to four inter-platform cables with combined 30nm length for DBS East and combined 53nm length for DBS West. Target burial depth for array cables and inter-	Single line of orientation in array layout. Minimum wind turbine air gap of 34m above MSL. Up to 350nm of array cables. Up to four inter-platform cables with combined 208nm length. Target burial depth for array cables and inter-platform cables of between 0.5 and 1m. Indicative maximum proportion of array cable protection requirement of 20%. Indicative maximum proportion of inter-	Single line of orientation in array layout. Minimum wind turbine air gap of 34m above MSL. Up to 350nm of array cables. Up to four inter-platform cables with combined 208nm length. Target burial depth for array cables and inter-platform cables of between 0.5 and 1m. Indicative maximum proportion of array cable protection requirement of 20%. Indicative maximum proportion of inter-platform	

	Parameter			
	DBS East or DBS West in isolation	DBS West and DBS East concurrently	DBS West and DBS East sequentially	Notes and rationale
	platform cables of between 0.5 and 1m. Indicative maximum proportion of array cable protection requirement of 20%. Indicative maximum proportion of inter-platform cable protection requirement of 20%. Up to 20 cable / pipeline crossings per array cable. Up to two cable / pipeline crossings per inter-platform cable for DBS West. Indicative height of protection for array	platform cable protection requirement of 20%. Up to 40 cable / pipeline crossings per array cable. Up to 24 cable / pipeline crossings per inter-platform cable. Indicative height of protection for array cables (including crossings) of 1.0m. Indicative height of protection for inter-platform cables (including crossings) of 1.4m. Presence of 500m safety zones during major maintenance.	cable protection requirement of 20%. Up to 40 cable / pipeline crossings per array cable. Up to 24 cable / pipeline crossings per inter-platform cable. Indicative height of protection for array cables (including crossings) of 1.0m. Indicative height of protection for inter-platform cables (including crossings) of 1.4m. Presence of 500m safety zones during major maintenance. Up to 21 operation and maintenance vessels on-site	

	Parameter			
	DBS East or DBS West in isolation	DBS West and DBS East concurrently	DBS West and DBS East sequentially	Notes and rationale
	cables (including crossings) of 1.0m. Indicative height of protection for inter-platform cables (including crossings) of 1.4m. Presence of 500m safety zones during major maintenance. Up to 11 operation and maintenance vessels on-site simultaneously and up to 473 annual round trips to port.	Up to 21 operation and maintenance vessels on-site simultaneously and up to 473 annual round trips to port.	simultaneously and up to 473 annual round trips to port.	
Offshore export cable route	Maximum operational life of 30 years. Up to one platform with topside dimensions of 125x110m.	Maximum operational life of 30 years. Up to two platforms with topside dimensions of 125x110m.	Maximum operational life of 32 years. Up to six offshore export cables including four of 107nm length (for DBS East)	Largest possible extent of sub-sea infrastructure and greatest duration resulting in the maximum spatial

	Parameter			
	DBS East or DBS West in isolation	DBS West and DBS East concurrently	DBS West and DBS East sequentially	Notes and rationale
	Up to two offshore export cables each of 107nm length for DBS East or up to four offshore export cables each of 85nm length for DBS West. Indicative separation of 50m between offshore export cables. Target burial depth for offshore export cables of between 0.5 and 1m. Indicative maximum proportion of export cable protection requirement of 20%. Up to 22 cable / pipeline crossings per offshore export cable for DBS East or up to 48 cable /	Up to six offshore export cables including four of 107nm length (for DBS East) and two of 85nm length (for DBS West). Indicative separation of 50m between offshore export cables. Target burial depth for offshore export cables of between 0.5 and 1m. Indicative maximum proportion of export cable protection requirement of 20%. Up to 70 cable / pipeline crossings per offshore export cable. Indicative height of protection for offshore	and two of 85nm length (for DBS West). Indicative separation of 50m between offshore export cables. Target burial depth for offshore export cables of between 0.5 and 1m. Indicative maximum proportion of export cable protection requirement of 20%. Up to 70 cable / pipeline crossings per offshore export cable. Indicative height of protection for offshore export cables (including crossings) of 1.4m.	and temporal effect of impacts.

	Parameter			
	DBS East or DBS West in isolation	**DBS West and DBS East concurrently**	**DBS West and DBS East sequentially**	**Notes and rationale**
	pipeline crossings per offshore export cable for DBS West. Indicative height of protection for offshore export cables (including crossings) of 1.4m.	export cables (including crossings) of 1.4m.		
Decommissioning				
No final decision regarding the final decommissioning policy for the offshore project infrastructure has yet been made. It is also recognised that legislation and industry best practice change over time. However, it is likely that offshore project infrastructure will be removed above the seabed and reused or recycled where practicable. 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. It is anticipated that for the worst case scenario, the impacts will be no greater than those identified for the construction phase.				

14.3.2.2 Development Scenarios

9. There are currently two possible electrical solutions being considered for DBS West; High Voltage Alternating Current (HVAC) or High Voltage Direct Current (HVDC). Due to the distance of the array area offshore DBS East will be an HVDC project. Therefore, there are two possible electrical solutions for the Projects:
    - One HVDC project and one HVAC project; or
    - Two HVDC projects.
10. Offshore the most significant difference between an HVAC solution and an HVDC solution is that if an HVAC electrical solution is used an additional platform (reactive compensation platform (RCP)) will be required along the offshore export cable. In addition, a HVAC solution will require two additional export cables offshore, over and above the four cables that would be required for two HVDC projects.
11. In order to ensure that a robust assessment has been undertaken, all development scenarios and options have been considered to ensure the realistic worst-case scenario for each topic has been assessed. Further details are provided in **Chapter 5 Project Description**.

14.3.2.3 Construction Scenarios

12. The following principles set out the framework for how the Projects may be constructed (relating to both onshore and offshore works):
    - DBS West and DBS East may be constructed at the same time, or at different times;
    - If built concurrently, both Projects could be constructed in five years;
    - If built non-concurrently, either Project could be built first;
    - If built non-concurrently, each Project would require a five year period of construction;
    - If built non-concurrently, it is anticipated that there would be up to a two year lag between the start of construction for the first project and the start of construction for the second project; and
    - Assuming a maximum construction period per Project of five years, and taking the above into account, the maximum construction period over which the construction of both Projects could take place is seven years.

13. In order to determine which construction scenario presents the realistic worst case for each receptor and impact, the assessment considers both maximum duration effects and maximum peak effects, in addition to each Project being developed in isolation, drawing out any differences between each of the two Projects.

14. The three construction scenarios considered by the shipping and navigation assessment are therefore:

- Build DBS East or build DBS West in isolation;
- Build DBS East and DBS West concurrently – reflecting the maximum peak effects; and
- Build the Projects sequentially with a lag of up to two years – reflecting the maximum duration of effects.

15. The individual, concurrent and sequential construction scenarios all allow for flexibility to build out the Projects using a phased approach. This will allow the Projects to adapt to National Grid Electricity Transmission Operator's development plans for the onshore grid connection points. Under a phased approach the maximum timescales for individual elements of the construction have been assessed.

16. Any differences between the Projects, or differences that could result from the manner in which the first and the second Projects are built (concurrent or sequential and the length of any gap) are identified and discussed where relevant in section 14.6. For each potential impact, only the worst case construction scenario for two Projects is presented, i.e., either concurrent or sequential. The justification for what constitutes the worst case is provided, where necessary, in section 14.6.

14.3.2.4 Operation Scenarios

17. Operation scenarios are described in detail in **Chapter 5 Project Description**. The assessment considers the following scenarios:

- Only DBS East in operation;
- Only DBS West in operation; and
- The two Projects operating concurrently, with a lag of two years between each Project commencing operation.

18. If the Projects are built out using a phased approach, there would also be a phased approach to starting the operational stage. The worst case scenario for the operational phases for the Projects have been assessed. See section 5.1.1 of **Chapter 5 Project Description** for further information on phasing scenarios for the Projects.

19. The operations lifetime of each Project is expected to be 30 years.

14.3.2.5 Decommissioning Scenarios

20. Decommissioning scenarios are described in **Chapter 5 Project Description**. Decommissioning arrangements will be agreed through the submission of a Decommissioning Programme prior to construction, however for the purpose of this assessment it is assumed that decommissioning of the Projects could be conducted separately, or at the same time.

14.3.3 Mitigation Embedded in the Design

21. This section outlines the mitigation relevant to the shipping and navigation assessment, which has been incorporated into the design of the Projects (**Table 14-3**). Where other mitigation measures are proposed, these are detailed in the impact assessment (section 14.4).

Table 14-3 Mitigation Measures

Parameter	Mitigation Measures Embedded into the Project Design
Aids to navigation management plan	An aids to navigation management plan for the Projects will be agreed with Trinity House. An aids to navigation management plan would be secured within the DCO.
Application for safety zones	An application will be made for safety zones post consent including up to 500m around ongoing activities during construction, major maintenance, and decommissioning and up to 50m for installed structures pre commissioning. This will be secured via a Safety Zone Application submitted post consent.
Cable burial risk assessment	Where possible, cable burial will be the preferred option for cable protection with the cable burial depth to be informed by a cable burial risk assessment and detailed within the Cable Specification Plan. Any damage, destruction or decay of cables must be notified to MCA, Trinity House, Kingfisher and United Kingdom Hydrography Office (UKHO) no later than 24 hours after discovered. A Cable Specification Plan would be secured within the DCO.

Parameter	Mitigation Measures Embedded into the Project Design
Charting of infrastructure	There will be appropriate marking of all offshore infrastructure associated with the Projects on UKHO admiralty charts. Appropriate notification to UKHO would be secured within the DCO.
Compliance with MGN 654	The Projects will ensure compliance with MGN 654 and its annexes, where applicable, including completion of a SAR checklist. Compliance with MGN 654 would be secured within the DCO.
Decommissioning Plan	A Decommissioning Plan will be developed prior to decommissioning based on the relevant guidance and legislation at the time. A Decommissioning Plan would be secured within the DCO.
Fishing liaison	Ongoing liaison with fishing fleets will be maintained during construction, maintenance, and decommissioning operations via an appointed Fisheries Liaison Officer (FLO). The appointment of an FLO would be secured within the DCO.
Guard vessel(s)	Where appropriate, guard vessels will be used to ensure adherence with safety zones or advisory passing distances.
Layout plan	A layout plan (including sub-sea cables) for the Projects will be agreed with the Marine Management Organisation (MMO) following appropriate consultation with Trinity House and the MCA setting out proposed details of the offshore development area. A layout plan would be secured within the DCO.
Lighting and marking	Lights, marks, sounds, signals and other aids to navigation will be exhibited as required by Trinity House, MCA, and Civil Aviation Authority (CAA) including a buoyed construction area around the arrays. An aids to navigation management plan would be secured by within the DCO.

Parameter	Mitigation Measures Embedded into the Project Design
Marine coordination for project vessels	Marine coordination will be implemented to manage project vessels throughout construction and maintenance periods. Marine coordination would be detailed in the ERCoP, which would be secured within the DCO.
Minimum blade clearance	There will be a minimum blade tip clearance (air draft height) of at least 34m above MSL. Project parameters would be secured within the DCO.
Pollution planning	A Marine Pollution Contingency Plan (MPCP) will be developed outlining procedures to protect personnel working and to safeguard the marine environment. An MPCP would be secured within the DCO.
Project vessel compliance with international marine regulations	Project vessels will ensure compliance with Flag State regulations including the Convention on the International Regulations for Preventing Collisions at Sea (COLREGs) (International Maritime Organization (IMO), 1972/77) and International Convention for the Safety of Life at Sea (SOLAS) (IMO, 1974). Compliance is a requirement of international maritime regulations.
Promulgation of information	The Projects will ensure that local Notifications to Mariners are updated and reissued at weekly intervals during construction activities and at least five days before any planned operation and maintenance works. Notice to Mariners would be secured within the DCO.
	Advance warning and accurate location details of construction, maintenance and decommissioning operations (including details of vessel routes, timings and locations), associated safety zones and advisory passing distances will be given via Kingfisher Bulletins at least 14 days prior where possible. Kingfisher Bulletins would be secured within the DCO.

Parameter	Mitigation Measures Embedded into the Project Design
Traffic monitoring	Monitoring of vessel traffic will be undertaken for the duration of the construction phase and during the first three years of the operation and maintenance phase. Vessel traffic monitoring would be secured within the DCO.
Under keel clearance	Where scour protection is required, MGN 654 will be adhered to with respect to changes greater than 5% to the charted water depth referenced to CD in consultation with the MCA and Trinity House. Compliance with MGN 654 would be secured within the DCO.

14.4 Assessment Methodology

14.4.1 Policy, Legislation and Guidance

14.4.1.1 National Policy Statements

22. The assessment of potential impacts upon shipping and navigation has been made with specific reference to the relevant National Policy Statements (NPS). The specific assessment requirements for shipping and navigation, as detailed in the NPS for Renewable Energy Infrastructure (EN-3) and the NPS for Ports, are summarised in **Table 14-4** together with an indication of the section of this chapter where each is addressed.

23. Although the overarching guidance principles set out in the Overarching NPS for Energy (EN-1) (Department of Energy and Climate Change (DECC), 2011) and the NPS for Electricity Networks Infrastructure (EN-5) (DECC, 2011) do not specifically refer to shipping and navigation, they have been considered.

24. Additionally, the draft version of a revised NPS for Renewable Energy Infrastructure (EN-3) (Department for Business, Energy and Industrial Strategy (BEIS), 2021) has also been considered, noting the key provisions relevant to shipping and navigation (paragraphs 2.33.6 to 2.33.13) are unchanged from the existing NPS for Renewable Energy Infrastructure.

25. Following the consultation in 2021 on the draft energy NPS, a new consultation opened on the 30 March 2023 on revised drafts of the energy NPSs, including EN1, EN3 and EN5. Due to the timing of this consultation, and finalisation of this PEIR we have been unable to review and take these revised draft NPS into account within these documents. However, these will be reviewed and incorporated into the final ES where relevant.

Table 14-4 NPS Assessment Requirements

NPS Requirement	NPS Reference	PEIR Section Reference
EN-3 NPS for Renewable Energy Infrastructure		
Consultation is undertaken from early in the development of an offshore wind farm and should continue throughout all phases, with the aim of ensuring co-existence of an offshore wind farm with navigation.	Paragraph 2.6.153	Consultation with relevant stakeholders has been a key input to the impact assessment and is summarised in section 14.6.
Consultation is undertaken with the MMO, MCA, the relevant General Lighthouse Authority (GLA), relevant industry bodies, and recreational representatives such as the Royal Yachting Association (RYA).	Paragraph 2.6.154	Consultation is ongoing and to date has included with MCA, Trinity House, and UK Chamber of Shipping (see section 14.2). This will continue post PEIR including the Hazard Workshop to which recreational representatives will be invited as well as Regular Operators identified from the vessel traffic surveys.
Internationally recognised sea lanes are publicly available and should be considered.	Paragraph 2.6.155	Main commercial routes – which are international in nature – have been identified (see section 14.6).
A Navigational Risk Assessment (NRA) should be prepared in consultation with the stakeholders outlined in paragraph 2.6.154.	Paragraph 2.6.156	The NRA has informed this chapter and has (thus far) included consultation with MCA, Trinity House, and UK Chamber of Shipping (see **Appendix 14-1 Navigational Risk Assessment**).

NPS Requirement	NPS Reference	PEIR Section Reference
Potential effects on recreational craft should be considered.	Paragraph 2.6.160	Recreational vessels are considered as a receptor in the impact assessment (see section 14.6).
NPS for Ports		
Potential effects on recreational craft should be considered.	Paragraph 5.14.2	Socioeconomics impacts are assessed in **Chapter 28 Socioeconomics**.
Where likely to occur, socio-economic impacts should be incorporated.	Paragraph 5.14.4	
The existing socioeconomic conditions should be described and the impact correlated with local planning policies.	Paragraph 5.14.5	

14.4.1.2 Other

26. In addition to the NPS, there a number of pieces of legislation, policy and guidance applicable to the assessment of shipping and navigation. These include:

- MGN 654 (Merchant and Fishing) Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response (MCA, 2021);
- Revised Guidelines for FSA for Use in the International Maritime Organization (International Maritime Organization (IMO)) Rule-Making Process (IMO, 2018);
- MGN 372 Amendment 1 (Merchant and Fishing) Offshore Renewable Energy Installations (OREIs): Guidance to Mariners Operating in the Vicinity of UK OREIs (MCA, 2022);
- IALA Guideline G1162 Guidance on the Marking of Offshore Man-Made Structures (IALA, 2021 (a));
- IALA Recommendation O-139 on The Marking of Man-Made Offshore Structures (IALA, 2021 (b));
- The RYA's Position on Offshore Renewable Energy Developments: Paper 1 (of 4) – Wind Energy (RYA, 2019);
- Standard Marking Schedule for Offshore Installations (DECC, 2011); and
- UK Marine Policy Statement (HM Government, 2011)

27. Further detail is provided in **Chapter 3 Policy and Legislative Context**.

14.4.2 Data and Information Sources

14.4.2.1 Site Specific Surveys

28. To provide site specific and up to date information on which to base the impact assessment, three vessel traffic surveys were conducted, consisting of two winter surveys (14 days at each array area in January/February 2022 and October/November 2022) and one summer survey (14 days at each array area in July 2022). Further vessel traffic surveys will be undertaken in relation to the potential platforms within the offshore export cable corridor in winter and summer 2023. These surveys include the collection of AIS, Radar, and visual observations, and were carried out in agreement with the MCA and Trinity House.

29. The first winter vessel traffic survey and summer vessel traffic survey were undertaken by the guard vessel *Star of Hope*, while the second winter vessel traffic survey was undertaken by the guard vessel *Karima*. For each survey, the survey vessel was situated at the DBS East array area for 14 full days and the DBS West array area for 14 full days.

30. The first winter vessel traffic survey was undertaken prior to the start of offshore construction works for the Dogger Bank A Offshore Wind Farm and will have been undertaken more than 24 months prior to the time of the DCO application. Therefore, this survey is considered as a secondary source only, with the summer and second winter vessel traffic surveys (totalling 28 days at each of the DBS array areas) serving as the MGN 654 (MCA, 2021) compliant vessel traffic data.

31. A number of vessel tracks recorded during the survey periods were deemed as temporary (non-routine) in nature, such as the tracks of the survey vessels themselves and the tracks of vessels associated with the ongoing construction of Dogger Bank A, and these vessels were therefore excluded from the vessel traffic baseline. Other temporary traffic excluded from the analysis included the tracks of a vessel undertaking a geophysical survey.

14.4.2.2 Other Available Sources

32. Other sources that have been used to inform the assessment are listed in **Table 14-5**.

Table 14-5 Other Available Data and Information Sources

Data Set	Spatial Coverage	Year	Notes
Winter vessel traffic (14 days, January/ February)	DBS East and DBS West shipping and navigation study areas	2022	Secondary source collected on-site including use of AIS, Radar and visual observations.
Vessel traffic (six months, April to October 2022)	DBS East and DBS West shipping and navigation study areas	2022	Secondary source collected on-site including AIS only.
Summer vessel traffic (14 days, July/August)	DBS East and DBS West shipping and navigation study areas	2022	Primary source (compliant with MGN 654) collected on-site including use of AIS, Radar and visual observations.
Summer vessel traffic (14 days, July)	Offshore export cable corridor shipping and navigation study area	2022	AIS only collected from shore based receivers and DBS West array area.
Winter vessel traffic (14 days, October/ November)	DBS East and DBS West shipping and navigation study areas	2022	Primary source (compliant with MGN 654) collected on-site including use of AIS, Radar and visual observations.
Winter vessel traffic (14 days, October/ November)	Offshore export cable corridor shipping and navigation study area	2022	AIS only collected from shore based receivers and DBS West array area.
Anatec ShipRoutes database	Shipping and navigation study areas	2022	Regularly updated based on vessel traffic data throughout the North Sea.
Marine Accident Investigation Branch (MAIB) marine incidents	Shipping and navigation study areas	2000 – 2019	Latest dataset available. Detailed review limited to latest ten years of data (2010 to 2019) with high level review undertaken for earlier data (2000 to 2009).

Data Set	Spatial Coverage	Year	Notes
Royal National Lifeboat Institute (RNLI) marine incidents	Shipping and navigation study areas	2010 – 2019	Latest dataset available.
Department for Transport (DfT) Helicopter tasking data	Shipping and navigation study areas	2015 – 2022	Latest dataset available.
UKHO Admiralty Charts 266, 1187, 1191, and 1192	In proximity to the DBS array areas	2022	Source is updated periodically and therefore may not reflect real time features with total accuracy, e.g., Dogger Bank B construction area.
UKHO Admiralty Sailing Directions North Sea (West) Pilot NP54	Western North Sea	2021	Latest publication available.

14.4.3 Impact Assessment Methodology

33. Unlike other offshore topics, the impact assessment methodology applied is bespoke to shipping and navigation. In particular, the IMO Formal Safety Assessment (FSA) methodology – which is the internationally recognised approach for assessing shipping and navigation impacts – has been applied, in line with stakeholder preference and the requirements of MGN 654 (MCA, 2021).

34. The following sections describe the methods used to assess the likely significant effects on shipping and navigation.

14.4.3.1 Definitions

35. There are differences between standard Environmental Impact Assessment (EIA) terminology applied for other offshore topics and FSA terminology applied for shipping and navigation. This chapter adapts the standard EIA terminology where possible (whilst maintaining the overarching IMO FSA methodology), whilst the NRA uses FSA terminology throughout. The key differences in terminology are summarised in **Table 14-6**.

Table 14-6 Summary of Differences in Terminology between EIA and NRA

EIA term	NRA term	Definition
Impact	Hazard	A potential threat to human life, health, property, or the environment.
Effect	Risk	The combination of frequency of occurrence and severity of consequence of an impact.
Receptor	User	Sufferer of effect.
Mitigation embedded in the design	Embedded mitigation measure	A commitment made by the Applicant to reduce and/ or eliminate the potential for significance effects.

36. For each potential impact, the assessment identifies receptors sensitive to that impact and implements a systematic approach to understanding the impact pathways and the level of impacts on given receptors based on two key factors – the frequency of occurrence and severity of consequence. The definitions of frequency of occurrence and severity of consequence for the purpose of the shipping and navigation assessment are provided in **Table 14-7** and **Table 14-8**.

Table 14-7 Definition of Frequency of Occurrence of Impacts for Shipping and Navigation

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

Table 14-8 Definition of Severity of Consequence of Impacts for Shipping and Navigation

Severity of Consequence	Definition
Major	More than one fatality, total loss of property, tier 3 national assistance required and international reputational effects.
Serious	Multiple serious injuries or single fatality, damage resulting in critical impact on operations, tier 2 regional assistance required, and national reputational effects.
Moderate	Multiple minor or single serious injury, damage not critical to operations, tier 2 limited external assistance required, and local reputational effects.
Minor	Slight injury to people, minor damage to property, tier 1 local assistance required, and minor reputational effects limited to receptors.
Negligible	No perceptible impact on people, property, environment, and/or business.

14.4.3.2 Significance of Effect

37. The assessment of significance of an effect is informed by the frequency of occurrence and severity of consequence. The determination of significance is guided by the use of a shipping and navigation significance of effect matrix, as shown in **Table 14-9**.

38. Effects determined to be of Broadly Acceptable significance are low risk and not significant in EIA terms. Effects determined to be of Tolerable significance are intermediate risk and not significant in EIA terms. Effects determined to be of Unacceptable significance are high risk and significant in EIA terms.

Table 14-9 Shipping and Navigation Significance of Effect Matrix

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

14.4.4 Cumulative Effect Assessment Methodology

39. The CEA considers other plans, projects and activities that may result in cumulation with the Projects. **Chapter 6 EIA Methodology** provides further details of the general framework and approach to the CEA that will be undertaken for the Projects.

40. The final assessment of cumulative effects will be undertaken during the later stages of the EIA, once information is available on a number of projects such as the Outer Dowsing Offshore Wind Farm, Hornsea Project Four decision and the Sheringham Shoal and Dudgeon Extension Projects examination. However, for the purposes of the PEIR, it is possible to identify a number of projects and plans which are likely to features in that assessment and consider the extent to which cumulative effects might arise. Section 14.8 presents the following preliminary information regarding cumulative effects:

- Screening for cumulative effects; and
- A preliminary short list of plans and projects considered for CEA, including a brief description as to how projects have been screened in and the initial tier level they have been assigned.

14.4.5 Transboundary Effect Assessment Methodology

41. The transboundary assessment considers the potential for transboundary effects to occur on shipping and navigation receptors as a result of the Projects; either those that might arise within the Exclusive Economic Zone (EEZ) of European Economic Area (EEA) states or arising on the interests of EEA states e.g., a non UK fishing vessel. **Chapter 6 EIA Methodology** provides further details of the general framework and approach to the assessment of the transboundary effects.

42. For shipping and navigation, the potential for transboundary effects has been identified in relation to international commercial routeing recorded (see section 14.8).

14.4.6 Assumptions and Limitations

43. This preliminary assessment is considered to be an interim stage in the EIA process. The results presented in the following sections are based on early design assumptions and initial assessments which will be refined and presented in the final ES to be submitted as part of the DCO application.

14.4.6.1 Automatic Identification System Data

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

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

14.4.6.2 Historical Incident Data

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

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

14.4.6.3 United Kingdom Hydrographic Office Admiralty Charts

48. The UKHO admiralty charts are updated periodically and therefore the information shown may not reflect the real time features within the region with total accuracy. However, during consultation input has been sought from relevant stakeholders regarding the navigational features in the existing environment.

14.5 Existing Environment

14.5.1 Navigational Features

49. A plot of the navigational features in proximity to the DBS array areas and offshore export cable corridor is presented on **Figure 14-2**.

50. Dogger Bank A is located approximately 4nm to the north-east of the DBS array areas and is currently under construction, with offshore works having commenced in May 2022 (Dogger Bank Wind Farm, 2022). It covers an area of approximately 150 square nautical miles (nm^2) and will comprise 95 wind turbines once commissioned, with this anticipated in 2024.

51. Dogger Bank A is marked with a buoyed construction area, featuring various cardinal marks and special marks. These will be removed following commissioning of the development, anticipated in 2024. A special mark is also located at the Munro Gas Field, marking the location of a well. At the time of writing the construction buoyage for Dogger Bank B is in the process of being deployed and will be taken into consideration at the ES stage.

52. Various oil and gas infrastructure associated with the nearby gas fields, including wells, platforms and manifolds, are located in proximity to the DBS array areas. The closest platform to the DBS array areas is Cavendish, located approximately 1.6nm south of the DBS East array area and within the offshore export cable corridor.

53. Other nearby oil and gas infrastructure include the:

- Munro platform approximately 6.0nm east of the DBS East array area;
- Cygnus platforms approximately 6.7nm and 8.9nm north-east of the DBS East array area;
- Trent platform approximately 9.3nm south-west of the DBS East array area; and
- Boulton platform approximately 9.6nm south-east of the DBS East array area.

54. It is acknowledged that some of the fields these platforms are associated with could be decommissioned prior to the start of construction, although the Cygnus gas field is a recent development and therefore is expected to remain *in situ* during the Projects' life.

55. Sub-sea pipelines connect the oil and gas infrastructure in proximity to the DBS array areas. A sub-sea pipeline connecting the Shearwater gas field and Bacton Gas Terminal (the SEAL pipeline) passes north-south through the DBS West array area. Three additional sub-sea pipelines are also located within DBS West array area but are disused; one of these also runs through the DBS East array area and is one of three sub-sea pipelines within DBS East array area, with two of these disused.

56. Two of the disused sub-sea pipelines also intersect the offshore export cable corridor.

57. Currently under installation sub-sea cables are located to the north and north-west of the DBS West array area, connecting to Dogger Bank A. These sub-sea cables pass alongside the offshore export cable corridor for much of its length and intersect over a distance of approximately 6.2nm. There is also a disused sub-sea cable passing through Dogger Bank A which stops approximately 0.8nm short of the DBS West array area. A sub-sea cable is also located approximately 8.4nm east of the DBS array areas, connecting the Cygnus and Murdoch platforms.

58. Various charted wrecks and obstructions are located in proximity to the DBS array areas. 14 charted obstructions are located within the DBS array areas; five within the DBS West array area, and nine within the DBS East array area. The shallowest of these features is a charted wreck at 15m below CD.

59. There are also six charted wrecks and obstructions located within the offshore export cable corridor (excluding overlap with the DBS array areas), with the shallowest of these features a charted wreck at 23m below CD.

60. Marine aggregate dredging areas in the southern North Sea are located well south of the Offshore Development Area, with the closest approximately 25nm south of the offshore export cable corridor.

61. The offshore export cable corridor overlaps with a submarine exercise area. This area is used to for training by submarines operated for the Royal Navy. There are also PEXA for aircraft overlap the DBS array areas.

14.5.2 Vessel Traffic Movements

14.5.2.1 DBS Array Areas

62. A plot of the vessel traffic recorded via AIS and Radar over the summer and winter survey periods within the DBS East shipping and navigation study area is colour-coded by vessel type and presented on **Figure 14-3**. A plot of the vessel traffic recorded via AIS and Radar over the summer and winter survey periods within the DBS West shipping and navigation study area is colour-coded by vessel type and presented on **Figure 14-4**.

63. Throughout the summer surveys, approximately 96% of vessel tracks were recorded via AIS with the remaining 4% recorded via Radar. Throughout the winter surveys, approximately 98% of vessel tracks were recorded via AIS with the remaining 2% recorded via Radar.

64. For the 14 days analysed in summer, there was an average of 14 unique vessels per day recorded within the DBS East shipping and navigation study area, and two to three unique vessels per day intersecting the DBS East array area. For the 14 days analysed in winter, there was again an average of 14 unique vessels per day recorded within the DBS East shipping and navigation study area, and four unique vessels per day intersecting the DBS East array area. The main vessel types within the DBS East shipping and navigation study area were cargo vessels (40%), oil and gas vessels (30%), and tankers (14%).

65. For the 14 days analysed in summer, there was an average of 11 unique vessels per day recorded within the DBS West shipping and navigation study area, and four unique vessels per day intersecting the DBS West array area. For the 14 days analysed in winter, there was an average of nine unique vessels per day recorded within the DBS West shipping and navigation study area, and two to three unique vessels per day intersecting the DBS West array area. The main vessel types within the DBS West shipping and navigation study area were cargo vessels (47%), tankers (18%), and oil and gas vessels (14%).

66. Vessel length was available for approximately 99% of vessels recorded throughout the two 14-day survey periods for the DBS East shipping and navigation study area and ranged from 9m for a sailing vessel to 336m for a crude oil tanker. Excluding the proportion of vessels for which length was not available, the average length of vessels within the DBS East shipping and navigation study area throughout the summer and winter survey periods was 119m and 110m, respectively. Vessel length was available for approximately 94% of vessels recorded throughout the two 14-day survey periods for the DBS West shipping and navigation study area and ranged from 11m for a sailing vessel to 300m for two container vessels. Excluding the proportion of vessels for which length was not available, the average length of vessels within the DBS West shipping and navigation study area throughout the summer and winter survey periods was 124m and 128m, respectively.

67. Vessel draught was available for approximately 84% of vessels recorded throughout the two 14-day survey periods for DBS East shipping and navigation study area and ranged from 2.4m for two wind farm vessels and 13.8m for a bulk carrier. Excluding the proportion of vessels for which draught was not available, the average draught of vessels within the DBS East shipping and navigation study area throughout the summer and winter survey periods was 6.1m and 5.3m, respectively. Vessel draught was available for approximately 86% of vessels recorded throughout the two 14-day survey periods for DBS West shipping and navigation study area and ranged from 2.5m for a wind farm vessel to 14.6m for a shuttle tanker. Excluding the proportion of vessels for which draught was not available, the average draught of vessels within the DBS West shipping and navigation study area throughout the summer and winter survey periods was 6.7m for both.

68. A methodology for identifying vessels at anchor is provided in the **Appendix 14-1**. One vessel recorded on AIS was deemed as being at anchor across the 28-day periods for the shipping and navigation study areas, based on track behaviour and navigation status. This was an oil and gas vessel and was recorded within the DBS East array area.

69. Main commercial routes have been identified using the principles set out in MGN 654 (MCA, 2021). A total of ten main commercial routes were identified within the array routeing shipping and navigation study area. A plot of the main commercial routes and corresponding 90th percentiles is presented on **Figure 14-5**.

70. Descriptions for each of the main commercial routes are provided in **Table 14-10**.

Table 14-10 Details of the Main Commercial Routes within the Shipping and Navigation Study Areas

Route Number	Average Vessels per Day	Description
1	2	**Immingham (UK) – Gothenburg (Sweden)**. Mainly used by cargo vessels (95%), including the DFDS Seaways operated Roll-on/Roll-off cargo (RoRo) services between Immingham and Gothenburg / Immingham and Brevik (Norway) and the Finnlines operated RoRo services between Immingham and Helsinki (Finland).
2	2	**Aberdeen (UK) – Rotterdam (Netherlands)**. Generally used by tankers (53%) and cargo vessels (22%).
3	1	**Tees (UK) – Gdynia (Poland)**. Generally used by cargo vessels (62%), tankers (19%), and tugs (19%).
4	0 to 1	**Grimsby (UK) – Thyborøn (Denmark)**. Mainly used by cargo vessels (92%).
5	0 to 1	**Rotterdam – Tórshavn (Faroe Islands)**. Mainly used by cargo vessels (78%).
6	0 to 1	**Aberdeen – Rotterdam**. Generally used by oil and gas vessels (56%) and cargo vessels (28%).
7	0 to 1	**Immingham – Odda (Norway)**. Mainly used by cargo vessels (78%).
8	0 to 1	**Aberdeen – Cygnus gas field**. Only used by oil and gas vessels (100%).
9	0 to 1	**Rotterdam – Icelandic ports**. Mainly used by cargo vessels (86%).
10	0 to 1	**Immingham – Kristiansand (Norway)**. Mainly used by cargo vessels (89%).

14.5.2.2 Offshore Export Cable Corridor

71. A plot of the vessel traffic recorded via AIS and Radar over the summer and winter survey periods within the offshore export cable corridor is colour-coded by vessel type and presented on **Figure 14-6**.

72. For the 14 days analysed in summer, there was an average of 53 unique vessels per day recorded within the offshore export cable corridor shipping and navigation study area, and 51 unique vessels per day intersecting the offshore export cable corridor itself. For the 14 days analysed in winter, there was an average of 46 unique vessels per day recorded within the offshore export cable corridor shipping and navigation study area, and 44 unique vessels per day intersecting the offshore export cable corridor itself. The main vessel types within the offshore export cable corridor shipping and navigation study area were cargo vessels (42%), tankers (24%), and fishing vessels (13%).

73. Vessel length was available for over 99% of vessels recorded throughout the two 14-day survey periods and ranged from 8m for an RNLI lifeboat to 333m for a crude oil tanker. Excluding the proportion of vessels for which length was not available, the average length of vessels within the offshore export cable corridor shipping and navigation study area throughout the summer and winter survey periods was 100m and 113m, respectively.

74. Vessel draught was available for approximately 78% of vessels recorded throughout the two 14-day survey periods and ranged from 1.0m for charter vessel and 19.5m for a crude oil carrier. Excluding the proportion of vessels for which draught was not available, the average draught of vessels within the offshore export cable corridor shipping and navigation study area throughout the summer and winter survey periods was 5.6m and 6.2m, respectively.

75. One vessel recorded on AIS was deemed as being at anchor during the 28-day period, based on its track behaviour and navigation status. This was a cargo vessel recorded 1.4nm south of the offshore export cable corridor in The Hills (a series of banks) with the behaviour characteristic of anchoring activity occurring over the course of six days.

14.5.3 Historical Maritime Incidents

76. A plot of the locations of the incidents reported to the MAIB between 2010 and 2019 within the array traffic and offshore export cable corridor shipping and navigation study areas, colour-coded by incident type, is presented on **Figure 14-7**.

77. A total of four unique incidents were recorded by the MAIB within the DBS East shipping and navigation study area between 2010 and 2019, which corresponds to an average of one incident every two to three years. Two of the incidents involved support vessels while the other two involved vessels of "other commercial" type. Three of the incidents involved an "accident to person" while the fourth involved "contact" in the Cygnus gas field. None of these incidents occurred within the DBS East array area itself.

78. There was a single documented MAIB incident during the ten year period within the DBS West shipping and navigation study area, involving the grounding of a barge towing another vessel. This incident occurred at the northern extent of the DBS West shipping and navigation study area on the Dogger North Shoal.

79. A total of 13 incidents were recorded by the MAIB within the offshore export cable corridor shipping and navigation study area between 2010 and 2019, which corresponds to an average of one to two incidents per year. There were two incidents within the offshore export cable corridor itself. The most common incident types recorded were "machinery failure" (46%), "accident to person" (15%) and "damage / loss of equipment" (15%). The vessel types involved in incidents were fishing vessels (77%), support vessels (15%), and pleasure craft (8%).

14.5.4 Future Trends

80. In the event that the Projects are not developed, an assessment of future conditions for shipping and navigation has been carried out and is described within this section.

81. There is uncertainty associated with long-term predictions of vessel traffic growth including the potential for any other new developments in UK or transboundary ports and the long-term effects of Brexit. Therefore, two independent scenarios of potential growth in commercial vessel movements of 10% and 20% have been estimated throughout the lifetime of the Projects.

82. There is similar uncertainty associated with long-term predictions for commercial fishing vessel and recreational vessel transits given the limited reliable information on future trends upon which any firm assumption could be made. There are no known major developments which would increase commercial fishing or recreational vessel activity in the region. Therefore, a conservative potential growth in commercial fishing vessel and recreational vessel movements of 10% and 20% has been estimated throughout the lifetime of the Projects. Changes in fishing activity are considered further in **Chapter 13 Commercial Fisheries** noting that in 2022 the 'Dogger Bank Special Area of Conservation (Specified Area) Bottom Towed Fishing Gear Bylaw' came into force which prohibits bottom towed fishing gear across the Dogger Bank area (sandbank)[1].

83. It is possible that climate change and measures taken to slow the effects of climate change could have an effect on shipping and navigation receptors. However, given the temporal nature of climate change, any effects are expected to develop in the long-term (post operational life of the Projects) rather than the short- or medium-term. Therefore, it is not possible to suitably consider the future baseline for shipping and navigation accounting fully for climate change.

1 https://www.gov.uk/government/publications/the-dogger-bank-special-area-of-conservation-specified-area-bottom-towed-fishing-gear-byelaw-2022

14.6 Assessment of Significance

14.6.1 Impact 1 Vessel Displacement and Increased Vessel to Vessel Collision Risk Between Third-Party Vessels (All Phases)

84. Activities associated with the installation, maintenance and decommissioning of structures and cables as well as the presence of surface structures may displace third-party vessels from their existing routes or activity, increasing the collision risk with other third-party vessels.

14.6.1.1 DBS East and DBS West Together – All Receptors

14.6.1.1.1 Main Commercial Route Displacement

85. During the construction and decommissioning phases, a buoyed construction/decommissioning area will be deployed around each DBS array area. No restrictions on entry will be enforced for the buoyed construction/decommissioning area or the arrays during the operations and maintenance phase outside of any statutory safety zones. However, based on experience at previously under construction and existing operational offshore wind farms, it is anticipated that commercial vessels will choose not to navigate internally within the buoyed construction/decommissioning area or the operational arrays.

86. 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 (28 days in winter and summer 2022) and Anatec's ShipRoutes database. Further details of the methodology for main commercial route identification are provided in section 14.5.2, noting that the vessel traffic data has been agreed as appropriate by the MCA and Trinity House. As part of the future case considerations, increases in 10% and 20% of all traffic including commercial vessels is assumed.

87. A deviation will be required for all phases of the Projects for five of the main commercial routes. The level of deviation varies between an increase of 0.1nm for Route 4 and an increase of 10.7nm for Route 9, with the maximum percentage change in total route length being 1.1% for Route 10. The size of these deviations is small when considered relative to the length of the routes overall, which typically cross the North Sea.

88. The deviated route with the highest vessel traffic was Route 3, with approximately one transit per day, i.e., deviations are expected to be a frequent occurrence. Regular RoRo and Roll-on/Roll-off Passenger (RoPax) vessels were only recorded on Route 1, which is not expected to require deviation due to the presence of the DBS array areas.

89. The most likely consequences of vessel displacement will be increased journey times and distances for affected third-party vessels. The impact will occur over a local spatial extent given that the buoyed construction/ decommissioning area will be deployed around the maximum extent of the DBS array areas.

90. As a worst case, there could be disruption to schedules, particularly for the DFDS Seaways-operated RoRo route. However, given that no deviations are anticipated for this route, and the international nature of routeing in the region alongside the ability to passage plan, disruptions to schedule are expected to be minimal.

14.6.1.1.2 Collision Risk

91. From historical incident data, no collision incidents between third-party vessels have occurred directly as a result of a UK offshore wind farm.

92. In poor visibility, third-party vessels may experience limitations regarding visual identification of other third-party vessels, either when passing on another side of the buoyed construction/decommissioning areas and operational arrays, or when navigating internally within the operational arrays (small craft only). These limitations may increase the potential for an encounter. However, this will be mitigated by the application of the COLREGs (including reduced speeds) in adverse weather conditions. Moreover, the minimum spacing between structures (830m) will be sufficient to ensure any visual hindrance is very short-term in nature.

93. The most likely consequences in the event of an encounter between two or more third-party vessels is the implementation of avoidance action in line with the COLREGs, with the vessels involved able to resume their respective passages with no long-term consequences.

94. Should an encounter develop into a collision incident, it is most likely to involve minor contact resulting in minor damage to the vessels with no harm to people and no substantial reputational effects. As a worst case with very low frequency of occurrence one of the vessels could receive substantial damage or founder with Potential Loss of Life (PLL) and pollution, with this outcome more likely where one of the vessels is a small craft (e.g., fishing vessel, recreational vessel or Crew Transfer Vessel (CTV)).

95. It is acknowledged that vessel traffic monitoring will be undertaken throughout the construction phase and the first three years of the operation and maintenance phase to characterise changes to routeing patterns. These will be compared against anticipated deviations to allow a comprehensive review of the mitigation measures applied at the time.

14.6.1.1.3 Adverse Weather Routeing

96. From the vessel traffic survey data, no instances of alternative routeing due to possible adverse weather were recorded, although from previous experience of the area it has been identified that the DFDS Seaways route between Immingham and Gothenburg does occasionally pass west of the DBS array areas during periods of adverse weather. These instances occur a sufficient distance from the DBS array areas and no disruption due to the presence of the DBS array areas is anticipated. Further consultation with DFDS Seaways and other relevant operators will be required to inform this element of the impact at the ES stage.

97. The most likely consequences of displacement of adverse weather routeing are similar to that of displacement of standard weather routeing, i.e., increased journey times and distances for affected third-party vessels with the impact occurring over a local spatial extent given that the buoyed construction/decommissioning areas and infrastructure will be deployed around the maximum extent of the DBS array areas.

98. As a worst case, the deviated route may be considered unsafe for navigation in adverse weather conditions resulting in the vessel being unable to make the transit. It is considered highly unlikely that the vessel would undertake an unsafe transit and therefore risk to the vessel or crew are negligible due to the very low frequency of occurrence.

14.6.1.1.4 Promulgation of Information and Passage Planning

99. All vessels operating in the area are expected to comply with international flag state regulations (including the COLREGs and SOLAS) and will have a raised level of awareness of construction and decommissioning activities given the promulgation of information relating to the Projects including the charting of the construction/decommissioning areas on relevant nautical charts and the use of safety zones. The buoyed construction/decommissioning areas will also serve to maximise awareness. Likewise, during the operations and maintenance phase infrastructure will be appropriately marked on relevant nautical charts and awareness of the operational arrays will be very high and continue to increase with the longevity of the Projects.

100. All vessels are expected to comply with flag state regulations including Regulation 34 of SOLAS Chapter V – which states that "*the voyage plan shall identify a route which… anticipates all known navigational hazards and adverse weather conditions*" (IMO, 1974) – and IMO Resolution A.893(21) on the Guidelines for Voyage Planning (IMO, 1999). The promulgation of information relating to the Projects will assist such passage planning.

14.6.1.1.5 Small Craft Displacement

101. From the vessel traffic survey data (which incorporates Radar and visual observations in addition to AIS) regular transits by commercial fishing vessels and recreational vessels through the DBS array areas are infrequent (noting that displacement of commercial fishing vessels engaged in fishing activity is assessed in **Chapter 13 Commercial Fisheries**).

102. Based on experience at previously under construction offshore wind farms, it is anticipated that commercial fishing vessels and recreational vessels will choose not to navigate internally within the buoyed construction/ decommissioning areas. Therefore, some displacement of transits by small craft may be required during the construction and decommissioning phases.

103. For the operations and maintenance phase, based on experience at existing operational offshore wind farms, it is anticipated that commercial fishing vessels and recreational vessels may choose to navigate internally within the operational arrays, particularly in favourable weather conditions and as awareness of the arrays increases throughout the operations and maintenance phase. In situations where small craft do navigate internally, the level of displacement is considered negligible.

14.6.1.1.6 Collision Risk Involving Small Craft

104. From the vessel traffic survey data (which incorporates Radar and visual observations in addition to AIS) regular transits by commercial fishing vessels and recreational vessels through the DBS array areas are infrequent.

105. In the event of a collision incident the likelihood of a worst case outcome (the small craft foundering with PLL and pollution) is greater due to the size and likely hull material of the small craft.

14.6.1.1.7 Frequency of Occurrence

106. The frequency of occurrence of effects due to vessel displacement and third-party collision risk is **reasonably probable** for the construction/ decommissioning phases and **reasonably probable** for the operations and maintenance phase.

14.6.1.1.8 Severity of Consequence

107. The severity of consequence of effects due to vessel displacement and third-party collision risk is **moderate** for the construction/decommissioning phases and **moderate** for the operations and maintenance phase.

14.6.1.2 DBS East or DBS West In Isolation – All Receptors

14.6.1.2.1 DBS East in Isolation

108. Should only DBS East in isolation be developed, this would result both in a greater area of available sea room for routeing commercial vessels, and fewer routes requiring a deviation; four route deviations would be necessary compared to five for DBS East and DBS West together. Therefore, it is expected that both the severity of consequence and frequency of occurrence for this impact would decrease compared to if both DBS East and DBS West are built together.

14.6.1.2.2 DBS West in Isolation

109. Should only DBS West in isolation be developed, this would result both in a greater area of available sea room able to be utilised, and fewer routes requiring a deviation; two route deviations would be necessary compared to five for DBS East and DBS West together. Therefore, it is expected that the frequency of occurrence would decrease compared to if both DBS East and DBS West are built together, especially for those vessels transiting further west. For example, as Routes 4 and 10 transit through DBS East, vessels on this route would not be required to deviate.

14.6.1.3 Significance of Effect – DBS East and DBS West Together

110. The frequency of occurrence, severity of consequence, and resulting significance of effect resulting from vessel displacement and third-party collision risk for DBS East and DBS West together, is presented in **Table 14-11**.

Table 14-11 Significance of Effect for Vessel Displacement and Third-Party Collision Risk of DBS East and West Together

Scenario	Phase	Worst Case Consequences	Frequency of Occurrence	Severity of Consequence	Significance of Effect
DBS East and West together	Construction	Displacement with effects on schedule and collision incident occurs with vessel damage, PLL, and/or pollution.	Reasonably Probable	Moderate	Tolerable
	Operations and maintenance		Reasonably Probable	Moderate	Tolerable
	Decommissioning		Reasonably Probable	Moderate	Tolerable

14.6.1.3.1 Mitigation and residual significance of effect

111. An additional mitigation measure has been identified relevant to this impact: consultation should be undertaken with Regular Operators including DFDS Seaways to allow further consideration of any adverse weather routeing in the region. With this additional mitigation implemented, the residual significance of effect is Tolerable with mitigation.

14.6.1.4 Significance of Effect – DBS East or DBS West in Isolation

112. The frequency of occurrence, severity of consequence, and resulting significance of effect resulting from vessel displacement and third-party collision risk for DBS East and DBS West in isolation, is presented in **Table 14-12**.

Table 14-12 Significance of Effect for Vessel Displacement and Third-Party Collision Risk of DBS East and West in Isolation

Scenario	Phase	Worst Case Consequences	Frequency of Occurrence	Severity of Consequence	Significance of Effect
DBS East in isolation	Construction	Displacement with effects on schedule and collision incident occurs with vessel damage, PLL, and/or pollution.	Reasonably Probable	Moderate	Tolerable
	Operations and maintenance		Reasonably Probable	Moderate	Tolerable
	Decommissioning		Reasonably Probable	Moderate	Tolerable
DBS West in isolation	Construction		Remote	Moderate	Tolerable
	Operations and maintenance		Remote	Moderate	Tolerable
	Decommissioning		Remote	Moderate	Tolerable

14.6.1.4.1 Mitigation and residual significance of effect

113. An additional mitigation measure has been identified relevant to this impact: consultation should be undertaken with Regular Operators including DFDS Seaways to allow further consideration of any adverse weather routeing in the region. With this additional mitigation implemented, the residual significance of effect is Tolerable with mitigation.

14.6.2 Impact 2 Increased Vessel to Vessel Collision Risk Between a Third-Party Vessel and a Project Vessel (All Phases)

114. The presence of vessels associated with construction, operations and maintenance, and decommissioning activities may result in increased risk of a collision between a third-party vessel and a project vessel.

14.6.2.1 DBS East and West Together – All Receptors

115. The construction/decommissioning phases may last for up to seven years with up to 11,489 return trips by construction vessels made throughout the construction phase, including vessels Restricted in Ability to Manoeuvre (RAM). It is assumed that construction vessels will be on-site throughout the construction phase. The operations and maintenance phase may last for up to 32 years (for the sequential build out scenario) with up to 473 annual return trips by operations and maintenance vessels made throughout this period.

116. From historical incident data, there have been two instances of a third-party vessel colliding with a project vessel associated with a UK offshore wind farm. In both incidents moderate vessel damage was reported with no harm to persons. It is noted that the two incidents occurred in 2011 and 2012, and awareness of offshore wind farm developments and the application of the measures outlined below has improved or been refined considerably in the interim, with no further collision incidents reported since.

117. Project vessel movements will be managed by the Applicants marine coordination and any associated procedures implemented will account for those areas where collision risk is assessed as greatest (where regular commercial routeing passes close to the arrays). Additionally, project vessels will carry AIS and be compliant with Flag State regulations including IMO conventions such as the COLREGs, and information for fishing vessels will be promulgated through ongoing liaison with fishing fleets via an appointed FLO.

118. Furthermore, an application for safety zones of 500m will be sought during the construction phase. These will serve to protect project vessels engaged in construction activities associated with surface piercing structures. Minimum advisory passing distances, as defined by a risk assessment, may also be applied, with advanced warning and accurate locations of both safety zones and any minimum advisory passing distances provided by Notifications to Mariners and Kingfisher Bulletins.

119. Also, the Projects will exhibit lights, marks, sounds, signals and other aids to navigation as required by Trinity House and MCA, including the buoyed construction/decommissioning area. These navigational aids will further maximise mariner awareness when in proximity, both in day and night conditions including in poor visibility.

120. Third-party vessels may experience restrictions on visually identifying project vessels entering and exiting the array during reduced visibility; however, this impact will be mitigated by the application of the COLREGs (reduced speeds) in adverse weather conditions and AIS carriage by project vessels.

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

122. Should an encounter develop into a collision incident, the most likely consequences will be similar to that outlined for the case of a collision between two third-party vessels. As an unlikely worst case, one of the vessels could founder resulting in PLL and pollution, with this outcome more likely where one of the vessels is a small craft (e.g., fishing vessel, recreational vessel or CTV). If pollution were to occur in proximity to the Projects or involving a project vessel, then the Marine Pollution Contingency Plan (MPCP) will be implemented to minimise the environmental effects.

14.6.2.1.1 Frequency of Occurrence

123. The frequency of occurrence of effects due to increased third-party with project vessel collision risk is **negligible** for the construction/decommissioning phases and **negligible** for the operations and maintenance phase.

14.6.2.1.2 Severity of Consequence

124. The severity of consequence of effects due to increased third-party with project vessel collision risk is **serious** for the construction/decommissioning phases and **serious** for the operations and maintenance phase.

14.6.2.2 DBS East or DBS West In Isolation – All Receptors

125. Should only one DBS array area in isolation be developed, it would result in fewer project vessels being on-site for all phases, leading to fewer encounter opportunities. Additionally, more sea room would be available for third-party vessels to navigate and maintain a safe passing distance from project vessels. As a result, the likelihood of a collision would be lower than if both sites were to be built together.

14.6.2.3 Significance of Effect – DBS East and DBS West Together

126. The frequency of occurrence, severity of consequence, and resulting significance of effect resulting from increased third-party with project vessel collision risk for DBS East and DBS West together, is presented in **Table 14-13.**

Table 14-13 Significance of Effect for Increased Third-Party with Project Vessel Collision Risk of DBS East and West Together

Scenario	Phase	Worst Case Consequences	Frequency of Occurrence	Severity of Consequence	Significance of Effect
DBS East and West together	Construction	Collision incident occurs with vessel damage, PLL, and/or pollution.	Negligible	Serious	Broadly Acceptable
	Operations and maintenance		Negligible	Serious	Broadly Acceptable
	Decommissioning		Negligible	Serious	Broadly Acceptable

14.6.2.3.1 Mitigation and residual significance of effect

127. No additional mitigation is proposed for this impact and therefore the residual significance of effect remains Broadly Acceptable.

14.6.2.4 Significance of Effect – DBS East and DBS West in Isolation

128. The frequency of occurrence, severity of consequence, and resulting significance of effect resulting from increased third-party with project vessel collision risk for DBS East and DBS West in isolation, is presented in Table **14-14**.

Table 14-14 Significance of Effect for Increased Third-Party with Project Vessel Collision Risk of DBS East and West in Isolation

Scenario	Phase	Worst Case Consequences	Frequency of Occurrence	Severity of Consequence	Significance of Effect
DBS East and West in isolation	Construction	Collision incident occurs with vessel damage, PLL, and/or pollution.	Negligible	Serious	Broadly Acceptable
	Operations and maintenance		Negligible	Serious	Broadly Acceptable
	Decommissioning		Negligible	Serious	Broadly Acceptable

14.6.2.4.1 Mitigation and residual significance of effect

129. No additional mitigation is proposed for this impact and therefore the residual significance of effect remains Broadly Acceptable.

14.6.3 Impact 3 Creation of Vessel to Structure Allision Risk (Operation and Maintenance Phase)

130. The presence of surface piercing structures during the operation and maintenance phase may result in the creation of a risk of allision for vessels.

14.6.3.1 DBS East and West Together – All Receptors

131. The main commercial route deviations and future case considerations described for the vessel displacement and collision risk impact (see section 14.6.1) have also been assumed for this impact, noting that internal navigation by commercial vessels is not anticipated. However, commercial fishing vessels and recreational vessels may choose to navigate internally within the arrays, particularly in favourable weather conditions.

132. The presence of new surface structures introduces new allision risk which can be considered across three forms, all of which are localised in nature given that a vessel must be in close proximity to a structure for an allision incident to occur:

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

14.6.3.1.1 Powered Allision Risk

133. 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 an RNLI lifeboat attending on each occasion.

134. Vessels are expected to comply with international flag state regulations (including the COLREGs and SOLAS) and will be able to effectively passage plan a route which minimises effects given the promulgation of information relating to the Projects including the charting of infrastructure on relevant nautical charts and the use of safety zones (for major maintenance). On approach, the operational lighting and marking of the arrays will also assist in maximising marine awareness and project vessels may alert a vessel on a closing approach with a structure as required.

135. Should a powered allision incident occur, the consequences will depend on multiple factors including the energy of the allision, 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 impact given the size and likely hull material of the small craft.

136. With consideration for lesson 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, the vessel could allide with a platform, resulting in foundering with PLL and pollution.

14.6.3.1.2 Drifting Allision Risk

137. A vessel adrift may only develop into an allision situation if in proximity to a wind farm structure. This is only the case where the adrift vessel is located internally within or in close proximity to the array and the direction of the wind and/or tide directs the vessel towards a structure.

138. Based on historical incident data, there have been no instances of a third-party vessel alliding with an operational wind farm structure whilst Not Under Command (NUC).

139. Should a vessel drift towards a structure, there are outcomes other than an allision incident which are more likely. A powered vessel may regain power prior to reaching the arrays (by rectifying any fault). Failing this, the vessel's emergency response procedures would be implemented – this may include an emergency anchoring event following a check of the relevant nautical charts to ensure the deployment of the anchor will not lead to other impacts (such as anchor snagging on a sub-sea cable or pipeline).

140. Should a drifting allision occur, the consequences will be similar to those noted for the case of a powered allision, including the determining factors. However, a drifting vessel is likely to transit at a reduced speed compared to a powered vessel, thus reducing the allision energy and the likelihood of the worst case consequences arising.

141. The platforms again carry increased allision risk and consequences due to their greater size and resistant force, although this may again be mitigated by effective use of operational lighting and marking in accordance with requirements from Trinity House and MCA.

14.6.3.1.3 Internal Allision Risk

142. As noted previously, based on experience at existing operational offshore wind farms, it is anticipated that:

- Commercial vessels will choose not to navigate internally within the arrays;
- Fishing vessels may choose to navigate internally within the arrays, particularly in summer months; and
- Recreational vessels are unlikely to choose to navigate internally within the arrays.

143. Therefore, the likelihood of an internal allision involving a commercial vessel is anticipated to be negligible.

144. Since the non-full build out array layout incorporates the minimum spacing between structures of 830m, it is considered for this element of the impact. However, a minimum spacing of 830m is considered sufficient for safe internal navigation, allowing vessels to keep clear of the wind farm structures. This spacing is similar to many other consented offshore wind farms in the UK (Dogger Bank A and Dogger Bank B were consented with a minimum spacing of 700m (Forewind, 2013)) and is slightly greater than the minimum spacing at some consented offshore wind farms where evidence suggests that fishing vessels are comfortable operating internally in favourable conditions. Layout plans will be agreed with MMO, post-consent, following appropriate consultation with Trinity House and the MCA, and a safety justification for a SLoO layout will be completed should this be taken forward.

145. As with any passage, any vessel navigating within the array is expected to passage plan in accordance with SOLAS Chapter V (IMO, 1974) and promulgation of information including through ongoing liaison with fishing fleets via an appointed FLO will ensure that such vessels have good awareness of any maintenance works being undertaken. This includes the placement of safety zones of 500m radius which will be applied for around major maintenance activities which itself will assist safe navigation internally within the arrays by guiding vessels on a safe passing distance.

146. The Projects will exhibit lights, marks, sounds, signals and other aids to navigation as required by Trinity House, MCA and CAA. This will include unique identification marking of each wind farm structure in an easily understandable pattern to minimise the likelihood of a mariner navigating internally within the array becoming disoriented.

147. Should a recreational vessel under sail enter the proximity of a wind turbine, 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 wind turbines do reduce wind velocity downwind of a wind turbine (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.

148. For recreational vessels with a mast there is an additional allision risk when navigating internally within the array associated with the wind turbine blades. However, the minimum blade tip clearance is 34m above MSL which is above and beyond the minimum 22m clearance above Mean High Water Springs (MHWS) the RYA recommend for minimising allision risk (RYA, 2019) and which is also noted in MGN 654.

149. Should an internal allision occur, the consequences will be similar to those noted for the case of a powered allision, including the determining factors. However, as with a drifting allision, the speed at which the contact occurs will likely be lower than for an external allision, resulting in reduced allision energy and a reduced likelihood of the worst case consequences arising.

14.6.3.1.4 Frequency of Occurrence

150. The frequency of occurrence of effects due to creation of vessel to structure allision risk is **extremely unlikely** for the operations and maintenance phase.

14.6.3.1.5 Severity of Consequence

151. The severity of consequence of effects due to creation of vessel to structure allision risk is **serious** for the operations and maintenance phase.

14.6.3.2 DBS East or DBS West In Isolation – All Receptors

152. Allision risk is heavily dependent upon the number of surface piercing structures. Therefore, should only one DBS array area in isolation be installed then the likelihood of an allision incident will be reduced. As DBS West has fewer routes passing in close proximity, it is likely that it will have less exposure than DBS East.

14.6.3.3 Significance of Effect – DBS East and DBS West Together

153. The frequency of occurrence, severity of consequence, and resulting significance of effect resulting from creation of vessel to structure allision risk for DBS East and DBS West together, is presented in **Table 14-15**.

Table 14-15 Significance of Effect for Creation of Vessel to Structure Allision Risk of DBS East and West Together

Scenario	Phase	Worst Case Consequences	Frequency of Occurrence	Severity of Consequence	Significance of Effect
DBS East and West together	Operations and maintenance	Allision incident occurs with a platform with the vessel foundering, PLL, and/or pollution.	Extremely unlikely	Serious	Tolerable

14.6.3.3.1 Mitigation and residual significance of effect

154. No additional mitigation is proposed for this impact and therefore the residual significance of effect remains Tolerable.

14.6.3.4 Significance of Effect – DBS East or DBS West in Isolation

155. The frequency of occurrence, severity of consequence, and resulting significance of effect resulting from creation of vessel to structure allision risk for DBS East and DBS West in isolation, is presented in **Table 14-16**.

Table 14-16 Significance of Effect for Creation of Vessel to Structure Allision Risk of DBS East and West in Isolation

Scenario	Phase	Worst Case Consequences	Frequency of Occurrence	Severity of Consequence	Significance of Effect
DBS East and West in isolation	Operations and maintenance	Allision incident occurs with a platform with the vessel foundering, PLL, and/or pollution.	Negligible	Serious	Broadly Acceptable

14.6.3.4.1 Mitigation and residual significance of effect

156. No additional mitigation is proposed for this impact and therefore the residual significance of effect remains Broadly Acceptable.

14.6.4 Impact 4 Reduction of Under-Keel Clearance due to Cable Protection (Operation and Maintenance Phase)

157. The presence of cable protection associated with the array cables may result in reductions to water depth and the creation of an under-keel clearance risk for vessels.

14.6.4.1 DBS East and West Together – All Receptors

158. For the array, inter platform, and export cables the indicative target burial depth is between 0.5 and 1m. Seabed burial will be the primary means of cable burial and the burial depth of any external cable protection will be determined by the cable burial risk assessment.

159. Where cable burial is not possible, alternative cable protection methods may be deployed which will be determined within the cable burial risk assessment. It is noted that there are up to 40 cable or pipeline crossings anticipated for the array cables, up to six cable or pipeline crossings anticipated for the inter platform cables, and up to 12 cable or pipeline crossings anticipated for the offshore export cables. The Applicant intends to follow the guidance contained in MGN 654 in relation to cable protection, namely that cable protection will not change the charted water depth by more than 5%. This aligns with the RYA's recommendation that the "*minimum safe under keel clearance over submerged structures and associated infrastructure should be determined in accordance with the methodology set out in MGN 543 [since superseded by MGN 654]*" (RYA, 2019). With this guidance adhered to, the likelihood of an underwater allision is considered very low.

160. Should this percentage be exceeded, further assessment including consultation with the MCA and Trinity House may be required to determine whether any additional mitigation measures (e.g., post consent lighting and marking, charting, etc.) are necessary to ensure the safety of navigation.

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

14.6.4.1.1 Frequency of Occurrence

162. The frequency of occurrence of effects due to reduction of under-keel clearance is **extremely unlikely** for the operations and maintenance phase.

14.6.4.1.2 *Severity of Consequence*

163. The severity of consequence of effects due to reduction of under-keel clearance is **minor** for the operations and maintenance phase.

14.6.4.2 DBS East and DBS West In Isolation – All Receptors

164. Under keel clearance risk is heavily dependent upon the number of cables installed and cable burial method used. Therefore, should only one DBS array area in isolation be installed, then the likelihood of an incident relating to reduced under-keel clearance will be reduced. However, it is acknowledged that the sub-sea footprint within the offshore export cable corridor may not be substantially different and so the lower likelihood of an incident relating to under keel clearance may be applicable to the array cables only.

14.6.4.3 Significance of Effect – DBS East and DBS West Together

165. The frequency of occurrence, severity of consequence, and resulting significance of effect resulting from reduction of under-keel clearance for DBS East and DBS West together, is presented in **Table 14-17**.

Table 14-17 Significance of Effect for Reduction of Under-Keel Clearance of DBS East and West Together

Scenario	Phase	Worst Case Consequences	Frequency of Occurrence	Severity of Consequence	Significance of Effect
DBS East and West together	Operations and maintenance	Grounding incident occurs with the vessel foundering, PLL, and/or pollution.	Extremely unlikely	Minor	Broadly Acceptable

14.6.4.3.1 *Mitigation and residual significance of effect*

166. No additional mitigation is proposed for this impact and therefore the residual significance of effect remains Broadly Acceptable.

14.6.4.4 Significance of Effect – DBS East and DBS West in Isolation

167. The frequency of occurrence, severity of consequence, and resulting significance of effect resulting from reduction of under-keel clearance for DBS East and DBS West in isolation, is presented in **Table 14-18**.

Table 14-18 Significance of Effect for Reduction of Under-Keel Clearance of DBS East and West in Isolation

Scenario	Phase	Worst Case Consequences	Frequency of Occurrence	Severity of Consequence	Significance of Effect
DBS East and West in isolation	Operations and maintenance	Grounding incident occurs with the vessel foundering, PLL, and/or pollution.	Extremely unlikely	Minor	Broadly Acceptable

14.6.4.4.1 Mitigation and residual significance of effect

168. No additional mitigation is proposed for this impact and therefore the residual significance of effect remains Broadly Acceptable.

14.6.5 Impact 5 Anchor Interaction with Sub-sea Cables (Operation and Maintenance Phase)

169. Presence of export cables, array cables, and inter-platform cables in the offshore environment may increase the potential for anchor interaction.

14.6.5.1 DBS East and West Together – All Receptors

170. Up to 350nm of array cables may be located within the array areas alongside up to 208nm of inter-platform cables. Up to 598nm of offshore export cables may be located within the offshore export cable corridor. Where available, the primary means of cable protection will be by seabed burial, with a target burial depth of between 0.5 and 1m for all sub-sea cables. Indicatively, up to 20% of all sub-sea cables may require alternative cable protection with a height (including for crossings) of 1.0m for array cables and 1.4m for inter-array and offshore export cables. The burial depth will be informed by the cable burial risk assessment.

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

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

172. Since the array cables will be fully contained within the array areas, it is considered unlikely that a vessel will choose to anchor in close proximity to an array cable due to the distance offshore.

173. Unlike for the array cables, the export cables may be crossed frequently by vessels on passage following the UK east coast. Given that an interaction risk exists only where the anchoring occurs in proximity to a sub-sea cable, the impact is local in nature and has a short temporal overlap – vessels enroute will be located over the export cables for only a short period of time. From the vessel traffic data, anchoring activity within and in proximity to the offshore export cable corridor was limited, with one instance of a vessel anchoring recorded approximately 1.4nm south of the offshore export cable corridor. There are no charted anchorage areas located in proximity to the offshore export cable corridor.

174. It is anticipated that the charting of infrastructure including all sub-sea cables will inform the decision to anchor, as per Regulation 34 of SOLAS (IMO, 1974). This includes in an emergency situation with general feedback from mariners indicating that even where time for decision-making is limited a key priority for the bridge crew whilst the anchor is being readied would be to check charts.

175. Anchor dragging features a relatively wider extent than planned or unplanned anchoring. However, from the vessel traffic data, the likelihood of a vessel dragging anchor close enough to interact with a sub-sea cable is very low. In such a circumstance, it is likely that the anchor dragging will be stopped prior to any interaction with a sub-sea cable becoming possible.

176. The most likely consequences in the event of a vessel anchoring over an array cable is that no interaction occurs given the protection applied to the cable (by burial or other means). Should an interaction occur, historical incident data suggests that the consequences would be negligible, with no damage caused to the vessel or sub-sea cable. As a worst case, a snagging incident could occur to a commercial fishing vessel with damage caused to the anchor and/or the cable, compromising the stability of the vessel.

14.6.5.1.1 Frequency of Occurrence

177. The frequency of occurrence of effects due to anchor interaction with sub-sea cables is **extremely unlikely** for the operations and maintenance phase.

14.6.5.1.2 Severity of Consequence

178. The severity of consequence of effects due to anchor interaction with sub-sea cables is **minor** for the operations and maintenance phase.

14.6.5.2 DBS East or DBS West In Isolation

179. Anchor interaction risk is heavily dependent upon the number and length of sub-sea cables installed. Therefore, should only one DBS array area in isolation be installed then the likelihood of an anchor interaction incident will be reduced. However, it is acknowledged that the sub-sea footprint within the offshore export cable corridor may not be substantially different and so the lower likelihood of an anchor interaction incident may be applicable to the array cables only.

14.6.5.3 Significance of Effect – DBS East and DBS West Together

180. The frequency of occurrence, severity of consequence, and resulting significance of effect resulting from anchor interaction with sub-sea cables for DBS East and DBS West together, is presented in **Table 14-19**.

Table 14-19 Significance of Effect for Anchor Interaction with Sub-sea Cables of DBS East and West Together

Scenario	Phase	Worst Case Consequences	Frequency of Occurrence	Severity of Consequence	Significance of Effect
DBS East and West together	Operations and maintenance	Anchor snagging incident occurs with anchor and/or cable damage and compromised vessel stability.	Extremely unlikely	Minor	Broadly Acceptable

14.6.5.3.1 Mitigation and residual significance of effect

181. No additional mitigation is proposed for this impact and therefore the residual significance of effect remains Broadly Acceptable.

14.6.5.4 Significance of Effect – DBS East and DBS West in Isolation

182. The frequency of occurrence, severity of consequence, and resulting significance of effect resulting from anchor interaction with sub-sea cables for DBS East and DBS West in isolation, is presented in **Table 14-20**.

Table 14-20 Significance of Effect for Anchor Interaction with Sub-sea Cables of DBS East and West in Isolation

Scenario	Phase	Worst Case Consequences	Frequency of Occurrence	Severity of Consequence	Significance of Effect
DBS East and West in isolation	Operations and maintenance	Anchor snagging incident occurs with anchor and/or cable damage and compromised vessel stability.	Extremely unlikely	Minor	Broadly Acceptable

14.6.5.4.1 Mitigation and residual significance of effect

183. No additional mitigation is proposed for this impact and therefore the residual significance of effect remains Broadly Acceptable.

14.6.6 Impact 6 Reduction of Emergency Response Capability (Including SAR Access) (Operation and Maintenance Phase)

184. The presence of surface structures and operation and maintenance activities associated with the Projects may result in an increased likelihood of an incident occurring which requires an emergency response and may reduce access for surface and air responders, including SAR assets.

14.6.6.1 DBS East and West Together – All Receptors

14.6.6.1.1 Emergency Response Resources

185. The operation and maintenance phase may last for up to 32 years (for the sequential build out scenario) with up to 19 operation and maintenance vessels located on-site simultaneously and making up to 473 annual round trips. With a full build out of the array areas, these vessels will increase the likelihood of an incident requiring an emergency response and subsequently increase the likelihood of multiple incidents occurring simultaneously, diminishing emergency response capability.

186. There are various emergency response resources serving the region, including RNLI stations (closest at Flamborough approximately 55nm to the south-west) and SAR helicopter bases (closest at Humberside approximately 83nm to the south-west). Given the distances which would be travelled in the event of an emergency response incident in proximity to the DBS array areas, this impact covers a regional spatial extent.

187. From historical incident data, there is a low rate of incidents in the region, with the likelihood of an incident relating to the Projects occurring at the same time being unlikely. Additionally, based on the number of collision and allision incidents[2] associated with UK offshore wind farms reported to date, there is an average of one incident per 1,508 operational wind turbine years (as of December 2022). Therefore, the Projects are not expected to result in a marked increase in the frequency of incidents requiring an emergency response.

188. Additionally, should an incident occur in proximity to the DBS array areas, it is likely that a project vessel (either for the Projects or the other Dogger Bank offshore wind farm developments) would be well equipped to assist under SOLAS obligations (IMO, 1974) and in liaison with the MCA, most likely as the first responder given the distance offshore. This is reflected in past experience, with 12 known instances of a vessel (or persons on a vessel) being assisted by an industry vessel for a nearby UK offshore wind farm.

189. The most likely consequences in the event of an incident in the region requiring an emergency response is that emergency responders are able to assist without any limitations on capability. As a worst case, there could be a delay to a response request due to a simultaneous incident associated with the Projects leading to PLL, pollution, and vessel damage. However, this worst case scenario is highly unlikely.

14.6.6.1.2 Search and Rescue Access

190. With a full build out of the DBS array areas, its physical presence may restrict access for SAR responders, either due to the incident in question occurring within the arrays or the arrays obstructing the most effective path to an incident (likely further offshore). This is more likely to be an issue in adverse weather conditions. The Applicant is committed to working within the parameters of MGN 654 to minimise impacts.

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[2] Although other types of incidents are acknowledged, collision and allision incidents have the potential to be among the most serious and give a reasonable indication of the rate of incidents requiring an emergency response.

191. From recent SAR helicopter taskings data, the frequency of UK SAR operations in proximity to the array areas is moderate, with incidents reported primarily occurring related to the Cygnus platforms. Due to the Cygnus platforms being further offshore, it is likely that SAR access may be hindered by the array areas due to the necessity of a longer flight path. However, the possibility remains of a SAR responder being able to fly over the array areas altogether, particularly in suitable weather conditions. Consideration of third-party helicopter access to/from oil and gas platforms is given in **Chapter 15 Aviation and Radar**.

192. The total area covered by the DBS array areas is approximately 288nm^2, which represents a relatively large area to search compared to other offshore wind farms. It is unlikely that a SAR operation will require the full extent of both DBS array areas to be searched; it is much more likely that a search could be restricted to a specific portion of the DBS array areas depending upon the information available regarding the casualty location (inclusive of any assumptions on the drift of the casualty).

193. When considering the non-full build out array layout, the minimum spacing between all structures of 830m is similar to many other consented offshore wind farms in the UK (Dogger Bank A and Dogger Bank B were consented with a minimum spacing of 700m (Forewind, 2013)). The array layout includes a SLoO and a safety justification for a SLoO layout will be completed should this be taken forward, including consideration of accessibility for SAR operations.

194. More fully, a layout plan will be agreed with the MMO following appropriate consultation with Trinity House and the MCA, with the final array layout agreed with the MCA and Trinity House post consent. However, the final array layout will be compliant with the requirements of MGN 654 (MCA, 2021), including:

- Safety justification for a SLoO (if taken forward);
- Inclusion of Helicopter Refuge Areas (HRA) as deemed necessary;
- Completion of a SAR Checklist;
- Completion of an Emergency Response Cooperation Plan (ERCoP); and
- Application of unique identification marking of structures in an easily identifiable pattern.

195. The SAR Checklist and ERCoP will remain live documents throughout the operation and maintenance phase.

196. The most likely consequences in the event of a SAR operation is that SAR assets are able to fulfil their objectives without any limitations on capability. As a worst case, it may not be possible to undertake an effective search. However, given compliance with MGN 654 for the final array layout, this is considered highly unlikely.

14.6.6.1.3 Existing Aids to Navigation

197. An indirect pathway to increasing the likelihood of an incident occurring which requires an emergency response is an impact upon use of existing aids to navigation due to the presence of the Projects.

198. There are no existing aids to navigation located within the DBS array areas or offshore export cable corridor. Additionally, the closest aids to navigation to the DBS array areas are the construction buoyage for Dogger Bank A which is expected to be removed by the operations and maintenance phase. Therefore, this element of the impact is not considered notable.

14.6.6.1.4 Frequency of Occurrence

199. The frequency of occurrence of effects due reduction of emergency response capability is **extremely unlikely** for the operations and maintenance phase.

14.6.6.1.5 Severity of Consequence

200. The severity of consequence of effects due reduction of emergency response capability is **moderate** for the operations and maintenance phase.

14.6.6.2 DBS East and DBS West In Isolation – All Receptors

201. Should only one DBS array area in isolation be constructed, this may allow for easier SAR access to the Cygnus field, particularly if it is DBS West. In this case a direct flight path would still be able to be maintained - construction of solely DBS East in isolation would still result in a direct flight path being obstructed by the array. Fewer wind turbines would also allow for emergency responders to locate incidents more efficiently within the array and create more unoccupied sea room. In addition, construction of one site would lead to fewer on-site project vessels, reducing the likelihood that an incident would occur requiring emergency response.

14.6.6.3 Significance of Effect – DBS East and DBS West Together

202. The frequency of occurrence, severity of consequence, and resulting significance of effect resulting from reduction of emergency response capability for DBS East and DBS West together, is presented in **Table 14-21**.

Table 14-21 Significance of Effect for Reduction of Emergency Response Capability of DBS East and West Together

Scenario	Phase	Worst Case Consequences	Frequency of Occurrence	Severity of Consequence	Significance of Effect
DBS East and West in isolation	Operations and maintenance	Delay to a response request and inability to undertake an effective search leading to vessel damage, PLL, and pollution.	Extremely unlikely	Moderate	Broadly Acceptable

14.6.6.3.1 Mitigation and residual significance of effect

203. No additional mitigation is proposed for this impact and therefore the residual significance of effect remains Broadly Acceptable.

14.6.6.4 Significance of Effect – DBS East and DBS West in Isolation

204. The frequency of occurrence, severity of consequence, and resulting significance of effect resulting from reduction of emergency response capability for DBS East and DBS West in isolation, is presented in **Table 14-22**.

Table 14-22 Significance of Effect for Reduction of Emergency Response Capability of DBS East and West in Isolation

Scenario	Phase	Worst Case Consequences	Frequency of Occurrence	Severity of Consequence	Significance of Effect
DBS East and West in isolation	Operations and maintenance	Delay to a response request and inability to undertake an effective search leading to vessel damage, PLL, and pollution.	Extremely unlikely	Moderate	Broadly Acceptable

14.6.6.4.1 Mitigation and residual significance of effect

205. No additional mitigation is proposed for this impact and therefore the residual significance of effect remains Broadly Acceptable.

14.7 Potential Monitoring Requirements

206. Monitoring requirements will be described in the In-Principle Monitoring Plan (IPMP) submitted alongside the DCO application and further developed and agreed with stakeholders prior to construction based on the IPMP and taking account of the final detailed design of the Projects.

207. The DCO will require vessel traffic monitoring to be undertaken. This will be undertaken for the duration of the construction phase and during the first three years of the operation and maintenance phase.

14.8 Preliminary Assessment of Cumulative Effects

208. As detailed in section 14.4.4, this section presents a preliminary assessment of cumulative effects in relation to shipping and navigation. The final CEA will be undertaken within the ES chapter.

14.8.1 Initial Screening for Cumulative Effects

209. **Table 14-23** details the potential cumulative effects that may occur between the Projects and other plans, projects and activities.

Table 14-23 Potential Cumulative Effects

Impact	Potential for Cumulative Effects	Data Confidence	Rationale
Construction			
Impact 1: Vessel displacement and increased vessel to vessel collision risk between third-party vessels	Yes	High	Presence of other plans, projects and activities may further reduce available sea room, increasing displacement and potentially increasing subsequent collision risk.
Impact 2: Increased vessel to vessel collision risk between a third-party vessel and a project vessel	Yes	High	Presence of project vessels associated with other plans, projects and activities may result in additional collision risk.
Operation & Maintenance			
Impact 1: Vessel displacement and increased vessel to vessel collision risk between third-party vessels	Yes	High	Presence of other plans, projects and activities may further reduce available sea room, increasing displacement and potentially increasing subsequent collision risk.
Impact 2: Increased vessel to vessel collision risk between a third-party vessel and a project vessel	Yes	High	Presence of project vessels associated with other plans, projects and activities may result in additional collision risk.

Impact	Potential for Cumulative Effects	Data Confidence	Rationale
Impact 3: Creation of vessel to structure allision risk	No	High	Localised impact which requires other plans, projects and activities to be located in proximity to the Projects (noting that Dogger Bank A is considered as part of the in isolation assessment - see section 14.8.2).
Impact 4: Reduction of under-keel clearance due to cable protection	Yes	High	Presence of cable protection associated with other plans, projects and activities may result in additional underwater allision risk, particularly where there are crossings.
Impact 5: Anchor interaction with sub-sea cables	Yes	High	Presence of sub-sea cables associated with other plans, projects and activities may result in additional underwater allision risk.
Impact 6: Reduction of emergency response capability (including SAR access)	Yes	High	Presence of other plans, projects and activities may further reduce emergency response capability.
Decommissioning			
Impact 1: Vessel displacement and increased vessel to vessel collision risk between third-party vessels	Yes	High	Presence of other plans, projects and activities may further reduce available sea room, increasing displacement and potentially increasing subsequent collision risk.

Impact	Potential for Cumulative Effects	Data Confidence	Rationale
Impact 2: Increased vessel to vessel collision risk between a third-party vessel and a project vessel	Yes	High	Presence of project vessels associated with other plans, projects and activities may result in additional collision risk.

14.8.2 Plans/Projects Considered for Cumulative Impacts

210. A high-level list of plans/projects that may result in cumulative effects with the Projects is detailed in Table 14-24. For shipping and navigation, a search distance of up to 50nm from the offshore development area has been used to determine the initial list of projects considered for the CEA.

211. The types of projects and distances considered are as follows:

- Offshore wind farms – up to 50nm from the DBS array areas and up to 5nm from the offshore export cable corridor;
- Oil and gas infrastructure – up to 10nm from the DBS array areas and up to 5nm from the offshore export cable corridor;
- Marine aggregate dredging areas – up to 25nm from the DBS array areas and up to 5nm from the offshore export cable corridor; and
- Sub-sea cables – up to 2nm from the DBS array areas and up to 2nm from the offshore export cable corridor.

212. Plans/projects have been assigned a tier level between 1 and 3, based on status, distance from the offshore development area, interaction with main commercial routes passing within 1nm of the DBS array areas, consultation, and data confidence. For the full CEA at ES, this high-level list will be reviewed and screened to ensure all relevant plans/projects are considered in the final assessment. All listed plans/projects will be re-examined at ES to ensure each assigned tier remains accurate at the time of writing.

213. Where a project/plan is already in situ (including offshore wind farms under construction[3]) the cumulative assessment considers them to be part of the baseline conditions for the surrounding area. As such, it is not expected that the Projects will contribute to cumulative effects with such projects/plans, and therefore these have not been the subject of further assessment.

Table 14-24 High-Level List of Plans/Projects Screened For Further Assessment in the Full CEA

Tier	Plan / Project	Distance to Offshore Development Area (nm)
Offshore Wind Farms		
1	Dogger Bank C[4]	30
1	Hornsea Project Three	25
1	Sofia	18
2	Hornsea Project Four	12
3	Outer Dowsing	44

[3] For shipping and navigation assessment, an offshore wind farm is deemed to be under construction where offshore works are ongoing and a buoyed construction area is in situ for the array.
[4] It is acknowledged that Dogger Bank C will not be built out in full and the remainder of the Dogger Bank C array area is being developed separately as 'Dogger Bank D'. This new development will be monitored at the ES stage, and Dogger Bank D added to the cumulative screening if deemed appropriate.

14.9 Transboundary Effects

214. Given the international nature of routeing by commercial vessels – particularly in the region containing the Projects given the central position within the North Sea – the potential for a transboundary effect relating to the displacement of commercial vessels undertaking international voyages has been identified.

215. Since the use of AIS transceivers (the primary data source for characterisation of commercial vessel movements) is international, the characterisation of the existing environment in section 14.5 is suitable for identifying relevant other EEAs. Other EEAs with port(s) which feature in the main commercial routes include the Netherlands, Sweden, Poland, Denmark, Iceland, and the Faroe Islands.

216. Since such international commercial routeing is captured in the existing environment, the environmental assessment for the Projects in isolation suitably considers this effect in transboundary terms, with no likely significant transboundary effects. The assessment of the Projects cumulatively with other future projects and plans to be considered in the ES stage.

14.10 Interactions

217. The effects identified and assessed in this chapter have the potential to interact with each other. The areas of potential interaction between effects are presented in **Table 14-25**.

218. The worst case impacts assessed for shipping and navigation account for these potential interactions for each phase, where appropriate. Therefore, the assessment of significance is considered conservative and robust the levels of significance of effect identified in section 14.6 are not further increased.

Table 14-25 Interactions Between Impacts - Screening

Potential Interactions between Impacts		
Construction		
	Impact 1 Vessel Displacement and Increased Vessel to Vessel Collision Risk Between Third-Party Vessels	Impact 2 Increased Vessel to Vessel Collision Risk Between a Third-Party Vessel and a Project Vessel
Impact 1 Vessel Displacement and Increased Vessel to Vessel Collision Risk Between Third-Party Vessels		Yes
Impact 2 Increased Vessel to Vessel Collision Risk Between a Third-Party Vessel and a Project Vessel	Yes	
Operation		

Potential Interactions between Impacts						
	Impact 1 Vessel Displacement and Increased Vessel to Vessel Collision Risk Between Third-Party Vessels	Impact 2 Increased Vessel to Vessel Collision Risk Between a Third-Party Vessel and a Project Vessel	Impact 3 Creation of Vessel to Structure Allision Risk	Impact 4 Reduction of Under-Keel Clearance due to Cable Protection	Impact 5 Anchor Interaction with Sub-sea Cables	Impact 6 Reduction of Emergency Response Capability (Including SAR Access)
Impact 1 Vessel Displacement and Increased Vessel to Vessel Collision Risk Between Third-Party Vessels		Yes	Yes	No	No	Yes
Impact 2 Increased Vessel to Vessel Collision Risk Between a Third-Party Vessel and a Project Vessel	Yes		Yes	No	No	Yes
Impact 3 Creation of Vessel to Structure Allision Risk	Yes	Yes		No	Yes	Yes
Impact 4 Reduction of Under-Keel Clearance due to Cable Protection	No	No	No		No	No

Potential Interactions between Impacts						
Impact 5 Anchor Interaction with Sub-sea Cables	No	No	Yes	No		Yes
Impact 6 Reduction of Emergency Response Capability (Including SAR Access)	Yes	Yes	Yes	No	Yes	

Decommissioning		
	Impact 1 Vessel Displacement and Increased Vessel to Vessel Collision Risk Between Third-Party Vessels	Impact 2 Increased Vessel to Vessel Collision Risk Between a Third-Party Vessel and a Project Vessel
Impact 1 Vessel Displacement and Increased Vessel to Vessel Collision Risk Between Third-Party Vessels		Yes
Impact 2 Increased Vessel to Vessel Collision Risk Between a Third-Party Vessel and a Project Vessel	Yes	

14.11 Inter-relationships

219. For shipping and navigation, potential inter-relationships between other topics are assessed within this PEIR including commercial fisheries and other users (oil and gas). A summary of the potential inter-relationships between shipping and navigation and commercial fisheries is provided in **Table 14-26**.

Table 14-26 Shipping and Navigation Inter-relationships

Topic and Description	Related Chapter	Where Addressed in this Chapter	Rationale
Construction			
Commercial Fisheries	Chapter 13		Displacement from fishing grounds for commercial fishing vessels due to the presence of the buoyed construction area.
Infrastructure and Other Users (oil and gas facilities)	Chapter 16		Reduction in localised marine access to existing and licenced oil and gas facilities due to the presence of partially constructed arrays.
Operation			
Infrastructure and Other Users (oil and gas facilities)	Chapter 16		Reduction in localised marine access to existing and licenced oil and gas facilities due to the presence of the arrays.
Decommissioning			
Commercial Fisheries	Chapter 13		Displacement from fishing grounds for commercial fishing vessels due to the presence of the buoyed decommissioning area.

Topic and Description	Related Chapter	Where Addressed in this Chapter	Rationale
Infrastructure and Other Users (oil and gas facilities)	Chapter 16		Reduction in localised marine access to existing and licenced oil and gas facilities due to the presence of partially decommissioned arrays.

14.12 Summary

220. This chapter has provided a characterisation of the existing environment for shipping and navigation based on both existing and site specific survey data. It has been established that the significance of effect is Broadly Acceptable or Tolerable for all impacts at the PEIR stage, which is not significant in EIA terms.

221. The effects of a potential impact relating to vessel displacement and increased vessel to vessel collision risk between third-party vessels has been assessed as Broadly Acceptable for all phases. This assessment will be informed post PEIR by collision risk modelling undertaken based on the pre and post wind farm main commercial routes and Regular Operator consultation.

222. The effects of a potential impact relating to increased vessel to vessel collision risk between a third-party vessel and a project vessel has been assessed as Broadly Acceptable for all phases.

223. The effects of a potential impact relating to the creation of vessel to structure allision risk has been assessed as Broadly Acceptable for DBS East and West in isolation and Tolerable for DBS East and West together. This assessment will be further informed post PEIR by allision risk modelling undertaken based on the post wind farm main commercial routes and the worst case array layout.

224. The effects of a potential impact relating to the reduction of under-keel clearance due to cable protection has been assessed as Broadly Acceptable.

225. The effects of a potential impact relating to anchor interaction with sub-sea cables has been assessed as Broadly Acceptable.

226. The effects of a potential impact relating to the reduction of emergency response capability (including SAR access) has been assessed as Broadly Acceptable.

227. The existing environment has not yet been established in relation to the potential platforms within the offshore export cable corridor. Therefore, no associated assessment of significance has been undertaken at the PEIR stage. Potential platforms within the offshore export cable corridor will be accounted for separately from the DBS array areas and offshore export cable corridor, as appropriate, in the assessment of significance at the ES stage. This assessment will be supported by site-specific surveys being undertaken between PEIR and ES to examine potential locations for offshore platforms within the offshore export cable corridor.

228. At the PEIR stage, the consultation effort is not yet complete. In particular, a Hazard Workshop with relevant stakeholders in which the impacts associated with the DBS array areas and offshore export cable corridor (including potential platforms) has not been undertaken. This will be undertaken at the ES stage with any feedback received considered when updating the assessment of significance.

229. Additionally, a full CEA will be provided in the final ES. The cumulative screening of developments presented in section 13 of **Appendix 14-1** will be reviewed at the ES stage and used to inform the CEA, including in relation to cumulative deviations of main commercial routes.

230. A full summary of additional steps required to inform the post PEIR assessment of significance is provided in section 18.5 of **Appendix 14-1**.

231. A summary of the assessment of significance at the PEIR stage is provided in **Table 14-27**.

Table 14-27 Summary of Potential Likely Significant Effects on Shipping and Navigation

Potential Impact	Receptor	Frequency of Occurrence	Severity of Consequence	Pre-Additional Mitigation Effect	Additional Mitigation Measures Proposed	Residual Effect
Construction						
Vessel displacement and increased vessel to vessel collision risk between third-party vessels	All vessels	Remote	Moderate	Tolerable	Consultation with Regular Operators	Broadly Acceptable
Increased vessel to vessel collision risk between a third-party vessel and a project vessel	All vessels	Negligible	Serious	Broadly Acceptable	None	–

Potential Impact	Receptor	Frequency of Occurrence	Severity of Consequence	Pre-Additional Mitigation Effect	Additional Mitigation Measures Proposed	Residual Effect
Operation						
Vessel displacement and increased vessel to vessel collision risk between third-party vessels	All vessels	Remote	Moderate	Tolerable	Consultation with Regular Operators	Broadly Acceptable
Increased vessel to vessel collision risk between a third-party vessel and a project vessel	All vessels	Negligible	Serious	Broadly Acceptable	None	–
Creation of vessel to structure allision risk	All vessels	Extremely Unlikely	Serious	Tolerable	None	–

Potential Impact	Receptor	Frequency of Occurrence	Severity of Consequence	Pre-Additional Mitigation Effect	Additional Mitigation Measures Proposed	Residual Effect
Reduction of under-keel clearance due to cable protection	All vessels	Extremely Unlikely	Minor	Broadly Acceptable	None	–
Anchor interaction with sub-sea cables	All vessels	Extremely Unlikely	Minor	Broadly Acceptable	None	–
Reduction of emergency response capability (including SAR access)	Emergency responders	Extremely Unlikely	Moderate	Broadly Acceptable	None	–

Potential Impact	Receptor	Frequency of Occurrence	Severity of Consequence	Pre-Additional Mitigation Effect	Additional Mitigation Measures Proposed	Residual Effect
Decommissioning						
Vessel displacement and increased vessel to vessel collision risk between third-party vessels	All vessels	Remote	Moderate	Tolerable	Consultation with Regular Operators	Broadly Acceptable
Increased vessel to vessel collision risk between a third-party vessel and a project vessel	All vessels	Negligible	Serious	Broadly Acceptable	None	–

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